

## Article

# The Determinants of Impulsive Buying Behavior in Electronic Commerce

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**Abstract:** Consumers' online impulsive buying behavior has become more and more frequent in the digital era. There is increasing concern regarding the adverse consequences that impulsive buying has generated for consumer wellbeing and the sustainability of our society and environment. In search of a way to decreasing impulsive consumption, this article proposes a comprehensive framework to explore the potential determinants of online impulsive buying behavior from the perspective of consumer characteristics grounded on the literature on sustainability, psychology and consumer behavior. Through an online survey, a total of 425 valid responses were obtained. Extroversion and neuroticism in personality, negative emotions, collectivism in culture and the cognitive and affective factors of impulsive buying tendency are found to be positively correlated with impulsive buying behavior, whereas self-control shows a negative impact on impulsive buying behavior. Furthermore, this study identifies the mediating roles that negative emotions and collectivism play. Specifically, in addition to the direct routes, neuroticism, self-control and the affective factor of impulsive buying tendency can indirectly influence impulsive buying behavior through the mediation of negative emotions, whereas extroversion can indirectly affect impulsive buying behavior with collectivism as the mediator. To conclude, theoretical and practical implications of this research are elaborated to promote sustainable consumption from both the micro and macro perspectives.

**Keywords:** electronic commerce; impulsive buying behavior; determinants; sustainable consumption



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## 1. Introduction

Overconsumption is classified as a severe ethical problem because of its harmful impact on the environment [1]. It is a major cause of the destruction of the natural environment in Western developed societies [2]. However, high consumption lifestyles have appeared together with increasing prosperity in the latest decades in China and India, where the corresponding sustainability issues have become evident [3]. Overconsumption has resulted in the excess waste of resources, further deterioration of the natural environment and adverse impacts on the sustainability of the planet [4]. The negative effects of overconsumption are often relevant to impulsive buying behavior since impulsive buying can be harmful for consumers' well-being and for society in the area of sustainability [5]. Consequently, this study intends to mitigate overconsumption through exploring consumers' impulsive buying behavior.

The widespread development of Internet-based platforms, such as social networking sites and various online blogs, has changed consumer behavior and habitats [6]. With the quick growth of social commerce, consumers browsing social networking sites and posts, e.g., Facebook and Twitter, can easily buy products they had not planned to buy or do not really need [7]. The proliferation of information technologies and online channels have facilitated not just consumers' access to products and services (e.g., [8,9]) but also the process of purchase and payment (e.g., [10,11]), and therefore spurred impulsive buying behavior (e.g., [11–13]). Based on a report, 68% of online purchases in China are

impulsive [14]. Impulsive buying, a frequently occurring consumption behavior in modern citizens' daily life [15], is defined as an unplanned purchase due to a strong stimulus without careful consideration and rational decision-making process (e.g., [4,16,17]). It takes place if powerful and convincing stimuli allure consumers into instantaneous purchase [18]. Due to its violation of the rational principles of human economics and the limited financial resources most people possess, impulse buying is usually related to negative outcomes, e.g., financial problems and post-purchase regret (e.g., [17,19]). Nevertheless, some researchers demonstrate that impulsive purchase is a common shopping practice which may bring about hedonic and pleasant outcomes (e.g., [16,17]).

Impulsive buying is a complicated process. However, sparked by its significance, researchers have been examining impulsive buying behavior for decades from various standpoints [20]. Prior studies on impulsive purchase consist of two streams. The first stream is related to the investigation of the possible consequences of impulsive purchase behavior (e.g., [17,21–24]). The other stream is relevant to the determinants of impulsive buying behavior, such as culture [25], self-interpretation [26] and types of food consumed [27]. The potential factors provoking impulsive buying behavior generally include two main types, i.e., the external and internal determinants, with the former unrelated to consumers and the latter associated with consumers' intrinsic characteristics. Early studies primarily focus on the external determinants of impulsive buying behavior, such as the product itself (e.g., [28–30]) and store atmospherics (e.g., [31–33]).

With the rapid development of e-commerce, consumers' initiative in marketing has been significantly enhanced. Consequently, studies on the determinants of impulsive buying behavior have tilted to consumers' intrinsic characteristics. Given that consumers receive roughly the same marketing information in the online shopping environment, differences in consumers' characteristics are more likely to cause impulsive buying behavior. Therefore, it is more necessary to explore factors influencing impulsive buying behavior from the perspective of consumers' intrinsic characteristics in electronic commerce. In recent years, more and more scholars have begun investigating this issue (e.g., [34–36]). While some studies found that demographic characteristics can influence impulsive buying behavior (e.g., [37–39]), others observed that personality also has a significant influence on impulsive buying behavior, most often based on the big-five model (e.g., [40–44]). Specifically, conscientiousness and agreeableness in the big-five model are found negatively correlated with impulsive buying behavior (e.g., [40,44]), whereas neuroticism and openness are positively correlated with impulsive buying behavior (e.g., [25,45]). Another internal factor that has been highlighted is emotions. Both positive and negative emotions can significantly augment the likelihood of impulsive buying behavior, but negative emotions' force is even stronger and can therefore drive that impulse more easily (e.g., [46,47]). Furthermore, emotions play a mediating role between impulsive buying tendency and impulsive buying behavior [46]. However, most of the prior studies just focus on single factors without a comprehensive consideration of multiple factors, e.g., culture ([24,48,49] etc.) and self-control ([26,50,51] etc.), which are frequently discussed in the related literature. In addition, few studies have examined the influence of mediation on impulsive buying behavior, especially the mediation of factors other than emotions. Based on the above analysis, this study selects emotions and culture as the mediators to explore the influence of personality, impulsive buying tendency and self-control on impulsive buying behavior in electronic commerce. In doing so, this study enriches the academic research on the determinants of consumers' impulsive buying behavior in the context of e-commerce, offers empirical evidence in support of the scales of the cognitive and affective factors that Badgaiyan et al. [52] developed and provides practical guidance for both the individuals and the nation to reduce overconsumption, promoting the sustainability of the planet.

The remainder of this article is structured as follows: Section 2 develops the hypotheses; Section 3 primarily addresses issues pertinent to data collection and research methods; Section 4 focuses on data analysis and results and Section 5 summarizes the research.

## 2. Hypothesis Development

### 2.1. Impact of Culture on Impulsive Buying Behavior

Hofstede's [53] cultural dimension of collectivism/individualism has received the lion's share of attention. The construction of individualism–collectivism depicts the difference between the common culture orientations which emphasize the significance of an individual versus those that underscore the harmony of the group. The individualistic society is “I”-oriented, while the collectivist society is “we”-oriented [54]. Individualism is related to societies where individuals tend to prefer independent emotional relationships and prioritize their personal objectives over those of their in-groups, whereas collectivism refers to interdependence among members of the public, consisting of individuals who regard themselves as an integral part of one or more groups [55]. As they can be easily affected by family members and peers, individuals from collectivistic societies are more prone to impulsive buying behavior compared to those from individualistic societies (e.g., [24,52,56]). Specifically, collectivism can significantly affect impulsive buying behavior, and the higher the degree of collectivism is, the more likely impulsive buying behavior will occur [52]. In addition, collectivistic consumers will be more content with the consumption outcomes if the impulsive purchase is made with people of importance, e.g., friends or family members [57]. Grounded on the aforementioned studies, it is evident that collectivism is more powerful than individualism in spurring impulsive buying behavior. Therefore, we only include collectivism in our theoretical model as a potential cultural driver of impulsive buying behavior and propose the following:

**H1:** *Collectivism has a direct positive influence on impulsive buying behavior.*

### 2.2. Impact of Negative Emotions on Impulsive Buying Behavior

Negative emotions are relevant to such feelings as hopelessness, anxiety, sadness or depression [58]. These states or responses emerge as negative reactions to one's experiences in health, events and circumstances [47]. Negative emotions are context-dependent [4]. Chronic and high-frequency impulsive buying, characterized by its compulsive element, is a potential means to escape negative affective conditions, e.g., depression and low self-esteem [39], or to alleviate negative feelings [59]. Impulsive buying may be the result of diluting negative emotions, e.g., seeking relief from depression [46]. Due to the wide range of products available on the electronic commerce shopping platforms, consumers are more likely to immerse themselves in impulsive buying to escape negative emotions. The extant literature has generally verified that emotions have a significantly positive impact on impulsive buying behavior and negative emotions' influence on impulsive buying is greater compared to positive emotions. Consequently, we only include negative emotions in our theoretical framework as a potential emotional driver of impulsive buying behavior. Many studies have verified that emotions can act as a mediator between other factors and impulsive buying behavior (e.g., [46,60]). Consequently, we propose the following hypothesis:

**H2:** *Negative emotions have a direct positive influence on impulsive buying behavior.*

### 2.3. Impact of Personality on Impulsive Buying Behavior

The big-five model is a hierarchical model of personality traits with five wide factors which represent personality at the widest level of abstraction [61]. This model is a prominent approach to distinguish personality traits (e.g., [62,63]). Personality is also one of the inner dimensions of consumers, which plays a significant role in consumer decision-making [64]. Consequently, the relationship between personality and consumption behavior has attracted the attention of many scholars (e.g., [24,52,64]). The five personality constructs from the big-five model, i.e., extroversion, neuroticism, agreeableness, conscientiousness and openness, have been tested concerning the reasonable relationship with impulsive buying behavior [52]. To better match the electronic commerce environment, we select

extroversion and neuroticism out of the basic personality traits of the big-five model to explore the potential determinants of online impulsive buying behavior.

Since extroverted individuals are social, active and energetic with positive emotions (e.g., [65,66]), individuals scoring high in extroversion like to explore new ideas and therefore possess less self-control and are more likely to make impulsive purchases (e.g., [67,68]). Many scholars have confirmed that there is a significantly positive correlation between extroversion and impulsive buying behavior (e.g., [52,67,69]). From the viewpoint of culture, both individualism and collectivism can significantly shape impulsive buying behavior [24]. Due to the impact of family members and peers, individuals from a collective society are more inclined to be involved in impulsive buying compared to individuals from an individualist society (e.g., [24,48,56]). Consequently, only collectivism is relevant to our theoretical model as a potential cultural driver of impulsive buying behavior. A number of scholars have pointed out that people who score high in extroversion like to be with others, so they are inclined to actively seek social occasions, prefer parties and be more talkative and enthusiastic and they are more likely to establish friendships (e.g., [70,71]). Extroverts are perceived as more approachable and more likely to become friends and fit in with groups [72]. In other words, extroverts tend to be collectivists, who can be easily affected by others. Accordingly, in the electronic commerce environment, extroverts are more inclined to be persuaded by sales staff or others' product comments, more easily resulting in impulsive buying behavior. Grounded on the above analysis, we propose the following:

**H3:** *Extroversion of the big-five model has a positive influence on impulsive buying behavior.*

**H3a:** *Extroversion of the big-five model has a direct positive influence on impulsive buying behavior.*

**H3b:** *Extroversion of the big-five model has an indirect positive influence on impulsive buying behavior through collectivism.*

Neuroticism, also termed emotional instability, is pertinent to the adverse impacts of sadness, depression and anxiety [73]. Individuals scoring high in neuroticism are more likely to exhibit negative emotions [74], and impulsive buying is generally regarded as a potential means to alleviate negative emotions (e.g., [39,40]). Consequently, several scholars have concluded that neuroticism is positively correlated with impulsive buying behavior (e.g., [24,45]). In the online shopping environment, neurotic consumers may be more likely to engage in impulsive buying behavior due to their own emotional distress, in order to deal with their negative emotions. Hence, we propose the following hypotheses:

**H4:** *Neuroticism of the big-five model has a positive impact on impulsive buying behavior.*

**H4a:** *Neuroticism of the big-five model has a direct positive impact on impulsive buying behavior.*

**H4b:** *Neuroticism of the big-five model has an indirect positive impact on impulsive buying behavior through negative emotions.*

#### 2.4. Impact of Self-Control on Impulsive Buying Behavior

Self-control can be perceived as a sign of willpower, which refers to the determination to fight against a specific impulse. Impulsive buying is usually conceptualized as uncontrolled and unplanned buying behavior affected by an individual's long-term values regarding impulsiveness and situational accessibility of costs and benefits (e.g., [23,50,75]). Impulsive behavior can be forecasted via observations of mesolimbic activation, consumer knowledge, cues and (lack of) self-control [76]. Intrinsic individual differences in self-control symbolize a stable characteristic of an individual's personality [75]. Meanwhile, self-control can also be regarded as a resource. Some scholars have proposed a 'strength' or 'limited resource' model of self-control, in which self-control is conceptualized as a finite resource [77]. When self-control resources are used up, people experience stronger impulsive buying desires, which may lead to increased impulsive buying behavior [26]. Impulsive buying has been characterized as a conflict between the desire to consume and

the willpower to resist it [78]. When one's willpower is low and self-control resources are exhausted, impulsive buying may occur more frequently [23]. Prior studies have generally confirmed that self-control has a significant direct influence on impulsive buying behavior (e.g., [50,51,76,79–81]). In short, self-control is a characteristic of consumers, and the failure of self-control often leads to negative outcomes, e.g., negative emotions. Consequently, we propose the following:

**H5:** *Self-control has a negative influence on impulsive buying behavior.*

**H5a:** *Self-control has a direct negative influence on impulsive buying behavior.*

**H5b:** *Self-control has an indirect negative influence on impulsive buying behavior through negative emotions.*

## 2.5. Impact of Impulsive Buying Tendency on Impulsive Buying Behavior

Impulsive buying tendency refers to the extent to which a person may make unplanned, instant and unreflective purchases (e.g., [16,49]). It is a relatively stable and highly consistent trait [82], which has great predictive power for impulse buying behavior (e.g., [46,83]). Specifically, it induces consumers to simultaneously purchase products of diverse types with no utilitarian reasons [84]. Individuals with a high level of impulsive buying tendency are more likely to engage in impulsive buying behavior than those with a lower level of this trait (e.g., [85,86]). As a precursor variable, impulsive buying tendency differs from impulsive buying behavior, since the former portrays a relatively lasting consumption characteristic which generates desires or motivations for the latter [87]. A large number of studies have verified that impulsive buying tendency can lead to impulsive buying behavior (e.g., [46,52,69,82,88]). Meanwhile, Badgaiyan et al. (2016) indicate that impulsive buying tendency includes cognitive and affective factors. However, little attention has been paid to the influence of the two components of impulsive buying tendency on impulsive buying behavior. Therefore, we will investigate whether these two components can directly lead to impulsive buying behavior, respectively. Furthermore, negative emotions are also related to impulsive buying tendency (e.g., [39,89]). Specifically, Ahn and Kwon (2020) point out that impulsive buying tendency can lead to negative emotions. Since negative emotions can only lead to affective impulsive buying behavior [90], it is natural and reasonable to presume that the affective factor of impulsive buying tendency can lead to impulsive buying behavior indirectly through negative emotions. Thus, we propose the following:

**H6:** *Impulsive buying tendency has a positive influence on impulsive buying behavior.*

**H6a:** *Both the cognitive and affective factors of impulsive buying tendency have a direct positive influence on impulsive buying behavior.*

**H6b:** *The affective factor of impulsive buying tendency has an indirect positive influence on impulsive buying behavior through negative emotions.*

On the basis of the aforementioned hypotheses, we build our conceptual framework as shown in Figure 1.



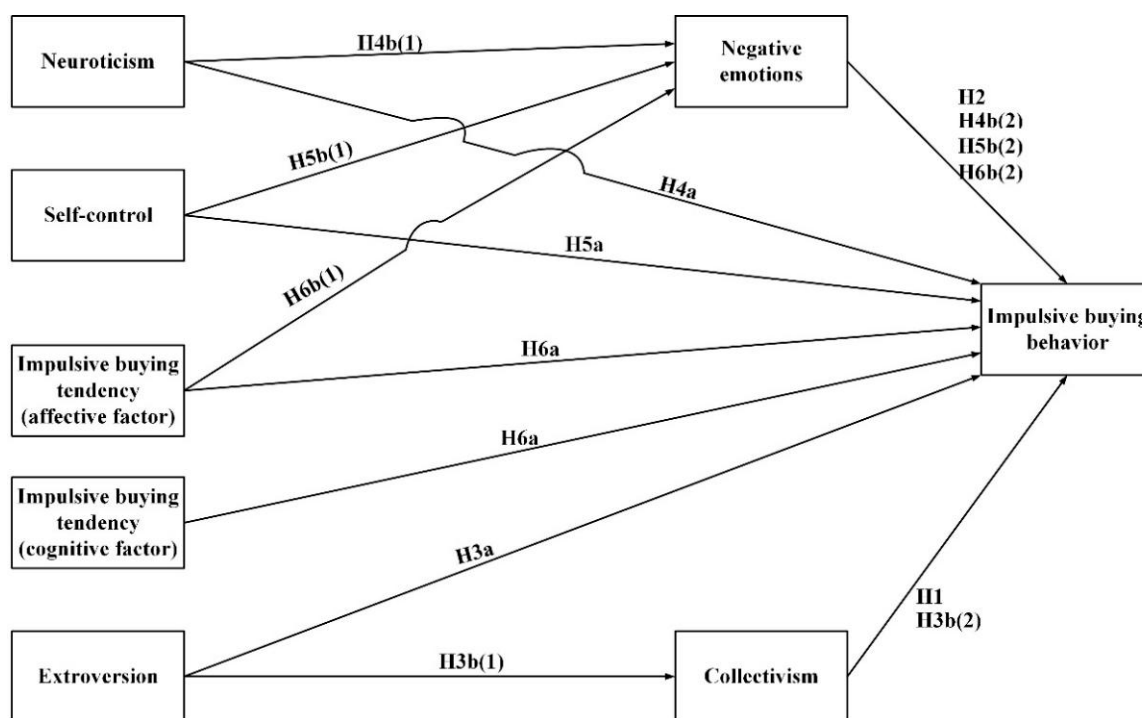


Figure 1. Conceptual model.

### 3. Methodology

#### 3.1. Data Collection

With the vigorous development of the Internet, the major shopping site is gradually shifting from traditional brick-and-mortar stores to online stores, and the number of online shoppers is rising year by year. Therefore, the object of this study is aimed at online consumer groups, mainly shoppers of mass electronic commerce platforms in China, such as Taobao and Tmall. These electronic commerce platforms have an enormous number of customers, which facilitates our online survey. Meanwhile, as a consequence of the outbreak of COVID-19, an offline survey has become too risky. Thus, it is much safer to collect data online. Furthermore, to some extent, the convenience of an online survey can boost the response rate while reducing invalid questionnaires. Hence, we decided to adopt an online survey to collect data.

Our online questionnaire is composed of two modules. Module 1 collects respondents' basic information, e.g., demographic and socio-economic characteristics and online shopping experience. Module 2 consists of 30 measurement scales related to respondents' generic online purchase experiences in the past, each of which uses a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). We developed all the measurement scales based on prior studies (e.g., [60,61,91]) and made minor modifications to fit our research. Since the questionnaire was originally designed in English, we applied the method of forward and backward translation to the development of the Chinese questionnaire to adapt to the Chinese context of our study. We launched our online survey on Wenjuanxing website (<https://www.wjx.cn/>, accessed on 31 July 2021), one of the largest professional data collection websites in China, and asked students and colleagues to share the link on their social media. In order to ensure the rationality of the questionnaire design, we first carried out a pre-survey, based on which we adjusted the related contents through the feedback of respondents.

Finally, we received 425 valid responses online. The vast majority of the respondents are from Zhejiang. In relation to gender, males account for 28.7%, while females account for 71.3%. Respondents aged 21–30 are particularly prominent, accounting for 46.4% of the total, whereas respondents aged 41–50 and above 50 account for 4.2% and 1.4% of the total, respectively. As for occupations, the 425 respondents are mainly students, accounting

for about 60.9% of the total. With regard to monthly expenditure, the majority is over RMB 1000, with RMB 1001–1500 and RMB 1501–2000 accounting for 33.9% and 24.9%, respectively. For more information about the sample, see Table 1.

**Table 1.** Basic information of the sample.

Characteristics	Category	Frequency	%
Gender	Male	122	28.7
	Female	303	71.3
Age	≤20	127	29.9
	21–30	197	46.4
	31–40	77	18.1
	41–50	18	4.2
	>50	6	1.4
Educational background	Junior middle school and below	22	5.2
	Senior school	45	10.6
	junior college	40	9.4
	Undergraduate	241	56.7
	Postgraduate and above	77	18.1
Occupations	Students	259	60.9
	Professionals (e.g., teachers and doctors)	40	9.4
	Elementary Occupations (e.g., farmers and miners)	42	9.9
	Clerks	60	14.1
	Others	24	5.6
Monthly Income (¥)	≤2000	228	53.6
	2001–4000	56	13.2
	4001–6000	58	13.6
	6001–8000	51	12.0
	>8000	32	7.5
Monthly Expenditure (¥)	≤1000	45	10.6
	1001–1500	144	33.9
	1501–2000	106	24.9
	2001–2500	58	13.6
	>2500	72	16.9

Note: The classification of occupations included in our survey is based on the International Standard Classification of Occupations (ISCO).

### 3.2. Measures

To gauge impulsive buying behavior, we employed two scales from Mattila and Wirtz [91]. Scales measuring neuroticism and extroversion in the big-five model are adapted from Gosling et al. [61]. The negative emotion scales are based on Verhagen and Dolen [60]. The collectivism scales are also adapted from prior studies (e.g., [48,54,92]). The self-control scales are modified on the basis of Haws et al. [93]. We combined several studies (e.g., [16,50,52]) to develop scales gauging impulsive buying tendency. Consequently, 30 measurement scales are created as Table 2 shows.

**Table 2.** Scale development.

Factor	Item	References
Impulsive buying behavior (IB)		Mattila and Wirtz, 2008 [91]
IB1	I ended up spending more money than I originally set out to spend.	
IB2	I bought more than I had planned to buy.	

Table 2. Cont.

Factor	Item	References
Extroversion (EX)		Gosling et al., 2003 [61]
EX1	I see myself as open to new experiences, complex.	
EX2	I see myself as conventional, uncreative.	
Neuroticism (NT)		Gosling et al., 2003 [61]
NT1	I see myself as anxious, easily upset.	
NT2	I see myself as calm, emotionally stable.	
Negative emotions (NE)		Verhagen and Dolen, 2011 [60]
NE1	While shopping at the website I was distressed.	
NE2	While shopping at the website I was upset.	
NE3	While shopping at the website I was irritable.	
Collectivism (CO)		Badgaiyan and Verma, 2014 [48] Singelis et al., 1995 [92]; Sivadas et al., 2008 [39];
CO1	It is important to maintain harmony within my group.	
CO2	I would sacrifice an activity that I enjoy very much if my family did not approve of it.	
CO3	I would do what would please my family, even if I detested that activity.	
CO4	We should keep our aging parents with us at home.	
CO5	I usually sacrifice my self-interest for the benefit of the group.	
CO6	I enjoy working in situations involving competition with others.	
Self-control (SC)		Haws et al., 2012 [93]
SC1	I am able to work effectively toward long term financial goals.	
SC2	I carefully consider my needs before making purchases.	
SC3	I often delay taking action until I have carefully considered the consequences of my purchase decisions.	
SC4	I am able to resist temptation in order to achieve my budget goals.	
SC5	Having objectives related to spending is important to me.	
SC6	I closely monitor my spending behavior.	
SC7	I am responsible when it comes to how much I spend.	
Impulse buying tendency (cognitive factor)		Badgaiyan et al., 2016 [52]; Beatty and Ferrell, 1998 [16]; Rook and Fisher, 1995 [50]
CF1	Most of my purchases are planned in advance. (Reverse coded)	
CF2	Before I buy something I always carefully consider whether I need it. (Reverse coded)	
CF3	I carefully plan most of my purchases. (Reverse coded)	
CF4	I often buy without thinking.	



Table 2. Cont.

Factor	Item	References
Impulse buying tendency (affective factor)		Badgaiyan et al., 2016 [52]; Beatty and Ferrell, 1998 [16]; Rook and Fisher, 1995 [50]
EF1	I sometimes buy things because I like buying things, rather than because I need them.	
EF2	I buy what I like without thinking about consequences.	
EF3	I buy products and services according to how I feel at that moment.	
EF4	It is fun to buy spontaneously.	

### 3.3. Research Methods

Since there are multiple complex assumptions between predicted and predictor variables as well as between predictor variables, we adopted structural equation modeling (SEM) as the analysis method in order to precisely evaluate the assumptions. As an extension of path analysis which enables us to investigate the relations between both observed and latent variables, structural equation modeling refers to a series of processes through which complex hypotheses, especially those with networks of path relations, are assessed based on multivariate data (e.g., [94–96]). It identifies the interplay between processes, their relative importance and how the influences of perturbations cascade via systems [97].

## 4. Results

This study used SPSS 27.0 to run structural equation modeling with maximum likelihood estimates. Since our model contains the complex relationships between multiple variables, we conducted a two-step procedure for the structural equation modeling. The first step is to estimate the overall measurement reliability and validity and the second is to test the hypotheses.

### 4.1. Measurement Model

We adopted composite reliability scores (CR), Cronbach's  $\alpha$  and average variance extracted (AVE) for the estimation of the measurement model (see Table 2 for detailed information). Specifically, by virtue of CR and Cronbach's  $\alpha$  values, we gauged the internal consistency, which is above 0.7 for all latent variables, suggesting high internal consistency [98]. For the evaluation of the convergent validity, we calculated the AVE. As shown in Table 3, all AVE values are greater than the suggested threshold of 0.5, indicating adequate validity [99]. We also employed AVE for the measurement of the discriminant validity to test if a construct is different from others. According to Fornell and Larcker's (1981) criteria, every construct ought to have a closer correlation with its own construct compared to with other constructs to achieve acceptable discriminant validity. As Table 4 shows, the diagonal elements, i.e., the square root of the AVE extracted between the constructs and their measures, are bigger than the non-diagonal elements, i.e., correlations among constructs, indicating satisfactory discriminant validity.

**Table 3.** Assessment of measurement model.

Latent Variable	Observed Variables	Indicator Loadings	Cronbach's $\alpha$	CR	AVE
Impulsive buying behavior	IB1	0.841	0.817	0.818	0.692
	IB2	0.822			
Extroversion	EX1	0.810	0.794	0.799	0.666
	EX2	0.813			
Neuroticism	NT1	0.853	0.829	0.833	0.713
	NT2	0.836			
Negative emotions	NE1	0.788	0.888	0.892	0.733
	NE2	0.896			
	NE3	0.881			
Collectivism	CO1	0.718	0.896	0.884	0.604
	CO2	0.746			
	CO3	0.825			
	CO4	0.818			
	CO5	0.772			
Self-control	SC1	0.793	0.916	0.918	0.616
	SC2	0.758			
	SC3	0.758			
	SC4	0.828			
	SC5	0.779			
	SC6	0.714			
	SC7	0.855			
Impulsive buying tendency	CF1	0.670	0.853	0.855	0.600
(cognitive factor)	CF2	0.793			
	CF3	0.776			
	CF4	0.842			
Impulsive buying tendency	AF1	0.797	0.839	0.841	0.569
(affective factor)	AF2	0.804			
	AF3	0.687			
	AF4	0.724			

**Table 4.** Discriminant validity of the measurements..

	IB	EX	NT	NE	CO	SC	CF	EF
IB	0.692							
EX	0.082 ***	0.666						
NT	0.089 ***	0.084 ***	0.713					
NE	0.077 ***	0.07 ***	0.089 ***	0.733				
CO	0.092 ***	0.101 ***	0.093 ***	0.078 ***	0.604			
SC	0.061 ***	0.061 ***	0.066 ***	0.059 ***	0.063 ***	0.616		
CF	0.052 ***	0.05 ***	0.058 ***	0.046 ***	0.058 ***	0.039 ***	0.600	
EF	0.073 ***	0.07 ***	0.078 ***	0.075 ***	0.077 ***	0.055 ***	0.049 ***	0.569
AVE Square roots	0.832	0.816	0.844	0.856	0.777	0.785	0.775	0.754

Note: IB: Impulsive buying behavior, EX: Extroversion, NT: Neuroticism, NE: Negative emotions, CO: Collectivism, SC: Self-control, CF: Impulsive buying tendency (cognitive factor), EF: Impulsive buying tendency (affective factor); \*\*\*  $p < 0.001$ .

#### 4.2. Hypothesis Testing of Direct Effects

To obtain stable results, we performed bootstrap 2000 times when calculating t values and path coefficients using AMOS 27.0. The results of the structural model test are presented in Figure 2 and Table 5. Both collectivism ( $\beta = 0.232$ ,  $<0.001$ ) and negative emotions ( $\beta = 0.211$ ,  $<0.001$ ) can directly cause impulsive buying behavior and their positive influences are significant. Thus, H1 and H2 have been verified. Extroversion ( $\beta = 0.281$ ,  $<0.001$ ) and neuroticism ( $\beta = 0.236$ ,  $<0.001$ ) of the big-five model can directly cause impulsive buying behavior, and these positive influences are significant, so H3a and H4a are verified. Self-control ( $\beta = -0.131$ ,  $<0.01$ ) can directly cause impulsive buying behavior and this negative influence is significant. Therefore, H5a has been verified. Both the cognitive factor ( $\beta = 0.126$ ,  $<0.001$ ) and affective factor ( $\beta = 0.184$ ,  $<0.001$ ) of impulsive buying tendency can directly cause impulsive buying behavior and their positive influences are significant. Consequently, H6a has been verified. In short, collectivism, negative emotions, extroversion, neuroticism and the cognitive and affective factors of impulsive buying tendency can directly cause impulsive buying behavior, and these positive influences are significant, while self-control can directly cause impulsive buying behavior and this negative influence is significant. In other words, H1, H2, H3a, H4a, H5a and H6a have been verified.

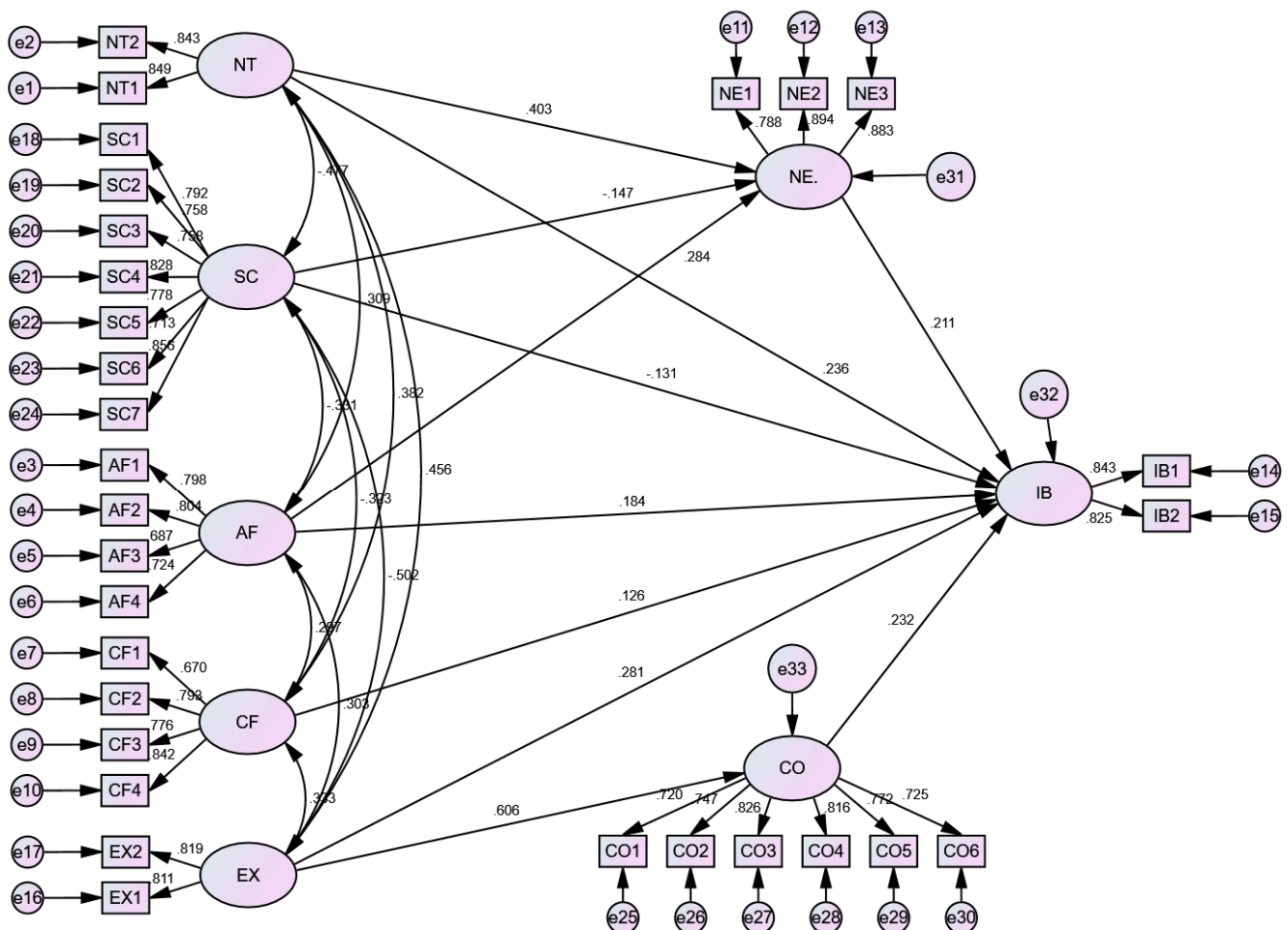


Figure 2. Model testing results.

**Table 5.** Results of path analysis with maximum likelihood estimates.

Hypothesis	Path	Estimate	S.E.	C.R.	<i>p</i>	Supported?
H1	IB <—CO	0.181	0.034	5.354	***	Yes
H2	IB <—NE	0.196	0.040	4.846	***	Yes
H3a	IB <—EX	0.272	0.053	5.155	***	Yes
H4a	IB <—NT	0.228	0.045	5.033	***	Yes
H5a	IB <—SC	−0.154	0.047	−3.289	0.001 **	Yes
H6a	IB <—CF	0.173	0.050	3.460	***	Yes
H6a	IB <—AF	0.177	0.037	4.793	***	Yes

Note: IB: Impulsive buying behavior, EX: Extroversion, NT: Neuroticism, NE: Negative emotions, CO: Collectivism, SC: Self-control, CF: Impulsive buying tendency (cognitive factor), EF: Impulsive buying tendency (affective factor); \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

#### 4.3. Hypothesis Testing of Indirect Effects

To verify H3b, H4b, H5b and H6b, we tested the indirect effects between factors. Specifically, multiple mediation analysis [100] was implemented to explore the mediating roles of negative emotions and collectivism in the influences of extroversion, neuroticism, self-control and the affective factor of impulsive buying tendency on impulsive buying behavior. We conducted the bootstrapping procedure with 2000 samples to develop and test (percentile and bias-corrected) confidence intervals for indirect impacts. The corresponding results are displayed in Table 6. As Table 6 indicates, extroversion ( $\beta = 0.136$ ,  $<0.01$ ) indirectly causes impulsive buying behavior with collectivism as the mediator. Thus, H3b is verified. Neuroticism ( $\beta = 0.073$ ,  $<0.01$ ) indirectly leads to impulsive buying behavior with negative emotions as the mediator, so H4b is verified. Self-control ( $\beta = -0.036$ ,  $<0.01$ ) inhibits impulsive buying behavior indirectly via the mediation of negative emotions. Consequently, H5b is verified. The affective factor of impulsive buying tendency ( $\beta = 0.058$ ,  $<0.01$ ) indirectly brings about impulsive buying behavior with the mediation of negative emotions. Hence, H6b is verified.

**Table 6.** Indirect and mediating effects.

Hypothesis	Path	Indirect Effect Coefficient	<i>p</i>	Bootstrap 95% CI		Supported?
				Lower Bound	Upper Bound	
H3b	EX → CO → IB	0.136 **	0.001 **	0.088	0.198	Yes
H4b	NT → NE → IB	0.073 **	0.001 **	0.042	0.111	Yes
H5b	SC → NE → IB	−0.036 **	0.009 **	−0.010	−0.075	Yes
H6b	AF → NE → IB	0.058 **	0.001 **	0.030	0.095	Yes

Note: IB: Impulsive buying behavior, EX: Extroversion, NT: Neuroticism, NE: Negative emotions, CO: Collectivism, SC: Self-control, CF: Impulsive buying tendency (cognitive factor), EF: Impulsive buying tendency (affective factor); \*\*  $p < 0.01$ .

Taken together, extroversion can indirectly affect impulsive buying behavior via the significant mediation of collectivism, whereas neuroticism, self-control and the affective factor of impulsive buying tendency can indirectly affect impulsive buying behavior through the significant mediation of negative emotions. Since extroversion, neuroticism, self-control and the affective factor of impulsive buying tendency have significant direct effects on impulsive buying behavior (see Table 5), collectivism partially mediates the effect of extroversion on impulsive buying behavior, and negative emotions partially mediate the effects of neuroticism, self-control and the affective factor of impulsive buying tendency on impulsive buying behavior.

#### 4.4. Robustness Check

To conduct a robustness check, we estimated the structural model using covariance-based SEM in AMOS 27.0 through generalized least squares estimates. Both methods, i.e.,

maximum likelihood and generalized least squares, give rise to identical results in terms of the signs and significance of the parameter estimates (see Tables 5 and 7).

**Table 7.** Results of path analysis with generalized least squares estimates.

Hypothesis	Path	Estimate	S.E.	C.R.	<i>p</i>	Supported?
H1	IB <— CO	0.176	0.037	4.789	***	Yes
H2	IB <— NE	0.202	0.051	3.973	***	Yes
H3a	IB <— EX	0.279	0.055	5.062	***	Yes
H4a	IB <— NT	0.179	0.044	4.070	***	Yes
H5a	IB <— SC	−0.179	0.054	−3.290	0.001 **	Yes
H6a	IB <— CF	0.153	0.063	2.426	0.015 *	Yes
H6a	IB <— AF	0.175	0.037	4.679	***	Yes

Note: IB: Impulsive buying behavior, EX: Extroversion, NT: Neuroticism, NE: Negative emotions, CO: Collectivism, SC: Self-control, CF: Impulsive buying tendency (cognitive factor), EF: Impulsive buying tendency (affective factor); \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

## 5. Discussion

Reducing overconsumption is a helpful means to promote sustainable consumption (e.g., [101,102]). The adverse impacts of overconsumption are usually related to impulsive buying behavior because impulsive buying can be harmful for consumers' well-being and for society in the realm of sustainability [4]. As an attempt to promote sustainable consumption, this article explored the determinants of consumers' impulsive buying behavior in electronic commerce from the perspective of their intrinsic characteristics. Founded on the literature on sustainability, psychology and consumer behavior, this article constructed a theoretical model composed of consumers' personality, emotions, culture, self-control and impulsive buying tendency, which have been frequently adopted in prior studies. The results demonstrated different mechanisms through which consumers' personality, emotions, culture, self-control and impulsive buying tendency are associated with online impulsive buying behavior.

First, all the direct effects were confirmed, and self-control was found to be the only determinant that has a significantly negative impact on impulsive buying behavior in electronic commerce, indicating that consumers lacking self-control are more likely to exhibit impulsive buying behavior online. This finding corresponds to those of previous studies identifying the negative effect of self-control on generalized impulsive buying behavior (e.g., [23,76,103]). Consumers scoring high in self-control are more likely to resist the temptation when facing various marketing strategies of merchants. The stronger their self-control is, the more easily consumers can restrain their impulsive buying behavior. Hence, impulsive buying behavior can be regarded as a manifestation of self-control failure.

Second, the mediating roles of both collectivism and negative emotions are verified when testing the indirect effects. On the one hand, our findings revealed that extroversion can trigger impulsive buying behavior through its positive influence on collectivism. Extrovert consumers can quickly integrate themselves into a group and then be influenced by the group's opinion, i.e., the extrovert personality can cultivate or activate collectivism, which makes extrovert consumers more prone to impulsive consumption behavior. On the other hand, we also observed that both neuroticism and the affective factor of impulsive buying tendency can promote impulsive buying behavior by positively affecting negative emotions, while self-control can result in impulsive buying behavior by negatively affecting negative emotions. Neuroticism is characterized by emotional instability [72], easily leading to negative emotions, which can then induce impulsive buying behavior. At the same time, the affective factor of impulsive buying tendency is easily influenced by the outside world, producing negative emotions, which can then directly cause impulsive buying behavior (e.g., [4,47]). In addition, when self-control is weakened, it is impossible to have good control over one's own emotions, easily leading to negative emotions, which will then give rise to the impulsive buying behavior of consumers.

### 5.1. Implications

Theoretically, this study has enriched to the scholarly work on the determinants of consumers' impulsive purchase behavior by virtue of a comprehensive theoretical model from the perspective of consumers' intrinsic characteristics. Specifically, this study offers new insights on the theme of online impulsive buying behavior with particular relevance to the realm of consumer psychology and behavioral economics. We have, in effect, combined the viewpoints of personality, emotion and culture and applied them to the area of consumer psychology in a way which is of value for sustainable consumer behavior and marketing in the digital era. For instance, given that online impulsive buying behavior occurs more and more frequently while the mechanism which underlies the phenomenon is still unclear, our findings demonstrate that consumers scoring high in negative emotions, neuroticism, extroversion, collectivism and low in self-control are more likely to exhibit impulsive buying behavior.

Moreover, our findings on the direct and indirect i.e., those with mediators, routes along which the determinants influence consumers' impulsive buying behavior have implications for the circumstances under which overconsumption is more likely to occur, and thus they are of potential relevance to the sustainable consumption literature. Meanwhile, our research separately investigates the cognitive and affective factors of impulsive buying tendency and demonstrates that these two components of impulsive buying tendency have nonidentical impacts on impulsive buying behavior. In doing so, this study provides valuable empirical support to validate the scales of the cognitive and affective factors that Badgaiyan et al. [52] developed to gauge consumers' impulsive buying tendency. Furthermore, our results provide insights into the ways in which impulsive buying tendency gives rise to impulsive buying behavior, in comparison with prior studies which consider impulsive buying tendency as a whole, i.e., an indivisible concept.

Empirically, on the one hand, the findings of this study make consumers aware of how their overconsumption behavior is formed and offer them possible ways to reduce overconsumption, e.g., strengthen self-control and improve emotional stability, although the related changes are not easy. On the other hand, the results of this study also provide a practically useful basis to decrease overconsumption, promoting the sustainability of the planet at national level. For instance, nations can enact relevant laws and regulations to restrict fake positive comments, which are usually manipulated by sellers, on online shopping platforms, so as to avoid their influence on collectivist consumers, who are more likely to be affected by others. Nations could also use public service ads with Key Opinion Leaders to guide collectivist consumers toward sustainable consumption.

### 5.2. Limitations and Future Research Directions

Certain limitations of the current research stem from the sample. For the sake of convenience in the data collection, we asked students and colleagues who are mainly from Zhejiang, the province in which the authors' university is located, to share the link of our online survey via social media. Consequently, the vast majority of the respondents are from Zhejiang, a province in southeastern China, which in turn heightens the usual concerns about the generalizability of our findings. Consequently, it is necessary to replicate this research with respondents from a wider range of geographical locations. A second limitation lies in the finite coverage of the factors we selected to examine the determinants of consumers' impulsive buying behavior, since we consider this issue only from the viewpoint of consumer-related characteristics, e.g., personality traits, moods and culture types. To achieve more comprehensive and sounder results, it would be helpful to involve a broader range of factors into this study, e.g., product categories (durable vs. nondurable, hedonic vs. utilitarian, tangible vs. intangible, etc.) and purchase occasions (with discounts vs. without discounts, with live-streamers vs. without live-streamers, sufficient stock vs. insufficient stock, etc.). These limitations open avenues for further research.



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