



Glued to your phone? Generation Z's smartphone addiction and online compulsive buying

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ABSTRACT

Recent studies found that smartphone usage has become an addiction nowadays, especially among young consumers. The abuse of these digital devices affects individuals' social life and well-being. Of particular interest in this regard is the study of compulsive buying, as it has been noted a possible co-occurrence of this disorder with smartphone abusive tendencies. With a model theoretically anchored in the stimulus-organism-response framework, the current study investigates the novel connection between smartphone addiction and online compulsive buying in a sample of 275 Generation Z consumers. The proposed model integrates mood regulatory behaviours and flow experiences associated with smartphone addiction to affect online compulsive buying behaviours. The current research contributes to the literature on compulsive buying behaviours and smartphone addiction by offering empirical evidence that (1) smartphone addiction and online compulsive buying are related; and (2) mood regulatory behaviours and flow experience act as strengthening factors in this relationship. This article advances knowledge in terms of theory and practice on Generation Z consumers' smartphone addiction and online compulsive buying.

1. Introduction

The wide diffusion of mobile devices and smartphones has significantly changed various aspects of our lives (Ameen et al., 2020a). Entertainment, work, social interactions and education are vehiculated through the screen of a smartphone. Smartphones have modified the spending habits of consumers to the extent that some insiders expect mobile commerce sales to grow up to 700 billion dollars by 2025 (Bloomberg, 2021). Nonetheless, recent years have also witnessed the offspring of new forms of mobile-related behavioural addictions, especially among young individuals, such as smartphone addiction (Olson et al., 2022). Smartphone addiction is defined as the excessive use of smartphones characterised by uncontrolled usage, neglect of daily activities, and negative consequences for the user's life (Otsuka et al., 2022). It affects a person's social, physical, and psychological functioning as it may induce states of depression, stress, sleep disorders, pain in the thumbs, decreased pinch strength, and reduced hand functions (Bian & Leung, 2015; Lee et al., 2014; Samaha & Hawi, 2016; Inal et al., 2015). It may co-occur with other behavioural addictions such as

compulsive buying (Jiang & Shi, 2016).

The potential link between compulsive buying and the online environment has been explored in recent years by introducing the label 'online compulsive buying' (Zheng et al., 2020). Both traditional and online compulsive buyers are characterised by a loss of spending control, a feeling of gratification and release of tension following the purchase, and a senseless and item-unrelated repetition of this dysfunctional behaviour (Duroy et al., 2014; Müller & Mitchell, 2014). Lyons and Henderson (2000, p.739) stated that online compulsive buying is "an old problem in a new marketplace". As smartphones offer access to the internet, they may act as an enabler for online compulsive buying behaviours. These devices offer intriguing, stimulating and customised digital environments (e.g., mobile shopping platforms). Furthermore, they allow individuals to make purchases with unprecedented ease and availability and avoid interaction with others (Kukar-Kinney et al., 2016). Altogether, this may facilitate the emergence and consequent satisfaction of those urges to purchase felt by compulsive buyers.

Smartphones are a fundamental tool for most people nowadays, and young generations make the most intense use of and are strongly

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attached to these devices. Nevertheless, an individual's excessive attachment to their smartphone has also dark sides (Lee et al., 2014). The diffusion of smartphones in people's everyday lives has been paralleled by vast debate in the literature discussing the positive or negative relationship between daily screen time and health and behavioural outcomes (Ratan et al., 2021). However, much about this relationship lies under-researched. There is no clear understanding of how mobile devices may influence the shopping process (Shankar et al., 2016) and if - in some cases - may lead to dysfunctional shopping behaviours, such as compulsive buying. Moreover, the pandemic substantially increased the time people spent on their smartphones (Elhai et al., 2020; Serra et al., 2021) and mobile shopping platforms (Chopdar et al., 2022). Thus, this research aims at exploring the potential link between smartphone addiction and compulsive buying behaviour. In particular, this research focuses on generation Z (Gen Z) consumers who constitute the biggest future challenge for marketing (Priporas et al., 2017) and represent over one-third of the Global population (Schroders, 2021).

Thus, the current research contributes to the current body of knowledge in three ways. First, it highlights a novel connection between dysfunctional smartphone use in young individuals and the development of compulsive buying tendencies. Second, it highlights the pivotal role that the consumer's internal states (*i.e.*, mood regulation mechanism and flow experience) play in the development of compulsive behaviours also in online environments. Third, this study contributes to the existing literature on Gen Z behaviour by addressing a gap on the consequences of one of their behavioural traits (*i.e.*, smartphone addiction) in terms of leading to addictive shopping behaviour. Despite the existence of previous studies on smartphone addiction (*e.g.*, Hu et al., 2022; Li et al., 2022; Noë et al., 2019; Olson et al., 2022), its impact on compulsive buying behaviour has not been investigated before, particularly among Gen Z consumers.

Based on the stimulus-organism-response (S-O-R) model (Mehrabian & Russell, 1974), this research proposes a new framework to explore the relationship between online compulsive buying and smartphone addiction in Gen Z consumers. In addition, serial mediation analysis was used to prove the results empirically and, to overcome some of the limitations related to symmetrical modelling, such as multiple regression analysis and structural equation modelling (Woodside, 2019), fuzzy-set qualitative comparative analysis (fsQCA) was also employed to highlight which causal configurations better explain high levels of online compulsive buying.

The remainder of the paper is organised as follows. The next section offers a comprehensive review of mood regulation and flow experience concepts and their relation to smartphone addiction and online compulsive buying. Section three describes the sample and the empirical method. Section four includes the main results of the serial mediation analysis and fsQCA. In Section five, the insights obtained from the serial mediation and fsQCA are discussed, and practical and theoretical implications are highlighted. Finally, in section six, the study's limitations are addressed with considerations about future research.

2. Theoretical background

2.1. Generation Z

Gen Z comprises young adults born in 1995 or later (Fister-Gale, 2015) who have not experienced the world without digital technology (Ameen & Anand, 2020; Ameen et al., 2021). These digitally native individuals are tech-savvy, have grown up with high exposure to social media and mobile technologies (Fister-Gale, 2015) and are born into a VUCA (volatility, uncertainty, complexity, and ambiguity) world (Casalegno et al., 2022). Wood (2013) and Priporas et al. (2017) explain that four trends characterise Gen Z: (1) An interest in new technologies (2) An insistence on ease of use (3) A desire to feel safe; and (4) A desire to temporarily escape the realities they face. They have experienced a lot in their brief lifetimes and have encountered political, social,

technological and economic changes. Gen Z as consumers are less loyal to retailers, and they expect retailers to get the product to them, as a consequence, retailers feel pressure to find new ways to grab and hold consumers' attention (Priporas et al., 2017). They have higher expectations, no brand loyalty and care more about the experience (Schlossberg, 2016). However, these individuals are considered the key generation to lead m-commerce consumer behaviour in the upcoming years (Monaco, 2018). Thus, studying Gen Z consumers is utterly valuable from a marketing perspective. Some estimates affirm that the cohort has \$360 billion in disposable income (Pollard, 2021) and is destined to grow steadily in the future.

Gen Zs are constantly connected and prefer communication via technology rather than direct contact (Poláková & Klímová, 2019). Nevertheless, technology does not only shape Gen Z's social lives but other aspects, including their physical well-being, learning processes, and social and professional identities. Furthermore, because of their dramatic exposure to global mass media, popular culture and international companies' marketing activities, they share a common consumer culture and traits (Benasso & Cuzzocrea, 2019; Ng et al., 2019). Their lives are characterised by multiple information flows and frequent-and-fast interactions with content and people. Most of these flows of information are vehiculated through a smartphone. Coherently with the conceptualization of smartphones as a 'package of stimuli' proposed in this research, some authors state that smartphones are, indeed, an "everything hub" for Gen Z including watching a TV show, listening to a song, chatting with a friend, playing a videogame all can be done on one's phone (Turner, 2015). Not surprisingly, it is estimated that the average Gen Z individual spends 4:15 h per day looking at his/her smartphone screen. (GlobalWebindex, 2019). Their dependence on smartphones also has led some authors (Bragazzi & Del Puente, 2014) to propose the inclusion of nomophobia (*i.e.*, the fear of being without a smartphone) in the new Diagnostic and Statistical Manual of Mental Disorders (DSM). Research addressing this topic has highlighted that the strong attachment of Gen Z towards mobiles may be a way to cope with loneliness (Gentina & Chen, 2019), stress, anxiety (Vahedi & Saiphoo, 2018), and that smartphone addiction may also be related to escapism (Wang et al., 2015). These devices, for Gen Z, are an integral part of their daily lives and represent a social hub that provides them with inspiration, interactivity, and creativity. However, researchers have also highlighted the downside of Gen Zs' overattachment, namely the abuse of mobile devices has been connected in Gen Z to a lack of physical activity, reduced sleep quality (Zhai et al., 2020), academic cheating (Gentina et al., 2018), depression (Stanković et al., 2021) and reduced attention to external stimuli (Mourra et al., 2020).

Smartphones also affect Gen Zs' shopping behaviours. This cohort makes the most intensive use of mobile shopping apps (AppAnnie, 2020), and the pandemic may have further reinforced this trend. Research addressing this mainly focuses on this generation's expectations and attitudes toward mobile shopping (Goldring & Azab, 2021; Lissitsa & Kol, 2021), while there is a paucity of studies addressing the potential downsides of mobile shopping in Gen Z. Several studies have found a negative correlation between compulsive buying and age, affirming that young consumers are more prone to display compulsive buying behaviour (*e.g.*, Dittmar, 2005; Adamczyk et al., 2020). Furthermore, sparse evidence suggests that smartphones may increase online purchases (*e.g.*, Eriksson et al., 2017; Bozaci, 2020). Thus, given the smartphone-dependent and highly stimulating environment in which Gen Z live and their higher likelihood of being compulsive buyers, it is plausible that smartphones may promote the enactment of other compulsive behaviours (Eide et al., 2018; Griffiths et al., 2016). Overall, there is a need to understand better the underlying mobile-related mechanism that may influence dysfunctional purchasing behaviours (*i.e.*, compulsive buying), especially among Gen Z individuals.

2.2. Smartphones in an extended S–O–R model-based conceptualization

The S–O–R model suggests that contextual stimuli (S) may influence an individual's cognitive and affective states (*i.e.*, related to their organism, O), triggering a behavioural response (R) (Mehrabian & Russell, 1974). In recent years, several investigations have extended the S–O–R model to the context of information technology to deepen our understanding of human-machine interactions (Gatautis et al., 2016; Luqman et al., 2017; Sohaib & Kang, 2015). Furthermore, the S–O–R model has been applied heavily in studies focusing on the use of mobile phones (Chen & Yao, 2018; Chopdar & Balakrishnan, 2020; Fang et al., 2017; Hew et al., 2018; Zhang et al., 2020), and online mobile-related behaviour (Chan et al., 2017). Within this theoretical framework, a smartphone's characteristics represent not just a stimulus but a 'package of stimuli' (Luqman et al., 2017). The stimuli extracted from the virtual environment trigger the formation of affective and cognitive states in the consumers and ultimately lead to a specific behavioural response. Thus, the current research posits that those over-attached to their devices (*i.e.*, affected by smartphone addiction) will receive a higher number of stimulative inputs.

In accordance with the S–O–R model, the internal cognitive state of the users (O) are mood regulatory behaviours and flow experiences. Moods are defined as "feelings that tend to be less intense than emotions and that often (though not always) lack a contextual stimulus" (Hume, 2012, p. 260). Moods and emotions diverge in intensity and duration as the former last longer and are less intense (Larsen, 2000). Furthermore, while emotions are reactions to external events, moods are responses to the state of the personal inner self (Larsen, 2000; Morris, 1992). Consequently, mood regulation consists of all those actions and behaviours aimed at altering the subjective state (Larsen, 2000). The other cognitive state which is triggered in smartphone over-attached users is flow. Flow experiences have been defined as a cognitive state of total absorption in an activity characterised by pleasant feelings and a loss of sense of time (Csikszentmihalyi, 1975). In human-machine interactions, this flow state is characterised by a total concentration on the activity and a sense of enjoyment (Ghani & Deshpande, 1994).

Previous studies generally agree that a flow state is something that most individuals have experienced in their lives through sports, board games, dancing, reading, watching television, using smartphones, and shopping (Gao & Bai, 2014; Liu et al., 2016; Nanda & Banerjee, 2020). Flow plays a significant role in understanding individuals' online behaviour (Islam et al., 2021). Moreover, flow experiences facilitate exploratory consumer behaviours, causing, for example, an increase in the time spent online. While most studies tend to overlook the downsides related to flow experience, some scholars have recently started to relate flow experience and mobile phone addiction, advocating for a possible connection between the two (Chen et al., 2017; Lee & Shin, 2016; Wang et al., 2020).

Besides being the primary vehicle for social interaction, smartphones are among the most preferred platforms for young individuals for shopping (Ameen & Anand, 2020; Bernstein, 2015). Furthermore, mobile shopping offers consumers the possibility to purchase products in a cashless manner while remaining hidden from the scrutiny of others, features that may trigger the occurrence of compulsive buying behaviours (Dittmar et al., 2007). Thus, smartphones may also be means through which compulsive buyers satisfy those uncontrollable urges that characterise their pre-purchase phase.

Compulsive buying is "an uncontrollable drive or desire to obtain, use, or experience a feeling, substance, or activity that leads an individual to repetitively engage in a behaviour that will ultimately cause harm to the individual" (O'Guinn & Faber, 1989, p. 148). Compulsive buying is an addiction associated with guilt, harm, and a repetitive and irresistible urge to purchase goods (Piquet-Pessôa et al., 2014) that are often inexpensive and useless (Lejoyeux & Weinstein, 2010) and may also emerge online (Duroy et al., 2014). Compulsive buying has been traditionally related to several environmental and psychological factors

(Faber & O'Guinn, 2008; Frost et al., 2002; Valence et al., 1988). However, most research on compulsive buying focuses on physical or general online settings. On the contrary, the current study examined online compulsive buying in relation to smartphone addiction. M-commerce is steadily growing, and the mobile environment is characterised by other factors that may prompt compulsive behaviours in users. For instance, overspending tendencies may be fuelled by the easy availability of products, engaging mobile shopping platforms, and the ease with which compulsive buyers can buy something to regulate their negative mood states. Noteworthy, the source of online compulsive buying may not be the smartphone itself. Instead, it may be the consequence of exposure to the mobile digital environment. Thus, it is essential to focus on the potential relation between digital stimuli and cognitive response to understand smartphone addictive behaviour and its relationship with online compulsive buying.

In sum, the current research conceives smartphones as an appealing 'package of stimuli' capable of triggering specific internal processes (*i.e.*, O; mood regulation and flow experience) which lead to behavioural reactions (*i.e.*, R; online compulsive buying). Fig. 1 depicts the proposed in this research.

3. Conceptual model and hypotheses development

3.1. Mood regulation, smartphones and online compulsive buying

Several studies have suggested that dysfunctional and repeated technology use may be related to the attempts to cope with negative feelings (Caplan, 2010; Caplan et al., 2009; LaRose et al., 2003), as "technology offers thrill and relief, and results in mood change" (Turel et al., 2011, p. 1044). Individuals may develop problematic internet use habits due to their attempts to use the net to reduce their negative feelings such as loneliness, anxiety, stress, and depression (LaRose et al., 2003). Besides interpersonal contact, smartphones offer instantaneous access to several digital contents, from information and entertainment to shopping platforms. Several authors have highlighted the link between mood regulation and mobile devices (Chen et al., 2017; Chen et al., 2019; Fu et al., 2020). Mobile virtual worlds may offer individuals digital spaces to regulate their unpleasant moods and deal with negative emotions (Yen et al., 2009). Hence, smartphone addiction may also be seen as an abuse of a technological device to achieve mood modifications. In line with this, the following hypothesis is proposed:

H1: Smartphone addiction is positively related to mood regulation through smartphone use.

A potential relation between moods, mood regulation strategies, and the development of pathological behaviours has been hypothesised by several authors (*e.g.*, Müller et al., 2012). For example, in their attempts to escape from unpleasant moods, individuals may repeat pleasurable activities, and this, in the long run, may result in the development of behavioural addictions (Billieux, 2012). Furthermore, this mechanism may be self-reinforcing: for example, pathological gamblers, kleptomaniacs, and compulsive buyers express "a decrease in these positive mood effects with repeated behaviours or a need to increase the intensity of behaviour to achieve the same mood effect, analogous to tolerance" (Grant et al., 2010, p. 234). Compulsive buyers perceive increasing anxiety levels that lower only when the purchase has been made (Black, 2007). In other words, the act of buying in compulsive buyers is likely a response to a negative mood state (Dittmar et al., 2007; Donnelly et al., 2013; Faber & Christenson, 1996). Compulsive buyers experience a short-term improvement in their mood through the purchase, which works as a positive reinforcement mechanism. This suggests that, like other compulsive behaviours, mood regulation, and even the enjoyment experienced by the customer while buying, can be involved in compulsive buying (Christenson et al., 1994; Faber et al., 1987; Miltenberger et al., 2003). In line with this, the following hypothesis is proposed:

H2: Mood regulation is positively related to online compulsive

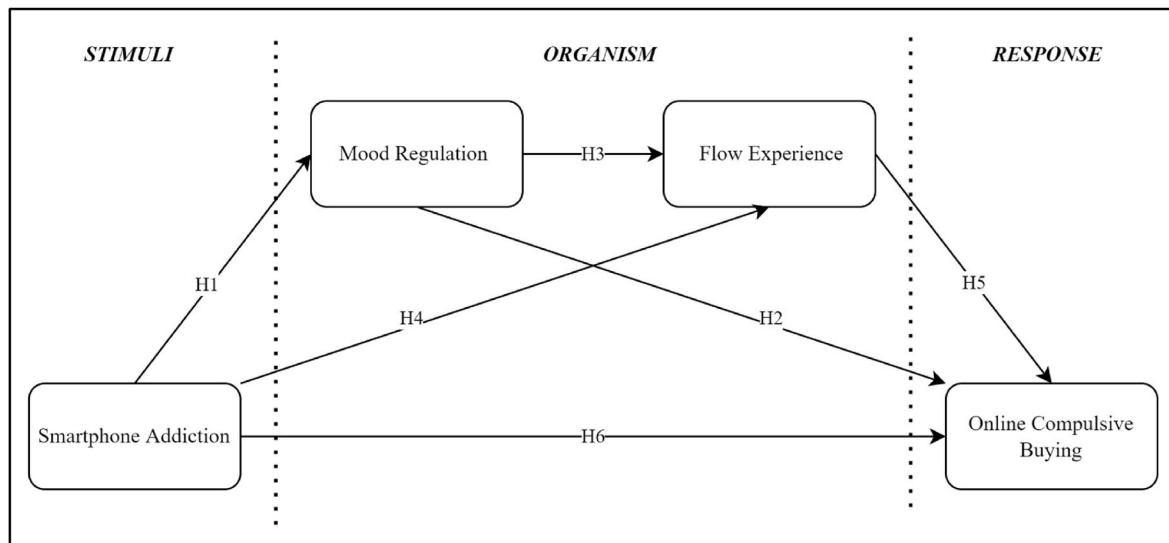


Fig. 1. The proposed theoretical model.

buying.

There are several similarities between compulsive buying and smartphone addiction. Both have been regarded as attempts to escape from internal negative feelings and focus on external stimuli. Thus, it is arguable that, for some users, dysfunctional and mobile-based mood regulation strategies may act as an enforcing factor of the relationship between online compulsive buying and smartphone addiction. Thus, people may select specific content (e.g., shopping items) to regulate their affective states, reduce negative moods, and achieve optimum arousal (Hoffner & Lee, 2015). In line with this, the following hypotheses are proposed:

H2a: Mood regulation through smartphone use acts as a strengthening mediator of the relationship between smartphone addiction and online compulsive buying.

Mood regulation behaviours may be defined as actions taken by individuals to reduce dysphoric moods (Turel et al., 2011). Such behaviours usually comprise an active escape from real-life problems and may also be vehiculated through digital devices. Moods are less intense than emotions, and as they “tend not to disrupt ongoing activity” (Kraiger et al., 1989, p. 13), prior research has associated mood regulatory mechanisms to the experience of flow states. For example, Hu et al. (2019) and Zhang et al. (2014) posited that a mood mechanism may be involved in the experience of flow while using digital devices. Through mood regulatory actions, individuals get involved in pleasant activities, prompting the achievement flow states (Li & Browne, 2006). Thus, the following hypothesis is proposed:

H3: Mood regulation through smartphone use is positively related to flow experiences triggered by smartphone use.

3.2 Flow experiences, smartphones, and online compulsive buying

Several scholars have investigated the relationship between flow states and smartphone use (Ameen et al., 2020b; Chou & Ting, 2003; Leung, 2020; Wang et al., 2020). In general, the literature suggests that smartphones undermine individuals’ ability to achieve a flow state, as some mobile-related behaviours – such as continuous phone checking – may interrupt the states of total concentration needed to experience flow (Duke & Montag, 2017a). Still, scholars do not exclude the possibility that individuals may experience flow through mobile devices (Duke & Montag, 2017b). In line with this latter point, Leung (2020) reported that, while engaging in hedonic (e.g., playing video games, watching videos, or online shopping) and eudemonic activities (e.g., socialising, reading the news, and internet surfing), smartphone users are likely to

achieve a state of flow. Furthermore, the massive variety of functions and applications present on smartphones may easily arouse one interest and, as the immersion and the attraction toward an activity rise, individuals will dwell into them and ignore everything else, thus experiencing flow states (Wang et al., 2020). Moreover, Khang et al. (2013) reported that the amount of time spent on the device was significantly related to higher chances of experiencing flow states for mobile users. To synthesise, for smartphone-addicted users – those who spent the most time looking at their mobiles - there may be an increased likelihood of reaching flow states. Thus, the following hypothesis is proposed:

H4: Smartphone addiction is positively related to flow experiences triggered by smartphone use.

Flow experience has been recently addressed as an influent determinant of users’ online behaviour. Ettis (2017) highlighted a positive relationship between flow experiences and consumers’ purchase and revisit intentions in online shopping websites. Similar results were reported by Kim and Han (2014), Kim et al. (2017) and Zhou et al. (2010). Higher flow levels are associated with a higher number of purchases, satisfaction, loyalty and longer hours spent on the internet (Herrando et al., 2019; Lee et al., 2019; Niu & Chang, 2014). More than this, when consumers are in flow states, their decisions are less well thought out (Barta et al., 2021). This can ease the senseless and item-unrelated purchase of products typical of compulsive buyers. In addition, in online environments, consumers have complete freedom to browse around, and staff and other consumers are absent, both factors which may enhance compulsive buying tendencies (Dittmar et al., 2007). In line with this, the following hypothesis is made:

H5: Flow experience through smartphone use is positively related to online compulsive buying.

Considering the role of flow in relation to the amount of time users spend on web platforms, researchers have advocated for implementing in-app gamification strategies to encourage further in-app engagement and prompt flow experiences (e.g., Dhir et al., 2020; Ozkara et al., 2017). Hence, mobile digital environments are nowadays designed to facilitate flow experiences (Ali, 2016) to capture users’ attention and boost their purchase intentions. This approach can be seen in mobile retail apps, but the potential consequences on consumers’ attitudes and behaviours have remained underexplored. Moreover, flow experiences are associated with positive feelings that people are usually eager to experience again and, as reported in Niu and Chang (2014), generate positive effects in terms of consumers’ buying behaviour strengthening such behaviour. Some evidence suggests that flow is significantly correlated with compulsive buying tendencies (Horváth & Adigüzel, 2018). Thus, it

may be hypothesised that a flow state achieved through a smartphone may indeed prompt online compulsive buying. Coherently with the literature above examined, the following hypotheses are proposed:

H5a: Flow experience through smartphone use acts as a strengthening mediator of the relationship between smartphone addiction and online compulsive buying.

3.3. The relationship between smartphone addiction, flow experience, mood regulation, and online compulsive buying

Smartphones are a fundamental tool for most people, especially young individuals (Brito et al., 2021). These are used to maintain social relationships, organise work and study days, for mood-regulatory purposes (Chen et al., 2017), and purchase goods. About the latter, mobile shopping is different from brick-and-mortar shopping. Like the other forms of online shopping, it allows compulsive buyers to avoid the social stigma connected with compulsive buying, and more than this, all online transactions are *de facto* cashless transactions (Dittmar et al., 2007; Kukar-Kinney et al., 2009). Thus, mobile shopping conveys all these tempting traits searched by compulsive shoppers who do not want others to know their obsession with shopping and what to buy in an unregulated manner. Previous literature on smartphone addiction stated that the higher the addiction, the higher the smartphone usage frequency (Konok et al., 2016). Chopdar et al. (2022) found a strong and positive effect of smartphone addiction on the frequency of shopping on mobile app platforms. Thus, mobile addicted users are more prone to shop more frequently over m-shopping applications. Given the advantages of m-shopping for compulsive buyers and the relationship between m-shopping and smartphone addiction, it may be claimed that smartphones may foster compulsive buying tendencies of some individuals while shopping and buying online through their mobiles. Furthermore, Choi et al. (2019) pointed out that several online maladaptive behaviours (e.g., compulsive gaming, social media abuse, and shopping) may be driven by constant accessibility via smartphones and other mobile device technologies. Thus, it supports the hypothesis of a positive relation between smartphone addiction and online compulsive buying.

H6: Smartphone addiction is positively related to online compulsive buying.

Furthermore, the medium (*i.e.*, smartphone) itself may not be addictive, but it is used to access to platform/source that promotes addictions (Griffiths et al., 2016). Researchers have indicated that emotional buying, mood (*i.e.*, retail therapy) and experiencing flow affect online buying (Dittmar et al., 2007; Niu & Chang, 2014). Mobiles allow access to many social media applications. Brands and products are displayed on these platforms, and users' behaviours are tracked. Retailers and companies are facilitated in delivering *ad-hoc* advertising content, through which consumers may be directly redirected to shopping platforms. These platforms are designed to show only relevant content and be stimulating and flow-inducing, encouraging and fostering user engagement (Choi et al., 2008; Kang et al., 2015; Xu et al., 2015). While this may be appealing for online sellers, it is plausible that negative consequences are present for some individuals, and these lie unexplored to the best of the authors' knowledge. Compulsive buyers, who buy online also regulate their mood, may be captured by the trilling, tempting, flow-inducing characteristic of the mobile shopping platform and, consequently, dwell more easily into dramatic purchasing sprees, as they are characterised by a reduced capacity for self-control and lower resistance to external triggers (Maccarrone-Eaglen & Schofield, 2017; Maccarrone-Eaglen & Schofield, 2017). Thus, the interaction between flow experience and mood regulation triggered by smartphone use likely enhances the possibility of buying compulsively online. Hence, flow experience and mood regulation are important factors in studying the relationship between smartphone addiction and online compulsive buying tendencies. Therefore, the following hypothesis is proposed:

H6a: Flow experience and mood regulation triggered by smartphone

use act as strengthening mediators of the relationship between smartphone addiction and online compulsive buying.

4. Method

The data collection for the current research was performed through a survey carried out in Italy (See Table 2). The survey target population included students between 18 and 24 years enrolled in high schools or universities. The participants were recruited in Italy, a country where the number of smartphones is higher than that of the inhabitants: about 80 million mobile devices for a population of 60 million. In Italy, 86% of individuals between 18 and 24 own and actively use a smartphone for chatting, playing, and shopping (Censis, 2019). The survey was publicised to high-school and universities; thus, every student had an equal opportunity to participate in the survey. Using a systematic sampling approach, 300 participants were randomly selected among those who agreed to participate. Incomplete responses were eliminated, leaving a useable sample of 275 completed questionnaires (131 secondary school students and 144 university students). Therefore, the final sample was formed by 275 participants with a prevalence of females (65%) with a mean age of 20 (SD = 2.50). The main characteristics of this sample are presented in Table 1. All participants signed a written informed consent before taking part in the study. The local review board approved the study of the University of Udine (Italy).

The 20-min survey was conducted face-to-face between February 2018 and January 2019. The questionnaire was developed after a thorough literature review and consisted of two parts. The former investigated the socio-demographic profile of the respondents. The latter consisted of four scales: (1) online compulsive buying (2) smartphone-induced flow experience (SFE) (3) smartphone addiction; and (4) mood regulation while using smartphones (MRS) with response options on a seventh-point Likert scale format ranging from 1 (absolutely disagree) to 7 (absolutely agree). The online compulsive buying scale was adapted from Edwards (1993) and Valence et al. (1988) and slightly modified to fit online purchases. The SFE scale was adopted from Ghani and Deshpande (1994). The items forming the smartphone addiction and MRS scales were derived from Caplan (2010) and Olivencia-Carrión et al. (2018) and adapted to the case of smartphone addiction. Since the data collection was carried out in Italy, the items were translated from English into Italian with a double translation method. The final English version of the questionnaire was translated into Italian by a professional bilingual translator, fluent in both English and Italian. Before the formal survey, ten Gen Z respondents (excluded from the main study) were randomly selected for pre-testing. The Italian version of the questionnaire was given to them to test items' clarity and, accordingly, several corrections to the terminology were made to reduce the ambiguity and to avoid content redundancy.

4.1. Construct validity and reliability

A two-stage approach was used to assess factorial validity: an

Table 1
Demographic profile of the interviewed.

Variable	Freq.	%	Cum. %
<i>Gender</i>			
Male	96	34.90	
Female	179	65.10	100.00
<i>Education Level</i>			
Middle School	105	38.20	38.20
Secondary School	145	52.70	90.90
Bachelor's degree	25	9.10	100.00
<i>Age</i>			
18–20	155	56.40	56.40
21–23	72	26.10	82.50
>23	48	17.50	100.00

Table 2
CFA with factor loadings, AVE, CR and Cronbach’s α .

Construct	Measurement items	Factor Loading	T-Value	CR	AVE	α
Online Compulsive Buying	Adapted from Edwards (1993) and Valence et al. (1988)			0.93	0.59	0.92
	As soon as I enter in an online shopping platform, I have an irresistible urge to go into a shop to buy something.	0.79	15.53			
	I often have an unexplainable urge, a sudden and spontaneous desire, to go and buy something online.	0.79	15.38			
	I am often impulsive in my online buying behaviour	0.76	14.67			
	For me, shopping is a way of facing the stress of my daily life and of relaxing.	0.73	13.92			
	I sometimes feel that something inside pushes me to buy online.	0.69	12.92			
	I buy things online I don’t need or won’t use	0.82	16.34			
	I go on online buying binges.	0.82	16.36			
	I feel “high” when I go on a buying spree	0.76	14.79			
	I feel driven to shop and spend online, even when I don’t have the time or the money.	0.75	14.30			
Smartphone addiction	Adapted from Caplan, 2010 and Olivencia-Carrion et al. (2018)			0.82	0.57	0.84
	When I am not using the smartphone, I have a hard time trying to resist the urge to use it.	0.81	15.29			
	I have difficulty controlling the amount of time I spend on the smartphone.	0.75	13.85			
	I find it difficult to control my smartphone use.	0.75	13.66			
Mood Regulation through Smartphone	I have tried to spend less time on my smartphone, but I am not able to do it.	0.71	12.86	0.92	0.78	0.93
	Adapted from Caplan (2010)					
	I have used the smartphone to make myself feel better when I’ve felt upset.	0.90	19.17			
	I have used the smartphone to make myself feel better when I was down.	0.88	18.29			
	I have used the smartphone to forget about my problems	0.90	19.11			
Smartphone-induced Flow Experience	I have used the smartphone to forget about my worries	0.86	17.73	0.86	0.64	0.87
	Adapted from Ghani & Deshpande, 1994					
	When I use the smartphone, I am absorbed intensely by it.	0.94	20.69			
	When I use the smartphone, I am deeply engrossed by it.	0.85	17.73			
	When I use the smartphone, I am fully concentrated on it.	0.85	17.17			
Using my smartphone is enjoyable.	0.50	8.63				

Note 1: Fit indexes $\chi^2(183) = 464.953$, $\chi^2/df = 2.541$, RMSEA = 0.075, CFI = 0.93, TLI = 0.920, NFI = 0.890, SRMR = 0,050.

exploratory factor analysis (EFA) was followed by confirmatory factor analysis (CFA). An EFA with maximum likelihood and a varimax rotation with Kaiser normalisation was performed to define the latent dimensions that underlie the data. The latent root criterion was used for factor inclusion (i.e., eigenvalue equal to or higher than 1, and a factor loading of 0.4 was used as a cut-off value to include the items in each factor). The appropriateness of factor analysis was confirmed by the Kaiser–Meyer–Olkin measure of sampling adequacy (KMO = 0.896) and Bartlett’s test of sphericity (p-value < 0.001). The rotation converged in five iterations. The four extracted factors, namely smartphone addiction, MRS, online compulsive buying, and SFE, accounted for 71% of the total variance. The internal consistency of the measures was assessed by computing the Cronbach’s alpha for all the extracted factors, showing for all the factors values higher than 0.80. Then, using the maximum likelihood method, a CFA was conducted to establish confidence in the measurement model. Most of the goodness-of-fit indexes were higher than the thresholds indicated in the literature ($\chi^2 = 464.953$, $df = 183$, $\chi^2/df = 2.541$, RMSEA = 0.075, CFI = 0.93, TLI = 0.920, NFI = 0.890, SRMR = 0,050) (Hair et al., 2019), while the NFI was the only lower than 0.90 indicated in Bentler and Bonnet (1980). Nevertheless, as all the other indexes aligned with the commonly used cut-offs, the measurement model was still deemed to have an adequate fit for the data.

Table 3
Correlations among constructs and square root of AVE.

Construct	M	SD	Gender	Age	Marker	OCB	SA	MRS	SFE
Gender	-	-	-	-	-	-	-	-	-
Age	20.50	2.60	0.08	-	-	-	-	-	-
Marker	3.07	1.69	0.27	-0.23	-	-	-	-	-
OCB	1.85	1.11	-0.11	-0.09	0.14	0.76	-	-	-
SA	2.37	1.29	-0.16	-0.07	0.03	0.28	0.75	-	-
MRS	3.44	1.76	-0.29	-0.21	-0.00	0.22	0.48	0.88	-
SFE	3.77	1.39	-0.22	0.02	-0.04	0.36	0.50	0.47	0.80

Note 1: OCB: online compulsive buying, SA: smartphone addiction, MRS: mood regulation while using smartphones, SFE: smartphone-induced flow experience.

Note 2: The marker variable was “Bargaining Proneness” adapted from Harris and Mowen (2001).

Note 3: Square root of AVE on diagonal in bold. Correlations among factors under the diagonal.

variable was unrelated to all other constructs (correlation ranged from -0.006 to 0.141). Furthermore, all the significant correlations among the other constructs remained significant after introducing the marker variable. Overall, the results of these tests indicated that the distortion imputable to a method bias is marginal.

4.3. Analysis method

The proposed theoretical model posited that (1) smartphone addiction and online compulsive buying are positively related; and (2) MRS and SFE would mediate the effect of smartphone addiction on online compulsive buying. In the model, gender and age were added as covariates. To explore these predictions, the proposed theoretical model was tested with a serial mediation analysis with two mediators using the Process macro (Hayes, 2017) for SPSS (Model 6, 5,000 bootstraps; 95% bias-corrected confidence intervals) to evaluate the following serial mediation: smartphone addiction \rightarrow MRS \rightarrow SFE \rightarrow online compulsive buying.

Further to the serial mediation analysis, asymmetrical modelling using fsQCA was employed to investigate the data further and observe which configurations of antecedents (*i.e.*, smartphone addiction, SFE, MRS, age and gender) are likely to investigate lead to high scores in online compulsive buying. Unlike the methodologies grounded on probability theory, qualitative comparative analysis fully embraces complexity theory and, relying on Boolean algebra, aims to explain whether conditions (or configurations of causal conditions) are necessary or sufficient for a specific outcome to occur (Ragin, 2009). As far as consumers' behaviour studies are concerned, several authors (Pappas et al., 2016; Pappas et al., 2020; Schmitt et al., 2017; Uruña & Hidalgo, 2016) have adopted this methodological approach to examine how relevant antecedents combine to lead to a behavioural outcome.

5. Results

5.1. Serial mediation model

The results from the serial mediation analysis showed that the indirect pathway from smartphone addiction to online compulsive buying through MRS and SFE was significant since the confidence interval did not include the zero (Indirect 3: indirect effect = 0.031 , 95% C.I.: 0.013 to 0.054), thereby supporting the hypothesis that MRS and SFE play a mediating role in the relationship between smartphone addiction and online compulsive buying. Hence, H6a was supported by the model. As for the individual indirect pathways, the one involving only MRS was found not significant (Indirect 1: indirect effect = 0.042 , 95% CI: -0.012 to 0.101), while the one involving only SFE was significant (Indirect 2: indirect effect = 0.081 , 95% C.I.: 0.036 to 0.132). These results supported the hypothesis that SFE mediates the relationship between smartphone addiction and online compulsive buying while rejecting the one involving MRS. Thus, H2a was rejected, and H5a was accepted. Looking at the direct paths, the analyses showed that smartphone addiction has a significant and positive relationship with MRS ($\beta = 0.538$, $SE = 0.071$, $p < 0.001$), supporting H1 and suggesting that people may tend to self-regulate their mood by using the smartphone. The model also supported the relationships between smartphone addiction and SFE ($\beta = 0.388$; $SE = 0.059$; $p < 0.001$) and between MRS and SFE ($\beta = 0.247$, $SE = 0.059$, $p < 0.001$), confirming H4 and H3, respectively. Surprisingly, the model did not confirm the relationship between MRS and online compulsive buying ($\beta = 0.063$, $SE = 0.040$, $p = 0.118$) therefore rejecting H2. H5 was supported as the relationship between SFE and online compulsive buying was positive and significant ($\beta = 0.191$, $SE = 0.050$, $p < 0.001$). Finally, even if the model showed the direct pathway was not significant ($\beta = 0.083$, $SE = 0.052$, $p = 0.115$), the total effect model showed that the relationship between smartphone addiction and online compulsive buying was significant ($\beta = 0.207$, $SE = 0.047$, $p < 0.001$), leading to the partial acceptance

of H6 and suggesting the presence of indirect-only mediation effect (Zhao et al., 2010).

Upon examining the effects of the control variables (*i.e.*, gender and age), the results suggested that dysfunctional use of smartphones to mood regulate is more prominent in younger participants ($\beta = -0.541$, $SE = 0.185$, $p < 0.001$) and females ($\beta = -0.820$, $SE = 0.185$, $p < 0.001$) and that being female may also facilitate experiencing a flow state while using the smartphone ($\beta = -0.335$, $SE = 0.152$, $p < 0.05$). No significant effects of the covariates on compulsive buying were found. Detailed results of the model are shown in Table 4, while the estimated model is displayed in Fig. 2.

5.2. Fuzzy QCA methodology and calibration

After serial mediation analysis, asymmetrical modelling was used and, using fsQCA, the configurations of antecedents (*i.e.*, smartphone addiction, MRS, SFE, age, gender) that can explain high scores in online compulsive buying were investigated. First, to perform the FsQCA's algorithm, all the variables must be calibrated into fuzzy sets, with values ranging from 0 to 1. In the present study, factors were directly calibrated (Ragin, 2009) using three anchors: full-membership, cross-over point, and non-membership. Calibration is a half empirical and half theoretical process (Greckhamer et al., 2018). Hence it should find its basis in previous theoretical knowledge. Although when calibration criteria are not available from previous research on the same topic, empirical calibration is recommended, and the data are calibrated using percentile distributions of the variables. Thus, for smartphone addiction, MRS and SFE, the full-membership threshold was set at the 90th percentile, the non-membership method threshold was set at the 10th percentile, and the cross-over point was set at the median value of each. Regarding gender, the value 1 was set for males and the value to 0 for females. Finally, age and online compulsive buying were calibrated based on previous theoretical knowledge. For age, the full-membership anchor was set at 18, the cross-over anchor was set at 20, and the non-membership anchor was set at 25 (Dittmar, 2005). Regarding online compulsive buying, the criteria suggested in O'Guinn and Faber (1989) and Faber and O'Guinn (1992) were followed. Hence, the full-membership point was set two standard deviations from the mean value of the measure (Adamczyk et al., 2020; Huang & Chen, 2017), the cross-over point was set at the median value, and the non-membership point at the 10th percentile. Table 5 summarises the calibration process showing the thresholds used and the descriptive statistics of the calibrated causal conditions and outcomes.

5.3. Fuzzy set QCA results

Following the calibration, analyses of necessity and sufficiency were performed. Since fsQCA enables asymmetrical causal relationships, what explains the outcome's presence may be different from what explains its absence. Thus, both the presence and absence of the outcome were tested.

The first analysis conducted using fsQCA was the analysis of necessity. Such analysis is used to evaluate whether the causal conditions are necessary for a given outcome to occur. Setting as outcomes both high and low online compulsive buying (*i.e.*, ~ online compulsive buying; in FsQCA, "~" stands for the negation of the outcome or a causal antecedent), the consistency scores for either presence or absence of every single configurational antecedent ranged between 0.327 and 0.710, not surpassing the threshold for necessity which is usually set at 0.80 (Ragin, 2000). Hence, none of them can be considered necessary for explaining high and low values in online compulsive buying. Details of the analysis of necessity can be found in Table 5.

Since none of the causal conditions can be considered as a necessity for the outcome of interest, the sufficiency analysis was performed. Sufficiency analysis identifies the different combinations of causal conditions that meet specific criteria of sufficiency for the outcome to

Table 4
Result of the model.

	Outcome variables								
	To MRS			To SFE			To OCB		
	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
Covariates									
Gender	-0.820	0.194	>0.001	-0.335	0.152	>0.05	0.012	0.128	0.992
Age	-0.541	0.185	>0.01	0.203	0.143	0.156	-0.150	0.119	0.209
Antecedents									
Constant	2.689	0.232	>0.01	2.142	0.215	>0.001	0.737	0.209	>0.001
SA	0.538	0.071	>0.001	0.338	0.059	>0.001	0.083	0.052	0.115
MRS	-	-	-	0.247	0.046	>0.001	0.063	0.040	0.118
SFE	-	-	-	-	-	-	0.191	0.050	>0.001
	R ² = .269 F(3,271) = 32.70 p.<0.001			R ² = .321 F(4,270) = 31.30 p.<0.001			R ² = .158 F(5,269) = 10.15 p.<0.001		
Total Effect Model				Indirect Effects					
	To OCB			Path	Effect	SE	LLCI	ULCI	
	Coeff.	SE	p	Total Indirect	0.155	0.037	0.081	0.229	
Covariates				Indirect 1					
Gender	-0.153	0.127	0.228	SA→MRS→OCB	0.042	0.028	-0.012	0.101	
Age	-0.171	0.121	0.160	Indirect 2					
Antecedents				SA→SFE→OCB	0.081	0.024	0.036	0.132	
Constant	1.444	0.152	>0.001	Indirect 3					
SA	0.207	0.047	>0.001	SA→MRS→SFE→OCB	0.031	0.010	0.013	0.054	
	R ² = .088 F(3,271) = 8.73 p.<0.001								

Note 1: OCB: online compulsive buying, SA: smartphone addiction, MRS: mood regulation while using smartphones, SFE: smartphone-induced flow experience.
Note 2: Gender was coded one for male and zero for female.

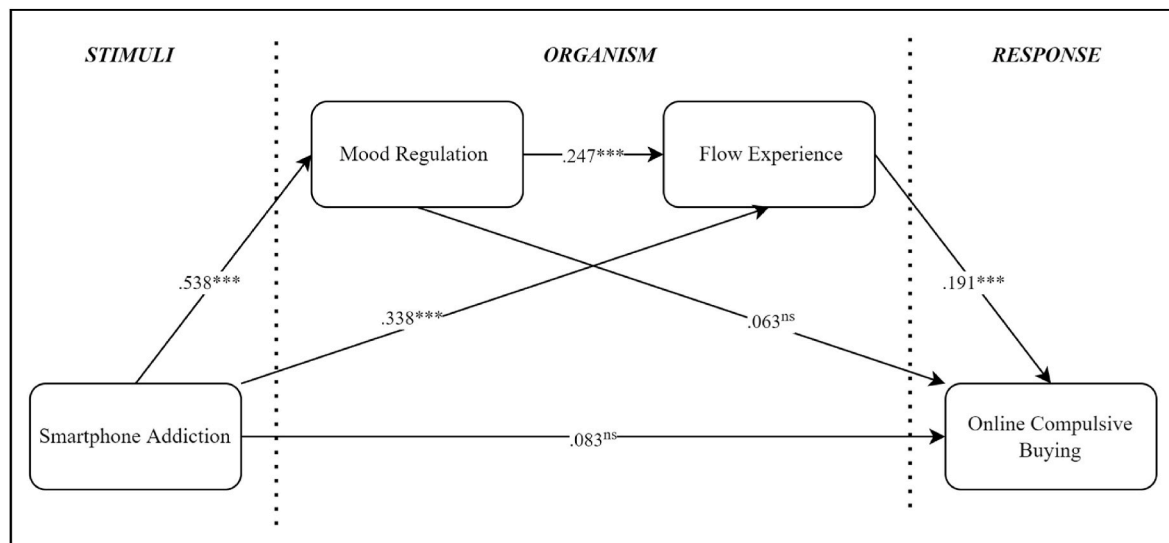


Fig. 2. The estimated model.

Table 5
Calibration thresholds, descriptive statistic of the causal conditions and analysis for necessity.

Fuzzy Set Measures	Calibration thresholds			Descriptive Statistics		Analysis of Necessity	
	Full-membership	Cross-over point	Non-membership	Mean	SD	Consistency	Coverage
OCB	3.80	1.40	1.00	.440	.330	-	-
SA	4.25	2.00	1.00	.488	.355	.710(.549)	.640(.473)
MRS	6.00	3.50	1.00	.482	.345	.682(.574)	.622(.488)
SFE	5.50	3.75	2.00	.491	.346	.703(.543)	.630(.470)
Age	18	20	25	.556	.370	.701(.506)	.506(.503)
Male	1	0	0	.349	.476	.327(.672)	.412(.455)

Note 1: OCB: online compulsive buying, SA: smartphone addiction, MRS: mood regulation while using smartphones, SFE: smartphone-induced flow experience.
Note 2: Gender was coded one for male and zero for female.
Note 3: In the analysis for necessity, consistency and coverage scores between parenthesis are the ones for the negation of the causal antecedents.

occur. Thus, the fuzzy-set algorithm was used to determine the combinations likely to lead to high levels and low levels of online compulsive buying (i.e., ~ online compulsive buying). FsQCA’s algorithm produced a true table of 2^k rows for both analyses, where k is the number of causal combinations considered (i.e., five). Then, each true table was refined considering two cut-off values: 0.80 for consistency scores and 3 for the observations’ frequency. Both values align with the commonly recommended ones (Ragin, 2009). In Table 6, the results of the fuzzy set analysis are displayed. In this, the crossed circles (⊗) indicate the absence of a causal condition, while the black circles (●) signal the presence of a condition. Large circles identify core elements, while small ones represent peripheral elements. The blank spaces stand for the “do not care” situation and are related to the unimportance of the presence or absence of a causal condition (Fiss, 2011).

Inspecting the results obtained for high values in online compulsive buying, the overall solution consistency score of 0.83 indicated a robust relationship between the outcome and the combination of recipes. Furthermore, the overall solution coverage was 0.34. Solution coverage suggests the extent to which the output can be determined based on the proposed configurations and can be compared to the R² value for symmetrical methods (Woodside, 2013). Hence, the three solutions proposed accounted for a substantial proportion of the outcome. Looking at the consistency scores for the three configurations, these were higher than 0.84. Thus, they all presented acceptable degrees of approximation (Ragin, 2009). Additionally, fsQCA software also estimates raw and unique coverage for each configuration, which represents their empirical relevance. Raw coverage is the amount of the outcome explained by a solution, while unique coverage is the amount exclusively explained by a configuration. All the combinations showed unique coverages higher than 0. Hence, all these solutions were considered empirically relevant. Similarly, for low values in online compulsive buying, both overall solution consistency (0.86) and coverage were acceptable (0.39). Furthermore, in this case, the consistency and coverage of the individual configurations were in line with the recommended thresholds (Ragin, 2009).

In the analysis of the configurations for the presence of online compulsive buying, the solutions’ table indicated that a different pattern of core, peripheral, and neutral conditions existed for each configuration. Specifically, in configuration C1, smartphone addiction, MRS and being male were identified as core conditions for online compulsive buying, while being around 25 years old (i.e., ~ age) represented a peripheral condition. In configuration C2, smartphone addiction and being around 18 years old were addressed as core conditions, while ~ MRS was regarded as peripheral. Similarly, C3 shared the same core conditions as S2, although, this time, the peripheral condition was represented by being male. Most notably, smartphone addiction was identified as a core condition for all the proposed causal configurations.

Furthermore, S2 displayed the largest unique coverage (0.18), affirming itself as the most empirically relevant solution.

Upon examining the configurations proposed for the absence of online compulsive buying (i.e., ~ online compulsive buying), the solutions table showed different patterns of core, peripheral, and neutral conditions. In C1 and C5 configurations, smartphone addiction, ~ MRS and ~SFE were identified as core conditions for online compulsive buying. Furthermore, in C1, ~ Age represented a peripheral condition, and likewise did being male for C5. In C2 configuration, ~ smartphone addiction, being male and around 18 years old, constituted the core conditions, while ~ MRS was regarded as a peripheral condition. Lastly, C3 and C4 shared the same core conditions, which were ~ smartphone addiction and MRS. Looking at their peripheral conditions, for C3, they were being male and ~SFE, while for C4 they were SFE and being male around 25 years old (i.e., ~ age). All the configurations explaining ~ online compulsive buying presented a sort of alternance between the presence and absence of smartphone addiction and MRS or SFE. Simplifying, the solutions that presented the presence of smartphone addiction as a core condition were characterised by the absence of MRS or SFE as a core condition as well, and vice versa. Finally, fsQCA’s findings provided clear evidence of asymmetric causality and equifinality: different configurational sets were able to lead to high and low online compulsive buying outcomes.

6. Discussion

This study aimed at investigating the relationship between smartphone addiction and online compulsive buying among Gen Z consumers within the conceptual framework of the S–O–R model. In summary, this research offers empirical evidence that a potential relationship between smartphone addiction and online compulsive buying may be present and that MRS and SFE may play a role in this relationship.

The serial mediation analyses showed that, after introducing MRS and SFE as mediating variables, the direct effect of smartphone addiction on online compulsive buying was not significant anymore. This suggests that smartphone addiction indirectly affects online compulsive buying via MRS and SFE. The indirect-only mediation effect highlights, on one side, the importance of organism components (i.e., flow and mood regulation) and, on the other, that the compulsive behaviour seems to be a response to an internal state rather than a direct reaction to technology-induced stimuli. Thus, the sole over-exposition to the smartphone environment may not necessarily lead to online compulsive buying. Furthermore, the mediating effects of SFE and MRS affected the relation between smartphone addiction and online compulsive buying in different ways. Indeed, the isolated indirect effect of SFE was significant, while the isolated indirect effect of MRS was not. Therefore, MRS *per se* did not mediate the relationship between smartphone addiction and

Table 6
Intermediate solutions for high score on the compulsive buying scale.

Configurations	High OCB			Low OCB				
	Solutions			Solutions				
	C1	C2	C3	C1	C2	C3	C4	C5
SA	●	●	●	●	⊗	⊗	⊗	●
MRS	●	⊗		⊗	⊗	●	●	⊗
SFE		●	●	⊗		⊗	●	⊗
Male	●		●		●	●	⊗	●
Age	⊗	●	●	⊗	●		⊗	
Consistency	0.89	0.84	0.86	0.93	0.87	0.92	0.90	0.89
Raw Coverage	0.10	0.26	0.11	0.20	0.15	0.10	0.12	0.12
Unique Coverage	0.04	0.18	0.02	0.05	0.06	0.02	0.05	0.01
Solution coverage	0.34			0.39				
Solution consistency	0.84			0.86				

Note 1: OCB: online compulsive buying, SA: smartphone addiction, MRS: mood regulation while using smartphones, SFE: smartphone-induced flow experience.
Note 2: Consistency threshold: 0.80; observation threshold: 3.

online compulsive buying, while SFE did. This suggests that online compulsive buying may be more related to the experience of a state of flow rather than a direct response to a negative mood. Overall, the symmetrical modelling results align with those reported by Horváth and Adigüzel (2018) and Niu and Chang (2014), where flow experience was positively related to consumers' dysfunctional buying behaviour. Still, concerning specifically MRS, the results do not align with previous investigation outcomes as these sustained that mood-regulating processes strengthen compulsive buying (e.g., Dittmar et al., 2007; Donnelly et al., 2013). Nevertheless, the total indirect effect assessing the serial mediation between smartphone addiction and online compulsive buying through MRS and SFE was significant. This novel result suggests that individuals with smartphone addiction may display a higher likelihood of mood-regulating by using their mobiles, which may facilitate experiencing 'flow' states and ultimately increase the likelihood of displaying compulsive buying tendencies while online.

As for the fsQCA analysis, the solution table for achieving high levels of online compulsive buying consists of three configurations. Firstly, smartphone addiction was a core condition in all solutions. Hence, also the asymmetrical modelling supports the hypothesis that a dysfunctional use of mobiles may be related to the development of online compulsive buying behaviours. Secondly, all three configurations showed a combination between smartphone addiction and MRS or SFE. Furthermore, in the solution table for achieving low levels of online compulsive buying (i.e., ~ online compulsive buying), all the configurations showed an alternation between the presence or absence of smartphone addiction and MRS or SFE. Both results suggest that the relationship between online compulsive buying and smartphone addiction was also influenced by the interaction with cognitive factors (i.e., MRS and SFE). Of note, these two causal conditions are never co-present in explaining the presence of online compulsive buying. This enriched symmetrical modelling results by suggesting that, for a part of the sample, compulsive buying is more related to the experience of flow states, while, for a minor portion of the sample, to mood regulation. Nevertheless, regarding fsQCA, the result confirmed that both above-mentioned factors may be involved in online compulsive buying behaviours, as previous research suggested (Dittmar et al., 2007; Donnelly et al., 2013; Horváth & Adigüzel, 2018). Lastly, age was addressed as a core condition in two configurations (i.e., C2 and C3 in Table 6). Considering that C2 was the most empirically relevant solution (highest unique coverage), and in line with previous research conducted by Dittmar (2005), online compulsive buying may indeed be more prominent among those younger Gen Z individuals that may still be considered as adolescents (around 18 years old). Nonetheless, this was not supported by the serial mediation model. Therefore, future studies should explore this potential interaction between different ages and online compulsive buying inside the Gen Z cohort.

The results from serial mediation and FsQCA analyses converge in suggesting that smartphone addiction and online compulsive buying are related and that MRS and SFE play a role in this relationship. To summarise, dysfunctional smartphone users may use their devices to regulate their dysphoric moods, implying greater exposure to online environments such as shopping platforms or social media and their funny and thrilling characteristics. This may significantly contribute to the generation of 'flow' states (e.g., while browsing flow-inducing shopping platforms), which may act as a trigger for their compulsive buying behaviours.

6.1. Theoretical contributions

From a theoretical point of view, the current research contributes to both the body of knowledge around compulsive buying and smartphone addiction. First, it highlights a novel connection between online compulsive buying and smartphone addiction in Gen Z. Previous research on compulsive buying focused on the role of the online environment (e.g., Dittmar et al., 2007; Kukar-Kinney et al., 2009; 2016).

However, the role that a specific device (i.e., smartphones) may have in fostering such compulsive behaviours has not been considered. Similarly, the literature concerning smartphone addiction never considered its potential downsides and the development of compulsive buying tendencies (e.g., Chatterjee et al., 2021; Lee et al., 2014). Second, grounded in the behavioural perspective of the SOR model, the current research highlighted the pivotal role that the consumer's internal states (i.e., cognitive processes leading to mood regulation and flow experience, the "O" component) may play in the development of compulsive behaviours. Thus, the current research extends the existing knowledge by affirming that both mood regulatory mechanisms and flow states may be involved in the processes which lead to the display of compulsive buying behaviours also in mobile online environments (Darrat et al., 2016; Dittmar et al., 2007; Horváth & Adigüzel, 2018; Müller et al., 2012), among Gen Z individuals. Mood regulation seems to have a secondary role in prompting compulsive behaviour. In the symmetrical model, mood regulation affects indirectly online compulsive buying only via flow. Furthermore, in the fsQCA results, only one solution displayed mood regulation as a core condition for the presence of online compulsive buying. Thus, experiencing flow states while using the smartphone seem more critical in prompting compulsive behaviour than the mood regulatory mechanism.

The trivial impact of smartphone addiction on compulsive buying in the mediation model when the organism component are considered and the fact that, in the fsQCA the sole presence of smartphone addiction does not suffice for online compulsive buying to be present, offer both some support to the claim that the smartphone *per se* may not be addictive, but it allows individuals to access platforms and other content through which they can foster their maladaptive behaviours (Griffiths et al., 2016).

Overall, our study contributes to the existing literature by identifying the consequences of smartphone addiction, particularly compulsive buying among Gen Z individuals. This adds to what was found in previous studies on the dark side of the use of technology, as previous studies explored the impact of smartphone addiction on academic performance (Chaudhury et al., 2018), stress, performance, and satisfaction with life (Samaha & Hawi, 2016), family conflict and personal conflict (Mahapatra, 2019). Furthermore, our study extends the findings of these studies by exploring another consequence of smartphone addiction. Finally, this research extends the theoretical lens of the S-O-R model to the smartphone addiction context, methodologically applying fsQCA to the field of consumers' behaviour and proposes an adaptation of the compulsive buying scale to the context of online purchases.

6.2. Practical implications

The findings of this research also have a few practical implications. First, both public and private sectors should pay increasing attention to Gen Z individuals who are likely to indulge in compulsive buying behaviours online. Gen Z compulsive buyers act without considering the financial consequences of their behaviours. Avoiding nurturing such compulsion must be regarded as a priority. Firms - especially those involved in online retail - should pay increasing attention to dysfunctional Gen Z customers on their platforms and take corrective actions if needed. For example, companies may want to develop innovative algorithms to identify them and enact precautionary procedures (e.g., remove compulsive buyers from shopping newsletters, introduce a limit of spendable money in a given timeframe). Second, public institutions - especially those involved in education - may develop *ad hoc* programs aimed at educating Gen Z and other young individuals about 1. the risks that are related to smartphone addiction and overattachment (e.g., loss of concentration, compulsive buying, technostress) and 2. the proper management of their finances. All of this may contribute to stem compulsive buying behaviours. Furthermore, from a CSR perspective, firms may see compulsive buying among Gen Z as an opportunity to enact socially responsible actions and interventions and, consequently,

picture themselves in a better light in front of their new consumers. Overall, ethical and socially responsible marketing able to reduce the risks of inducing compulsive buying and spread the culture of responsible spending habits is utterly needed. This is important to consider Gen Z individuals, as their available income is low – or even parents-dependent - and their economic future is paved with uncertainty.

7. Limitations and future research

The current study has limitations that also provide fruitful avenues for future research. One limitation is that this research evaluated smartphone addiction without assessing usage intensity. Future research would benefit from using temporal data (e.g., daily screen time) in terms of reliability. Still, it should also be noted that smartphone addiction is a more complex condition that may not necessarily be well-reflected in objectively measured smartphone usage time. Therefore, relying on the assumption that excessive smartphone use is linearly related to smartphone use data may lead to a biased perspective. It should also be interesting to test if the results are replicable across different digital technologies (e.g., computer games, which have started to include microtransaction systems to stimulate in-game purchases). Further studies should replicate the analysis using samples from other cultural backgrounds as specific consumption behaviours may emerge from different cultures. Another avenue for future research is comparing the proposed model for different socio-demographic segments. The model has been developed and tested on Gen Z individuals. Studying other age groups may add significant knowledge about the relationship between smartphone addiction and online compulsive buying. More than this, the model focuses on technology-related variables. Future investigations may consider studying the interaction between individual-related characteristics (e.g., narcissism, materialism, self-esteem) and technology. Finally, this research is based on the cross-sectional method, limiting the results' generalizability. Nevertheless, the systematic and randomised sampling approach partially offset this limitation. Using a random sample with a high response rate to the interviewer-administered questionnaire can be considered an indicator of the high external validity of results, which means that the results may be deemed generalisable at least to Western-European Gen Z individuals. Nevertheless, future scholars should focus on qualitative and longitudinal data collection to more accurately frame the mechanisms that lead to online compulsive buying.

8. Conclusion

This research aimed to analyse the link between smartphone addiction and compulsive buying behaviours among Gen Z individuals. The model developed in the study drew on the stimulus-organism-response framework, and it was empirically tested using data collected through a survey distributed to Gen Z consumers. The findings indicated that smartphone addiction and online compulsive buying are related, and mood regulatory behaviour and flow experience strengthen this relationship. Accordingly, the study offers theoretical contributions and practical implications to academics and practitioners.

Author credit statement

Michela Cesarina Mason: Conceptualization, study design, literature review.

Gioele Zamparo: Conceptualization, study design, literature review, data analysis.

Andrea Marini: Conceptualization, literature review.

Nisreen Ameen: Révising and editing of multiple versions of the paper, literature review.

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