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The sources of the many faces of consumer smartphone attachment: A value-in-use perspective

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Abstract

Smartphones have evolved to be among the most important objects in peoples' daily lives. However, little knowledge exists on users' relationships with smartphones. This study examines the user-smartphone relationship from an attachment perspective. More specifically, the present research develops an understanding of the different faces of smartphone attachment considering the perceived value-in-use of smartphones as a source. The findings of an online survey among smartphone users reveal that users are attached to the smartphone itself because of the value it derives during usage. Most interestingly, the effects of perceived value-in-use have been found to be ambivalent because they can enhance both positive (e.g., passion) and negative (e.g., separation distress) aspects of smartphone attachment. Moreover, specific compositions of the value-in-use define the individual facets of smartphone attachment. For instance, passion has been found to be determined by social, hedonic, and utilitarian value-in-use, whereas distress is triggered by both perceived utilitarian and hedonic value-in-use. In sum, this study's findings help to understand and manage consumers' smartphone attachment.

KEYWORDS

distress, emotional attachment, passion, smartphone attachment, value-in-use

1 | INTRODUCTION

The use of smartphones has become ubiquitous. According to current studies, the number of smartphone users will increase to approximately 7.5 billion people in 2026 (Ericsson, 2021). At the same time, the usage frequency will continue to grow. While users interacted with their smartphones 50 times a day on average in 2018 (Deloitte, 2017), daytime usage increased by 70% due to the outbreak of the coronavirus and the related lockdowns. The current usage frequency has already reached greater levels than those reported for the usage of other digital devices, such as televisions. Smartphones are thus the leaders in media consumption today.

With the intensive use of smartphones in everyday life, important behavioral and social implications have emerged. Finding people engrossed in their smartphones is part of everyday life. Smartphones are used at almost every time and in nearly every environment, whether in public transport, in restaurants, or while crossing a street. As a result, the way in which people interact with each other, access information, and allocate time has changed substantially (Rosen, 2004; Rotondi et al., 2017). Through current systems

such as smart homes, smart living, smart mobility, and smart banking, smartphones can be connected to everyday items and even take over their control and monitoring (Lee et al., 2017). Hence, smartphones go beyond serving communication purposes and enable people to accomplish their everyday tasks within and with a single device (Hubert et al., 2017).

However, little knowledge exists on the nature and sources of people's relationships with their smartphones (Melumad & Pham, 2020). This knowledge might be decisive for understanding peoples' responses in the many situations in which smartphones already occupy or will occupy a central position. The existing literature has repeatedly emphasized that relationships to objects trigger important behaviors or behavior-related responses (Bowlby, 1969; Parent & Shapka, 2019). Against this background, the current research aims to understand consumers' relationship with their smartphones. To do so, this research integrates the theory of consumer attachment (Bowlby, 1969; Thomson et al., 2005; Williams et al., 1992) and perceived value-in-use (Grönroos & Voima, 2013; Vargo & Lusch, 2004).

Existing studies in the field of mobile and/or smartphone relationships predominantly focus on smartphone or mobile addiction (Chang et al., 2019; Chou & Chou, 2019; Noë et al., 2019). Attachment differs substantially from addiction: the former represents a normative phenomenon that is most common among today's smartphone users (Konok et al., 2016), while addiction represents an extreme situation that results from an attachment disorder (Flores, 2001). In other words, the view on smartphone addiction provides a negativist framing and therefore a one-sided perspective on users' relationship to their smartphones (Melumad & Pham, 2020). Moreover, evidence shows that smartphone attachment determines problematic use behavior such as addiction (Kim & Koh, 2018; Parent et al., 2021). Hence, to understand smartphone addiction, it is also important to understand people's attachment to smartphones.

Scholars such as Konok et al. (2016) have recognized the need to assess individuals' relationships with smartphones through the lens of attachment theory. They argue that smartphones, as all-day companions, represent an ideal compensatory attachment object when human attachment objects are unavailable. Vincent (2006) postulates that people are most likely to develop an attachment to their mobile phone because it is fully integrated into their daily life. Some users cannot even imagine living without their phone and talk about their mobile phone in an emotional way (Vincent, 2006): "The mobile phone is thus an important part of our emotional cache in that it is a repository for storing links to things that engender emotional response, as well as performing a functional role in the management of day-to-day life" (Vincent, 2006, p. 42).

Empirical works on consumer attachment to nonhuman objects such as smartphones present an inconsistent understanding of the concept of attachment. While consumer research predominantly refers to the perspective of Thomson et al. (2005), who describe the extent of attachment to a nonhuman object with feelings of passion, connection and affection, works in the information system literature rely on an understanding of attachment based on the central functions of the attachment system (Ainsworth et al., 1978; Hazan & Shaver, 1994). Moreover, most contributions focus on separation distress (Cheever et al., 2014; Hartanto & Yang, 2016; Nie et al., 2020) as a negative side of individuals' attachment (Hung & Lu, 2018). To broaden previous research, this study integrates the available perspectives on attachment (Bowlby, 1969; Huang et al., 2020; Park et al., 2010; Thomson et al., 2005) and adopts a multifaceted understanding of smartphone attachment.

Most importantly, this research aims to understand the psychological sources of smartphone attachment. In doing so, this study develops the *value–attachment hypothesis*, inspired by involvement–commitment theory (Beatty et al., 1988). Although extensive efforts have been undertaken to understand each of the concepts (i.e., consumer value vs. attachment), knowledge is sparse on the effect of perceived value on attachment. In summary, this research answers the following questions: What are the facets of consumers' attachment to smartphones? How are the different facets of smartphone attachment explained by the perceived value-in-use of smartphones?

2 | CONCEPTUAL FRAMEWORK AND HYPOTHESES

2.1 | Attachment

Attachment describes a strong relationship and, more specifically, a deep psychological bonding of a person to another person, who is then the object of attachment (Bowlby, 1977). Attachment contributes significantly to life satisfaction as it creates self-compassion and emotional empathy (Wei et al., 2011). Unsurprisingly, the need for strong relationships with specific others reflects a basic human need (Ainsworth et al., 1978), beginning with experiences in early childhood where the child naturally has a strong bond with his or her caregiver (Bowlby, 1977). Later, attachment to specific others finds expression in romantic relationships and/or friendships (Hazan & Shaver, 1987). Evidence shows that attachment can extend beyond interpersonal relationships (Pozharliev et al., 2021; Vlachos, 2012). People develop attachment to nonhuman objects such as animals (e.g., Hirschman, 1994) and marketplace entities such as material possessions (Kleine & Baker, 2004), places (e.g., Halpenny, 2010), brands (e.g., Thomson et al., 2005), and products (Mugge et al., 2005, 2010).

Consumer attachment to these nonhuman objects has been found to be reflected in both an identification with the object and a dependence on the object (Park et al., 2010; Williams et al., 1992). Most contributions have conceptualized attachment as the bond connecting a consumer to an object by feelings of affection (i.e., warm feelings one may have toward the attachment object), connection (i.e., general feeling of a bond between the object and the self), and passion (i.e., strong feelings for the attachment object that are characterized by feelings of captivation by the attachment object) (Thomson et al., 2005). This emotional attachment to nonhuman objects has been validated across different contexts and "represents a holistic (yet parsimonious) approach" (Dwivedi et al., 2019).

Moreover, it has been found to produce important consumer responses, such as repurchasing and word-of-mouth behavior (Hung & Lu, 2018), sustainable consumption (Nieuwenhuis, 2008), product usage (Zhang et al., 2020), and satisfaction (Dwivedi et al., 2019).

2.2 | Smartphone attachment

Although smartphones represent a key element in consumers' lives, consumer research has paid little attention to the relationship between consumers and their smartphones (Berlo et al., 2020; Melumad & Pham, 2020; Sultan et al., 2009). The concept of *smartphone attachment* can yield important insights into this relationship (Melumad & Pham, 2020; Nie et al., 2020; Parent & Shapka, 2019). Compared to other material objects, the smartphone accompanies its user throughout the day. Due to its high levels of portability, the smartphone is accessible anytime. In addition, with its input interfaces (e.g., touch, voice), the smartphone offers unique sensory experiences. Moreover, the smartphone is a highly personal possession that offers several options for customization (e.g., selection of required apps) (Sultan et al., 2009). Mobile phones or smartphones are "the repositories of our memories and social connections" and thus reflect an extension of individuals' emotional life (Vincent, 2006, 2015). Most importantly, smartphones allow users to perform diverse activities that go beyond the basic functions of calling and messaging (e.g., listening to music, watching videos), thereby fulfilling various needs (Fullwood et al., 2017; Nie et al., 2020). In keeping with Melumad and Pham (2020) and Holte and Ferraro (2021), this research starts from the assumption that people develop an attachment to the smartphone itself. Unlike other material possessions, a smartphone is directly replaced by a new smartphone when the old one is broken or lost (Nie et al., 2020).

Empirical findings in the information system literature underline the significance of smartphone attachment. For instance, attachment to smartphones has been found to encourage users to take more risks and to enter novel environments in the presence of their phones (Parent & Shapka, 2019). Furthermore, the greater one's smartphone attachment is, the stronger the compulsive urge to answer one's phone and the stronger the feeling that one needs a smartphone to connect with others (Bodford et al., 2017). Smartphone attachment has also been found to negatively affect task performance (Hartanto & Yang, 2016), to increase heart rate responses (Konok et al., 2017), and to increase the likelihood of using smartphones while driving (Weller et al., 2013). In addition, smartphone attachment has implications for marketing. For instance, consumers with higher levels of smartphone attachment show more positive attitudes toward mobile advertising (Sultan et al., 2009), are better able to recognize the commercial intent of mobile games (Berlo et al., 2020), and are more likely to purchase travel using smartphones (Rodríguez-Torrico et al., 2020). In sum, smartphone attachment has been shown to have important effects on behavioral and behavior-related responses.

Nonetheless, inconsistent perspectives exist on how to conceptualize smartphone attachment. Research on information systems predominantly refers to separation distress (Cheever et al., 2014; Han et al., 2017; Hartanto & Yang, 2016; Nie et al., 2020) as one of the central functions of the attachment system (Ainsworth et al., 1978; Hazan & Shaver, 1994). However, the other facets—namely, *proximity maintenance* (i.e., perceived need to be near the smartphone), *safe haven* (i.e., desire to return to the smartphone for safety and comfort), *secure base* (i.e., the perceived security the smartphone provides)—have received less attention (Youn, 2019). To gain a comprehensive understanding of attachment to smartphones, the literature on human attachment recommends considering all four facets (Huang et al., 2020). Recently, the perspective of Thomson et al. (2005) has been applied to define smartphone attachment and to study the effects of smartphone attachment on text-message dependence (Holte & Ferraro, 2021). However, in their research, the authors do not further differentiate between passion, connection, and affection.

This research is the first to integrate the available understandings of attachment in both *consumer* and *information system* research and to test a multifaceted understanding of smartphone attachment, as recently suggested (Berlo et al., 2020). In this study, *smartphone attachment* means consumers' feelings of passion, connection, and affection as well as consumers' perceptions of proximity maintenance, safe haven, emotional security, and separation distress toward the smartphone.

2.3 | Sources of smartphone attachment

Research on the sources of smartphone attachment is still in its infancy. Initial evidence exists that smartphone attachment results from the perceived extension of the self through the smartphone (Han et al., 2017). Furthermore, Bodford et al. (2017) underline the role of individual tendencies to predict smartphone attachment by showing that a tendency toward anxious human attachment fosters anxious smartphone attachment. Additionally, Konok et al. (2016) demonstrate that individual predispositions, such as fundamental attachment anxiety (Konok et al., 2016; Parent et al., 2021), shape attachment to smartphones. The work of Fullwood et al. (2017) adds to this perspective by suggesting that smartphone attachment is determined by the affordances a smartphone offers. The results of this qualitative study suggest that additional research is required that explores the extent to which these smartphone-related affordances shape users' perceptions of attachment. The present study addresses this question by examining the extent to which smartphone attachment results from the perceived value of smartphone usage.

2.4 | Perceived value-in-use as a source of smartphone attachment

Value means that something provides more benefits than sacrifices (Gordon et al., 2018). Customer perceived value has received considerable attention in the marketing literature (Grönroos

& Voima, 2013; Sweeney & Soutar, 2001; Woodruff, 1997; Zeithaml, 1988). However, this literature is based on a large number of distinct understandings. The present study uses the understanding of value as *perceived value-in-use* (Grönroos & Voima, 2013; Sweeney et al., 2018). In contrast to the value-in-exchange perspective (e.g., Sweeney & Soutar, 2001), this view captures individuals' value received during the usage of a product or service over time. Accordingly, value is seen as realized during the experiences of consumption rather than as embodied in products or services (Vargo & Lusch, 2004). This value-in-use perspective understands the consumer as a co-creator of value as opposed to being solely a receiver of value "embedded in tangible goods at the factory gate" (Macdonald et al., 2011). Value-in-use not only accumulates from previous and present experiences but also encompasses envisioned experiences (Helkkula et al., 2012). Individuals are expected to interfere with the outcome of usage (i.e., value-in-use) from the features of a product (Vargo & Lusch, 2004; Woodruff, 1997). Hence, previous work has conceptualized the perceived value of electronic services (Heinonen & Strandvik, 2009), smartphones (Chun et al., 2012), and mobile services (Japutra et al., 2021; Pihlström & Brush, 2008) using the perspective of value-in-use. In keeping with prior literature, the current study defines perceived value-in-use as the value a consumer receives from using a smartphone over time.

In addition to defining perceived value from the exchange or usage perspective, perceived value has been conceptualized in two different ways: an unfaceted (Zhang et al., 2020) or multifaceted (Kim et al., 2013; Youn, 2019) way. The latter is particularly appropriate for the current research context because it captures the diversity of the possible value received during smartphone usage. In keeping with previous research (Kim et al., 2013; Yeh et al., 2016), perceived value is composed of three facets: utilitarian, hedonic, and social value in this paper. *Utilitarian value* summarizes the perceived instrumental and functional benefits received using a product such as a smartphone (Babin et al., 1994). Smartphones' utilitarian value is determined by their user-friendliness (Mohd Suki, 2016), ability to save time (Kim et al., 2007), task-related productivity (Wong et al., 2019), and efficiency (Kim et al., 2013). In contrast to the utilitarian value, the hedonic value is predominantly received by nonfunctional benefits. Hedonic value refers to feelings and affective states received from personal rewards and fulfillment during product usage (Sheth et al., 1991). Hence, it involves emotive aspects of a consumer's experience with a product as a perceived sense of pleasure and enjoyment (Mohd Suki, 2016). Smartphone users tend to become emotionally driven in seeking enjoyment, fun, relaxation, and sensory stimulation while using their smartphone (Chun et al., 2012). The device is able to provide comfort to people recovering from stressful situations (Shen et al., 2019) and is increasingly used to seek entertainment (Jeong et al., 2016). Hence, smartphones are not only simple electronic devices whose outcome of usage is to fulfill tasks but are also entertainment-oriented tools that provide hedonic experiences to their owners. Individuals may assess smartphone usage not only by hedonic and utilitarian value but also by social value. Users of communication technology can derive respect and admiration from peers as a result of their technology usage (Lin & Bhattacherjee, 2010). Moreover, the use of a smartphone enables social interactions and represents an interface through which users "can build enduring and engaging relationships that can incorporate friends, workers and others and social networks" (Kim et al., 2013), also enhancing perceptions of social value (Figure 1).

In summary, this study is the first to integrate the perspectives on perceived value in the literature (i.e., value-in-use and the multifaceted nature of value) and to suggest that the perceived value-in-use of smartphones can have a utilitarian, a hedonic, and a social facet. Drawing on involvement-commitment theory (Beatty et al., 1988), this study suggests that the perceived value-in-use of a smartphone positively influences consumers' smartphone attachment. In other words, consumers' attachment to smartphones is expected to be strengthened by the increasing value-in-use of smartphones. Involvement-commitment theory (Beatty et al., 1988) proposes that consumers' greater involvement in brand-related activities leads to greater commitment to the brand. This knowledge can be transferred to develop a value-attachment hypothesis. Value-in-use is closely related to the understanding of the active involvement of the consumer. Following the idea of value-in-use, consumers receive value from active involvement (i.e., interaction) with a smartphone (e.g., adapting services on the smartphone to their own needs). Commitment, in turn, is comparable with the attachment concept because it also has both cognitive and emotional elements (Arriaga & Agnew, 2001). To sum up:

Hypothesis 1 *The greater the perceived hedonic value-in-use, the greater the smartphone attachment.*

Hypothesis 2 *The greater the perceived utilitarian value-in-use, the greater the smartphone attachment.*

Hypothesis 3 *The greater the perceived social value-in-use, the greater the smartphone attachment.*

2.5 | Control variables

As a robustness check, we included the measure of self-brand connection. Previous research has found that self-brand connection, which describes "the strength to which a consumer's self-concept is connected to the brand" (van Doorn et al., 2010), exerts an important impact on the relationship to the brand and to brand-related entities such as products (Burke & Stets, 1999). The smartphone brand represents an important characteristic of the smartphone because its usage is associated, for instance, with a brand-specific operating system. Hence, one can assume that the greater the perceived self-connection with the smartphone brand is, the greater the attachment to the smartphone will be. As a second control variable, we included individuals'

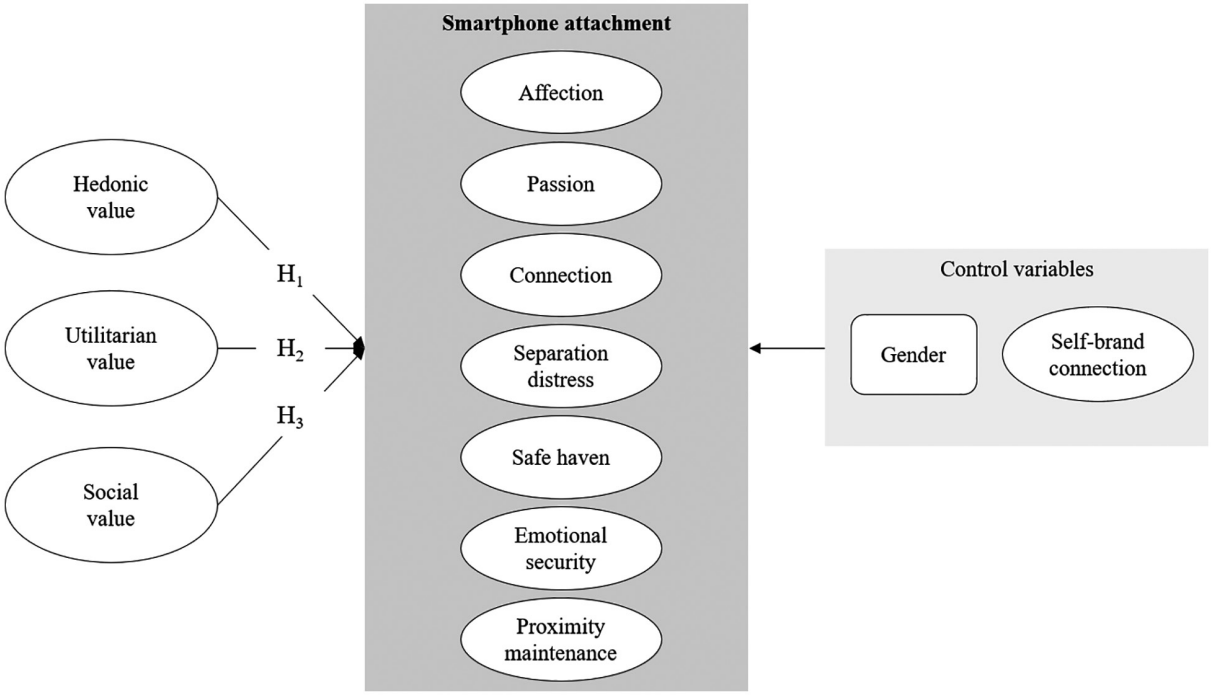

FIGURE 1 Research model

gender, which has been repeatedly included in previous studies as a predictor of smartphone attachment (Konok et al., 2016; Trub & Barbot, 2016).

3 | METHODOLOGY

3.1 | Procedures and sample

This study used a self-administered survey that was conducted in Germany from 21 June to 23 July 2018. In accordance with prior research on mobile attachment (e.g., Trub & Barbot, 2016), participants were recruited in the following ways: (1) we sent emails to peers asking them to participate in the survey and to distribute the link to the survey among their peers, and (2) we posted the link to the survey in different groups on social media platforms such as Facebook. These efforts led to 872 visits to the welcome page of the online questionnaire. The final sample included 462 respondents, 12 of whom were screened out because they did not fulfill the participation criterion of being a smartphone owner. For data analysis, 411 data sets were retained because the remaining data sets comprised a major part of missing information or contained implausible answers. The sample was 165 (40.1%) male and 240 (58.4%) female respondents. The respondents' age groups were 16–26–24 (36.0%), 25–44 (39.4%), and 45–64 (22.1%). A majority of the sample were students (47.9%).

Respondents proceeded to answer the questionnaire after informed consent was obtained. The questionnaire consisted of four sections and was made available to participants in German. Before questioning, we assured respondents of their anonymity and emphasized that there were no right or wrong answers. Afterward, qualifying questions were asked to check whether the respondents owned at least one smartphone. If the respondents indicated that they possessed multiple smartphones at the time of questioning, we asked them to refer all the subsequent responses to only one of the smartphones they possessed. Then, we collected information on the respondents' smartphone usage behavior. More than half of the respondents (62.0%) indicated, for instance, that they had owned their smartphone for less than 24 months. On average, respondents revealed that they used their smartphone predominantly for private issues (M = 91.91%, SD = 48.36%). Finally, we collected information regarding the core variables of our model and the sociodemographic background of the respondents. Items measuring each of the latent variables were arranged in random order. In this way, we additionally accounted for common method variance (CMV), which is likely to occur when a single instrument is used to gather data for both exogenous and endogenous variables (Podsakoff et al., 2003). Moreover, prior to the main data collection, a pretest of the questionnaire was conducted with respondents from a similar sample as the main study. Their feedback served to ascertain face and content validity and thus avoided unfamiliar or complicated terms or sentences.

3.2 | Measures

This study borrowed pretested measures from prior studies and adapted them to reflect the context of this research (see Appendix). To assess *affection*, *passion*, and *connection*, we used the scales developed by Thomson et al. (2005). In their work on emotional attachment,

TABLE 1 Reliability and validity of the measurement models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
AFF (1)	**0.789**										
PASS (2)	0.365	**0.665**									
CONN (3)	0.618	0.598	**0.705**								
PROXI (4)	0.195	0.352	0.324	**0.736**							
SAFE (5)	0.402	0.413	0.490	0.585	**0.699**						
EMO (6)	0.415	0.392	0.503	0.487	0.627	**0.673**					
SEPA (7)	0.266	0.325	0.370	0.714	0.602	0.448	**0.681**				
SBC (8)	0.352	0.212	0.373	0.118	0.314	0.207	0.155	**0.682**			
UTILI (9)	0.059	0.160	0.045	0.291	0.135	0.197	0.261	0.006	**0.620**		
HEDON (10)	0.284	0.377	0.312	0.379	0.593	0.429	0.526	0.166	0.237	**0.649**	
SOCIAL (11)	0.434	0.305	0.419	0.176	0.423	0.308	0.203	0.500	0.030	0.246	**0.663**
FL	**0.833**	**0.833**	**0.820**	**0.853**	**0.808**	**0.786**	**0.757**	**0.794**	**0.690**	**0.752**	**0.815**
CR > 0.7	**0.918**	**0.799**	**0.878**	**0.848**	**0.823**	**0.804**	**0.865**	**0.865**	**0.829**	**0.847**	**0.865**

Note: The off-diagonal values are the squared interconstruct correlations, while the diagonal values (in bold) are the AVEs.

Abbreviations: AFF, affection; CONN, connection; CR, composite reliability; EMO, emotional security; FL, lowest factor loading; HEDON, hedonic value; PASS, passion; PROXI, proximity; SAFE, safe haven; SBC, self-brand connection; SEPA, separation distress; SOCIAL, social value; UTILI, utilitarian value.

Thomson et al. (2005) also measured *proximity maintenance*, *emotional security*, *safe haven*, and *separation distress*.[1] Perceived social value and perceived emotional value were measured with statements using the scales by Pihlström and Brush (2008). Perceived utilitarian value was captured using a scale with items by Chun et al. (2012). Finally, we used the scale by Escalas and Bettman (2003) to measure self-brand connection. Therefore, we asked respondents at the beginning of the questionnaire which brand of smartphone they possessed. All items were measured using five-point Likert scales. The Appendix provides a list of the employed measures.

4 | RESULTS

We analyzed the data using a structural equation modeling approach. In particular, MPlus 7.4 software was applied to first conduct an assessment of the measurement model with confirmatory factor analysis (CFA). Second, the same software was used to test the structural model and the associated hypotheses. To account for endogeneity, we additionally used the software R.

We estimated both the measurement and the structural model using the maximum likelihood procedure with robust standard errors (Chou et al., 1991). To evaluate the models, we used the following fit indices: comparative fit index (CFI), Tucker–Lewis index (TLI), standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), ratio of the chi-square (X^2) value, and the degrees of freedom (*df*). Following Hair et al. (2014), the CFI and TLI values should be above 0.90, the SRMR should be 0.08 or less, and the RMSEA should be less than 0.07 to reflect a good model fit. The X^2/df-ratio should be smaller than five (Taylor & Todd, 1995).

4.1 | Measurement model

The results of the CFA showed a good fit because the fit indices were above the recommended thresholds ($X^2/df = 1.757$, RMSEA = 0.043, CFI = 0.964, TLI = 0.955, SRMR = 0.034). Table 2 depicts the psychometric properties of the latent constructs. The values for the composite reliability (CR) and the average variance extracted (AVE) exceeded the recommended thresholds of 0.60 and 0.50, respectively (Bagozzi & Yi, 1988; Fornell & Larcker, 1981). Hence, construct reliability and convergence validity were supported. Discriminant validity was assessed with the Fornell and Larcker (1981) criterion, which requires that the square root of each construct's AVE be greater than the constructs' highest squared correlation shared between the construct and the other constructs in the model. As Table 1 shows, this criterion was also met.

4.2 | Common method variance

Before testing the hypotheses, further statistical analyses were performed to statistically check the potential occurrence of CMV. First, we performed Harman's single-factor test (Podsakoff et al., 2003). The results revealed that one factor explained less than 50% of the total variance. Moreover, the fit of the single-factor model

[1]We received the items upon request.

TABLE 2 Structural model

	Model without control variable	Model with control variable
Hypotheses tests		
Hypothesis 1: Hedonic value → emotional smartphone attachment		
Hedonic value → affection	0.259***	0.227***
Hedonic value → passion	0.365***	0.350***
Hedonic value → connection	0.337***	0.289***
Hedonic value → separation distress	0.549***	0.520***
Hedonic value → safe haven	0.580***	0.553***
Hedonic value → emotional security	0.401***	0.388***
Hedonic value → proximity maintenance	0.365***	0.346***
Hypothesis 2: Utilitarian value → emotional smartphone attachment		
Utilitarian value → affection	0.025ns	0.049ns
Utilitarian value → passion	0.163**	0.175***
Utilitarian value → connection	−0.037ns	−0.008ns
Utilitarian value → separation distress	0.219***	0.233***
Utilitarian value → safe haven	0.023ns	0.038ns
Utilitarian value → emotional security	0.193***	0.203***
Utilitarian value → proximity maintenance	0.365***	0.339***
Hypothesis 3: Social value → emotional smartphone attachment		
Social value → affection	0.528***	0.372***
Social value → passion	0.342***	0.269***
Social value → connection	0.485***	0.308***
Social value → separation distress	0.140**	0.068ns
Social value → safe haven	0.358***	0.267***
Social value → emotional security	0.322***	0.257***
Social value → proximity maintenance	0.182***	0.128*
Controls		
Self-brand connection/gender → affection		0.235***/0.014
Self-brand connection/gender → passion		0.113ns/−0.013
Self-brand connection/gender → connection		0.283***/0.068*
Self-brand connection/gender → separation distress		0.129*/0.089**
Self-brand connection/gender → safe haven		0.151**/0.053ns
Self-brand connection/gender → emotional security		0.129*/0.008ns
Self-brand connection/gender → proximity maintenance		129*/0.049ns
Model fit		
X^2/df	1.778	1.762
RMSEA	0.046	0.043
CFI	0.964	0.962
TLI	0.954	0.952
SRMR	0.034	0.036

Note: Numbers between brackets indicate the confidence interval (95%).
Abbreviations: ns, nonsignificant.
***$p < .01$; **$p < .05$; *$p < .1$.

was unsatisfactory (CFI = 0.624; TLI = 0.595; RMSEA = 0.129, SRMR = 0.111). Second, we realized a full collinearity assessment by running multiple regressions and thereby obtained variance inflation factors (VIFs) ranging from 1.894 to 6.135. Hence, all values were below the recommended value of 10 (Diamantopoulos, 2011). Except for the VIF of safe haven, all remaining values were even

below the stringent VIF threshold of 5 (Kock & Lynn, 2012). Based on these results, CMV did not seem to be a major source of variations in the model.

4.3 | Structural model and hypothesis testing

Overall, we found that both the structural model with the control variables and the structural model without the control variables adequately fit the data (Table 2).

When controlling for self-brand connection and gender, the perceived hedonic value of smartphone usage positively influences affection ($\beta = 0.227$, $p < .001$), passion ($\beta = 0.350$, $p < .001$), connection ($\beta = 0.289$, $p < .001$), separation distress ($\beta = 0.520$, $p < .001$), safe haven ($\beta = 0.553$, $p < .001$), emotional security ($\beta = 0.388$, $p < .001$), and proximity maintenance ($\beta = 0.346$, $p < .001$). Hence, Hypothesis 1 can be accepted. While the utilitarian value of smartphone usage positively influences passion ($\beta = 0.175$, $p < .001$), separation distress ($\beta = 0.233$, $p < .001$), safe haven ($\beta = 0.038$, $p < .001$), emotional security ($\beta = 0.203$, $p < .001$), and proximity maintenance ($\beta = 0.339$, $p < .001$), it does not affect affection ($\beta = 0.049$, $p = .663$) or connection ($\beta = -0.008$, $p = .512$). Hence, Hypothesis 2 can be partially accepted. The social value of smartphone usage positively influences affection ($\beta = 0.372$, $p < .001$), passion ($\beta = 0.269$, $p < .001$), connection ($\beta = 0.308$, $p < .001$), safe haven ($\beta = 0.267$, $p < .001$), emotional security ($\beta = 0.257$, $p < .001$), and proximity maintenance ($\beta = 0.128$, $p < .001$), but it does not influence separation distress ($\beta = 0.068$, $p = .386$). Hence, Hypothesis 3 can be partially accepted.

4.4 | Endogeneity

Although we considered available theory and control variables for our assumptions, it is not unlikely that the facets of perceived value-in-use may exhibit endogeneity from both omitted variables (e.g., general attachment anxiety; Konok et al., 2016) and simultaneity (e.g., evidence shows that emotion-related perceptions can also guide cognitive perceptions; Youn, 2019). These issues may cause a correlation between the independent variable(s) and the dependent variable error term, leading to biased and unreliable results. To test whether endogeneity represents a threat to the results of the current research, we used an analytical approach, namely, the Gaussian copula approach, for which no additional variables are needed (Rutz & Watson, 2019). In doing so, we used the R program and the functions implemented by Hult et al. (2018) to create Gaussian copulas. We also used this program and the respective functionalities to check the assumptions of the Gaussian copula approach that the variables that might evoke endogeneity are nonnormally distributed. The results of the Kolmogorov-Smirnov test with Lillefors correction to the standardized composite scores of perceived utilitarian, hedonic, and social value reveal that all scores are nonnormally distributed. Subsequently, we calculated the copulas (i.e., $c_{utilitarian}$, $c_{hedonic}$, and c_{social}) and integrated the values to our *SEM* in Mplus. A bootstrapping procedure ($n = 10{,}000$ samples) and both a simultaneous and sequential inclusion of the copulas showed that none of the considered copulas exerted a significant effect on the dependent variables (e.g., $c_{utilitarian}$ → separation distress: $b = 0.008$, 95% CI [−0.031, 0.064], $c_{hedonic}$ → separation distress: $b = -0.451$, 95% CI [−2.055, 0.077], and c_{social} → separation distress: $b = 0.001$, 95% CI [−0.109, 0.206][2]). Overall, this robustness check indicates that endogeneity due to perceived utilitarian, hedonic, and social value is not a concern in this research.

5 | DISCUSSION

This study offers a comprehensive view of the concept of *smartphone attachment* and empirically demonstrates that this specific form of attachment to nonhuman objects has many faces. Emotionally, for smartphone users of different age groups, smartphone attachment can be described by seven distinct facets, namely, feelings of *affection*, *passion*, and *connection* and fundamental functions of attachment, namely, *safe haven*, *emotional security*, *proximity maintenance* and *separation distress*. Most interestingly, this research reveals that consumers' smartphone attachment encompasses strong positive (i.e., passion) and negative (i.e., distress) as well as cognitive (e.g., perceived safe haven) and emotional (e.g., passion) elements. Prior research on attachment has referred to one specific perspective and thus provided an incomplete picture (Holte & Ferraro, 2021; Youn, 2019) while only recommending the integration of different facets to gain a broad understanding of consumer attachment (Berlo et al., 2020). Because some of the facets have been used to describe attachment to humans (Bowlby, 1977), the findings of this study imply that consumers have a similar attachment to their smartphone as to humans, supporting existing findings on smartphone attachment (Konok et al., 2017).

Our findings further reveal that this comprehensive picture of consumers' smartphone attachment is particularly valuable for understanding the role of the perceived value-in-use of smartphones as a source of smartphone attachment. Overall, this research reveals that consumers are attached to their smartphones because they provide value during usage. Therefore, this research advances previous research by providing evidence that attachment to the object *smartphones* is a function of perceived value-in-use (Nie et al., 2020). In other words, the greater smartphone users' perceived value-in-use is, the more likely users are to experience affection, passion, and connection toward their smartphone and to seek proximity to their smartphone. Similarly, the more emotional security or relaxation users feel from smartphone usage, the more distress they experience when separated from their smartphone. Hence, these findings support our initial expectations that build on available theory (Beatty et al., 1988).

[2]Further results are available upon request.

TABLE 3 Key results

	Utilitarian value-in-use	Hedonic value-in-use	Social value-in-use
Affection	×	●	●
Passion	●	●	●
Connection	×	●	●
Proximity maintenance	●	●	●
Safe haven	×	●	●
Emotional security	●	●	●
Separation distress	●	●	×

Note: ● = significant effect; × = nonsignificant effect.

More specifically, our findings show that while passion, proximity maintenance, and emotional security are directed by a combination of social, utilitarian, and hedonic value-in-use, separation distress is strengthened with increasing perceptions of both hedonic and utilitarian value-in-use. Finally, the greater both the social and the hedonic value-in-use are, the greater the feelings of connection, affection, and safe haven to the smartphone (Table 3).

Interestingly, the hedonic facet of value-in-use is the only value-in-use facet that affects all the considered facets of smartphone attachment. The outstanding relevance of recreational smartphone features that might affect perceived hedonic value-in-use has been the subject of previous research findings (Fullwood et al., 2017). However, together with increasing perceived utilitarian value-in-use, augmented hedonic value-in-use can also exert separation distress. In keeping with previous research (Fullwood et al., 2017), this finding underlines the outstanding relevance of both hedonic and utilitarian value-in-use for the positive and negative sides of attachment to smartphones. Perceived social value-in-use, and hence the perceived ability to satisfy needs such as social interaction, acceptance, and self-approval during smartphone usage, does not affect separation distress after controlling for self-brand connection and gender.

6 | CONCLUSION

6.1 | Theoretical implications

The findings of this research contribute to the literature on smartphone attachment and to the literature on consumer attachment in general. First, the present work enriches previous research on consumer attachment (Holte & Ferraro, 2021; Zhang et al., 2020) by integrating the key conceptualization of attachment available in consumer (Thomson et al., 2005) and information system research (Ainsworth et al., 1978; Bowlby, 1969). In this way, the current study shows that emotions and beliefs as well as positive and negative facets of smartphone attachment are important to gain a comprehensive understanding of consumer attachment to smartphones.

Second, this study develops and provides evidence for the value attachment hypothesis. In this way, this research contributes not only to the literature on consumer attachment but also to the literature on consumers' perceived value-in-use. This research outlines the relevance of the perceived value-in-use of a nonhuman attachment object as a source of the psychological bond between individuals and nonhuman objects. In this way, it focuses on the determinants of smartphone attachment, whereas previous research has often looked at the effects (Berlo et al., 2020; Sultan et al., 2009). In addition, the findings of this study contribute to existing theory as they show that increasing value-in-use can also induce undesirable outcomes, such as distress. This finding significantly broadens the positivist views in research on value perceptions (Vargo & Lusch, 2004). Moreover, our findings emphasize the relevance of distinguishing between the different facets of value-in-use when attempting to fully understand the effects of value-in-use (Grönroos & Voima, 2013).

6.2 | Practical implications

This study's findings offer practical implications for both marketers and public policy. For managers of digital products (e.g., smartphones) who aim to strengthen the bond between their products and the consumer, the findings of the current research suggest that it is particularly important to increase perceived hedonic value-in-use since this perception occupies a dominant role in the promotion of smartphone attachment. Marketers should identify and embed relevant features that enable the creation of more enjoyable and pleasurable experiences during smartphone usage instead of focusing solely on functional features. However, focusing on enhancing both perceived hedonic and utilitarian value-in-use could also evoke emotions such as distress, which marketers might want to avoid. Hence, to find the right balance, marketers are well advised to consciously choose a favorable combination of hedonic and functional value-in-use levels. This might be a challenging task that requires both in-depth research before market introduction and precise goal setting. Moreover, because smartphone attachment, in general, can have detrimental effects (e.g., smartphone addiction) (Hartanto & Yang, 2016; Kim & Koh, 2018), marketers (including marketers of services that promote the value-in-use of smartphones) should generally reflect on the extent to which they want to enhance smartphone attachment in a way that warrants their responsibility at both an individual and a societal level. Developing products or services that enable responsible usage is an important avenue in that respect.

The negative side of emotional smartphone attachment should concern not only marketers but also public policy or, more specifically, organizations that aim to manage addictions or want to promote public health. Our findings can provide these parties with insights into how to manage both experienced distress and smartphone attachment in general.

6.3 | Limitations and future research

This research has some limitations that should be addressed in future research. One of these limitations is the measurement of emotional attachment. Although established concepts and measures were used to capture smartphone attachment, the facets considered still have limitations. First, the negative side of emotional smartphone attachment should be reflected from additional perspectives in future research. Negative emotions such as anger, outrage, and frustration should also be reflected. Neuroscientific methods could be used as an additional way to capture the valence. Moreover, the potential interrelationships between the considered facets of the introduced concept of emotional smartphone attachment should receive more attention in future research.

This research focused on the direct antecedents of smartphone attachment and thus neglected to shed light on the outcomes. To advance existing research, future research would benefit from considering desirable and undesirable outcomes of smartphone attachment in one study. Moreover, future research should consider antecedents to the perceived value-in-use of smartphones. It could be interesting to examine which smartphone features or applications are related to which facet of value-in-use. To overcome the limitations of cross-sectional studies, experimental or longitudinal studies should be performed. Finally, the results of this study are based on a convenience sample. Future research should validate this study's findings with a sample with a more diverse sociodemographic background. Moreover, it could be fruitful to understand how age determines how smartphone attachment is shaped by the different value-in-use facets (Berlo et al., 2020).

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CONFLICT OF INTEREST

The authors have declared no conflicts of interest for this article.

DATA AVAILABILITY STATEMENT

Authors can provide data upon request.

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APPENDIX

EMPLOYED MEASURES

Perceived social value
Using my smartphone helps me to feel accepted by others
Using my smartphone makes a good impression on other people
Using my smartphone gives me social approval
Perceived hedonic value
Using my smartphone gives me pleasure
Using my smartphone makes me feel good
Using my smartphone makes me feel relaxed
Perceived utilitarian value
Using my smartphone is useful in my life
Using my smartphone improves my efficiency
Using my smartphone saves time
Affection
Assess the extent to which the following words describe your typical feelings toward your smartphone
Affectionate
Friendly
Loved
Passion
Assess the extent to which the following words describe your typical feelings toward your smartphone
Passionate
Delighted
Connection
Assess the extent to which the following words describe your typical feelings toward your smartphone
Connected
Bonded
Attached
Separation distress
If my smartphone were permanently gone from my life. I'd be upset
I miss my smartphone when it is not around
Losing my smartphone forever would be distressing to me
Proximity maintenance
I like to have my smartphone or things that remind me of it near me
I can really relax with my smartphone
I prefer to have my smartphone or things that remind me of it near me than far away
Emotional security
My smartphone is always there for me
My smartphone helps me to take on the world
Through good times and bad. I can always count on my smartphone
Safe haven
My smartphone has a relaxing effect on me when I'm stressed
When I'm feeling down, I often turn to my smartphone
If something upsets me, my smartphone can make me feel better
Self-brand connection
Brand X reflects who I am
I can identify with brand X
I feel a personal connection to brand X
I (can) use brand X to communicate who I am to other people
I think brand X (could) help(s) me become the type of person I want to be