



“Smartphones’ Sway: How Social Exclusion Causes Compulsive Buying Behavior among University Students in Egypt through Serial Mediation; the Moderating role of Self-control”

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Abstract

This study aimed to explore the effect of social exclusion on compulsive buying, grounded in Self-Determination Theory (SDT) and Compensatory Internet Use Theory (CIUT). It examined the mediating roles of FoMO (fear of missing out) and smartphone addiction, as well as the moderating effect of self-control among university students in Egypt. This study presented a theoretical framework, followed by hypothesis development, resulting in the formulation of five hypotheses. A field study was conducted using a snowball sampling method, gathering data from 367 university students in Egypt. The data were analyzed using SPSS 26 and AMOS 20 to test the proposed hypotheses. AMOS, a widely adopted multivariate analysis tool in social sciences, facilitated the testing process. The results revealed a significant positive effect of social exclusion on compulsive buying. Furthermore, FoMO and smartphone addiction were identified as sequential mediators in the relationship between social exclusion and compulsive buying. Additionally, self-control significantly and negatively moderated the relationship between FoMO and smartphone addiction among the university student sample.

Key word: Social exclusion, Fear of missing out smart phones addiction, compulsive buying and self-control.

ملخص البحث

هدفت هذه الدراسة إلى استكشاف تأثير الاستبعاد الاجتماعي على سلوك الشراء الإجباري (القهري) اعتماداً على نظريتي تحديد الذات والاستخدام التعويضي للإنترنت، وكذلك دراسة الدور المعدل للتحكم في الذات في العلاقة بين الخوف من تفويت الفرصة وإدمان الهواتف الذكية بين طلاب الجامعات في مصر. تم استعراض الخلفية النظرية لمتغيرات البحث وكذلك العلاقات فيما بينهما، وتم صياغة خمسة فروض. كما أجريت الدراسة الميدانية باستخدام عينة كرات الثلج المكونة من (٣٦٧) من طلاب الجامعات في مصر. ثم تحليل البيانات التي تم جمعها من خلال برنامجي (SPSS BV. 26 - AMOS V. 20) وذلك لاختبار فروض البحث. أوضحت نتائج البحث أن هناك تأثيراً إيجابياً بين كلاً من الاستبعاد الاجتماعي والخوف من تفويت الفرصة وسلوك الشراء الإجباري. كذلك أشارت النتائج إلى أن الخوف من تفويت الفرصة وإدمان الهواتف الذكية تعد متغيرات وسيطة تتخلل العلاقة بين الاستبعاد الاجتماعي والشراء الإجباري. كما أشارت نتائج الدراسة إلى أن التحكم في الذات له تأثير سلبي معنوي في العلاقة بين الخوف من تفويت الفرصة وإدمان الهواتف الذكية بين طلاب الجامعات في مصر.

الكلمات المفتاحية: الاستبعاد الاجتماعي، والخوف من تفويت الفرصة، وإدمان الهواتف المحمولة، والشراء الإجباري، والتحكم في الذات.

1- Introduction:

Nowadays, smartphones have become an important part of our everyday lives and changed life style. Smart phones were globally used by 3.688 billion people in 2015. This number is expected increase to 6.378 billion in 2021 and 7.516 billion in 2026 (Okela, 2023). These digital devices have substantially changed the way we live, not only for social interaction but also shopping opportunities. For many people, especially university students have confirmed using their information and purposes like online purchasing, virtual gaming, browsing their social media applications and sharing their experiences (Kumar & Kumar, 2024). This practice may lead drive them to compare their lives and experience with those displayed on these platforms (Yue, et al, 2023).

Social exclusion occurs when an individual is isolated or rejected by others (Gao, et al, 2023). This experience not only adversely influences physical and mental health, but also impacts individual's consumption behavior (Zhang, et al., 2024). Compulsive buying is a way of unplanned behavior caused by an internal, irrational desire, often resulting in the excessive purchase of unnecessary things (Sun & Bao, 2023). When individual being socially excluded they tend to staying more time on these social media applications, which lead to adverse consequences such as social anxiety, depression, smartphone addiction and Fear of missing out (FoMO) (Yue et al., 2023). FoMO is characterized by a persistent need to stay updated on others' activities via smartphone platforms, leading to excessive usage and contributing to compulsive consumption behaviors (Choi et al., 2019; Elhai et al., 2020).

In the current digital landscape, online purchasing behavior is increasingly influenced by individuals' levels of self-control. Self-control is a necessary psychological function for controlling thoughts, feelings, behaviors and actions in response to impulses, in order to accomplish long term goals. Previous research has indicated that people with adequate self-control resources are better able to regulate their decision-making in a rational manner (Meng & Xuan, 2023). Therefore, self-control may play a moderating role between FoMO and Smartphone addiction. This study aims to examine the associations among these variables through the lenses of Self-Determination Theory (SDT) and Compensatory Internet Use Theory (CIUT). Specifically, it investigates the moderating role of self-control in the link between FoMO and smartphone addiction among Egyptian university students.

2- Theoretical background and hypotheses development

2-1 Social exclusion (SE):

Social exclusion refers to the phenomenon and situation in which a person is isolated, rejected and ostracized by other individuals or groups (Gao, et al., 2023). Previous studies indicated that social exclusion featured as the feeling of being disregarded by others in one's life (Yue et al., 2023). Social exclusion is widespread in interactive environments, where such behavior can undermine individuals' sense of belonging and negatively impact their interpersonal experiences (Zhang et al., 2024).

When individuals perceive a high level of social exclusion, they are more likely to experience these negative feelings (Zhang et al., 2024; Gao et al., 2023).

In an effort to build or restore social relationships, rejected individuals often modify their behavior. These behavioral changes are typically driven by the desire to compensate for unmet psychological needs. Consumption, in particular, is a common strategy used to reinforce self-concept and satisfy the need for belonging (Yue et al., 2023). As a result, socially excluded individuals may develop compulsive tendencies.

2.2 Fear of missing out (FoMO):

Fear of missing out (FoMO) has become a growing and widespread social phenomenon since the common use of social media, and it has recently emerged as a developing concept in consumer psychology (Holte et al., 2022). Przybylski et al., (2013, P. 1841) defined FoMO as "a pervasive apprehension that others might be having rewarding experiences from which one is absent". FoMO refers to the anxiety that arises from the fear of not being aware of or missing out on information, events, or experiences that could enhance an individual's life (Zhang et al., 2024; Holte et al., 2022). This implies that FoMO is closely linked to one's self-concept. As a result, it encourages social comparison due to individuals' attachment to self-conceptualization (Franchina et al., 2018). In line with self-determination theory (SDT), the need to fulfill basic psychological needs may be associated with an increased fear of missing out, which results in using social media application as a self-regulatory mechanism to fulfill individual's psychological requirements (Przybylski et al., 2013; Zhang et al., 2023).

The previous distinguished between self-initiated FoMO and externally initiated FoMO. The self-initiated FoMO is considered as an individual trait, while the externally initiated FoMO is triggered by external attractions (Franchina et al., 2018). This considers FoMO as a personal trait connects to excessive smartphone usage to maintain their linkage with society. Therefore, scholars showed that FoMO was identified as key predictors of smartphone addiction tendencies.

2.3 Smartphone addiction (SMA):

Smartphone use has grown significantly in recent years, and scholars have referred to its addictive nature using various terms, including 'smartphone addiction' (Sun et al., 2024; Li et al., 2021; He & Zeng, 2024; Handa & Ahuja, 2020), 'problematic smartphone use' (Elhai et al., 2020; Panova & Carbonell, 2018), and 'excessive smartphone use' (Sun et al., 2024). However, the terminology used to describe this phenomenon remains a subject of debate, with the term 'smartphone addiction' being more commonly recommended (Sun et al., 2024). Smartphone addiction is widely accepted by scholars as a kind of behavioral addiction (Li et al., 2021). Smartphone addiction refers to "an individual's inability to regulate smartphone use, leading to negative consequences and functional impairment in daily life" (Billieux, 2012, P. 299). Moreover, Sun et al., (2024) defined smartphone addiction as individual's non dominant and extreme use of smartphones with ignoring occupational and personal activities and lead to negative consequences in life.

In line with self-determination theory (SDT), individuals whose essential psychological needs are not fulfilled may engage in alternative activities—such as smartphone use—in a repetitive and habitual manner, which can ultimately lead to

smartphone addiction (Li et al., 2021; Elhai, et al., 2020). In line with the perspective of compensatory internet use theory (CIUT), which proposes that unsatisfied psychological needs in an individual's daily life may give rise to compensatory motivations that drive them to remain online (Sun & Miller, 2023). Some scholars have indicated that psychological needs satisfaction (PNS) was a crucial risk predictor for smartphone addiction (Sun et al., 2024; Handa & Ahjua, 2020). Previous studies have investigated the negative consequences of smartphone addiction, including its impact on physical and mental health (Michaels, 2016), psychosocial well-being (Caplan et al., 2009), and overall satisfaction and quality of life (Handa & Ahjua, 2020).

2.4 Compulsive buying (CB):

Compulsive buying is defined as uncontrollable, repetitive, and obsessive purchasing behavior, often regarded as the 'dark side' of consumer behavior (Sun & Bao, 2023). Some scholars thought that compulsive buying refers to addictive shopping behavior, where the consumer is incapable to rational purchasing (Suprawan, et al., 2024). Previous studies have identified several negative consequences of compulsive buying, including feelings of shame, cognitive dissonance, and regret (Suprawan, et al., 2024; Hussain, et al., 2023). While, other researchers showed that compulsive buying can cause some desirable outcomes like consumer pleasure, excitement and escaping from daily life stress (Sun & Bao, 2023 & Kshatriya & Shah, 2021).

Emotions such as anxiety, depression, social exclusion, low self-esteem, internet addiction, FoMO, and sadness have been identified as key motivators of compulsive buying and excessive purchasing behavior (Japutra et al., 2025). The widespread availability of smartphones, which facilitates excessive use and provides immediate positive emotional feedback, has intensified compulsive buying through e-commerce platforms by satisfying to the needs of compulsive consumers (Hussain, et al., 2023).

2.5 Self-control (SC):

Self-control refers to the ability of individuals to resist and manage their actions and behavior in response to impulses (Koc et al., 2023). Self-control also encompasses essential skills such as regulating thoughts and emotions, adapting conceptually, and maintaining goal-directed motivation to achieve desired behaviors (Kumar & Kumar, 2024). Additionally, self-control can help individual accomplish higher balance and growth in individual's life. Moreover, poor self-control is related to mental health problems. Therefore, the ability to resist and overcome individual's behavior can result in positive consequences in different fields of life like satisfaction of life, social flexibility, and balance between online activities with other responsibilities (Meng & Xuan, 2023).

Previous studies have explored the significance of self-control in addictive behaviors like smartphone addiction (Li et al., 2021), social media excessive usage (Koc et al., 2023), and problematic smartphone use (Kumar & Kumar, 2024). Individuals with strong self-control can resist their smartphone and social media usage patterns to accomplish long term goals (Koc et al., 2023). Conversely, individuals with weaker self-control are more likely to seek immediate gratification and are highly engaged with social media applications,

frequently checking their smartphones for updates due to FoMO (Swiatak et al., 2023).

2.6 Relationship between social exclusion and compulsive buying:

Social exclusion influences an individual's behavior, leading to behavioral adjustments in various ways, with some individuals responding differently across diverse situations (Zhang et al., 2024). According to self-determination theory (SDT), socially excluded individuals whose basic psychological needs are unmet often seek alternative means of compensation, with consumption behavior serving as a common way to fulfill these unmet needs (Yue et al., 2023). Consumers with a relatively high level of social exclusion are likely to have continuous shopping and purchasing more things than they need. In other words, the sense of social exclusion may act as a driving force and trigger uncontrollable motives behind compulsive buying behavior. Previous studies have indicated that social exclusion is positively correlated with compulsive buying behavior (Mert & Tengi Limoglu, 2023; Han, 2020; Harnish & Bridges, 2015). While Zhang et al., (2024) highlighted that social exclusion is positively correlated with impulsive purchasing behavior. Moreover, Yue et al., (2023) confirmed that social exclusion can significantly and positively predict impulsive buying. Thus, individuals who were excluded often exhibit compulsive behaviors. Therefore, this study proposes the following hypothesis:

Hypothesis (H1): Social exclusion is positively impact on compulsive buying.

2.7 Relationship between social exclusion and fear of missing out:

Social exclusion featured as the feeling of being disregarded and isolated by social groups, oftentimes lead to negative emotions (Yue et al., 2023). People who are afraid of being social excluded usually have continuous motivation toward need to belong, high level of self-esteem, and desire of dominance of their surroundings (Holte et al., 2022). On the other hand, it has been showed by various studies that FoMO can arise as a result of negative experiences such as social exclusion and social comparison (Zhang et al., 2024; Franchina et al., 2018).

Alabri, (2022) found that individuals who have social exclusion threats may face negative situations that result in the experience of FoMO. Holte et al., (2022) indicated that social exclusion is positively related to FoMO and people who are socially excluded their experience increases instead of FoMO. Alabri, (2022) discovered that experience of FoMO is predicted by Fear of social exclusion. Therefore, based on the findings linking social exclusion with social existence, it can be inferred that social exclusion may predict individuals rewarding experiences of FoMO. Therefore, we hypothesis:

Hypothesis (H2): Social exclusion is positively correlated with FoMO.

2.8 Relationship between fear of missing out and smartphone addiction:

According to self-determination theory (SDT) and compensatory internet use theory (CIUT) which suggest that individual psychological needs entail autonomy, competence, relationships (Przybylski et al., 2013), which can explore the drive for smartphone excessive use between adolescents and adults. Smartphone usage provides them presence through smartphone app and platforms

(He & Zeng, 2024). Daily disappointment of main psychological needs and intensive smartphone use drivers may result in high levels of FoMO and smartphone addiction (Zhang et al., 2024).

Prior studies provide evidence that FoMO is a key predictor of smartphone addiction, although the number of studies is limited and the contexts vary. He & Zeng, (2024) revealed that FoMO is positively related to smartphone addiction. In addition, Li et al., (2021) highlighted that there is a close relationship between FoMO and smartphone addiction. Other researchers have explored the connection between FoMO and problematic smartphone use (Elhai et al., 2020; Panova & Carbonell, 2018), as well as linking FoMO with compulsive social media use (Joshi M., 2023; Zhang et al., 2024). Thus we hypothesize that:

Hypothesis (H3): FoMO has a significant relationship with smartphone addiction.

2.9 Relationship between smartphone addiction and compulsive buying:

Smartphone are an essential tool for many people, particularly young adults. They spend a lot of time to keep social relationships, manage work and daily education, which lead to increase purchasing goods through offers and advertisements (Jimenez et al., 2024). Prior studies on smartphone addiction showed that the high level of addiction result in the excessive smartphone usage. This may be triggered by symptoms and behaviors of smartphone addiction as a result of uncontrollable desires (Nikolinakou., et., 2023). Chopdar et al. (2022) stated a significant and positive impact of smartphone addiction on the frequency of purchasing on smartphone app, where it can be explained that intensive mobile usage may boost compulsive buying tendencies of consumers. Choi et al., (2019) found that social media addiction, internet addiction and smartphone addiction are all highly associated with compulsive buying. Nikolinakou et al., (2023) pointed that impulsive buying is positively predicted by social media addiction. Mason et al., (2022) asserted that smartphone addiction is positively related to online compulsive buying on Generation Z consumers. Jimenez et al., (2024) highlighted that smartphone addiction boosts the compulsive app downloading tendency for younger Gen Z consumers. Thus, it supports the hypothesis of a positive association between smartphone addiction and compulsive buying. Thus we hypothesize that:

Hypothesis (H4): Smartphone addiction has appositive impact on compulsive buying.

2.10 The role of FoMO and smartphone addiction as serial mediation:

According to Self-Determination Theory (SDT), social exclusion undermines individuals’ basic psychological need for relatedness, prompting compensatory behaviors to restore emotional equilibrium. Compensatory Internet Use Theory (CIUT) similarly explains that individuals may turn to digital technologies to cope with negative emotions resulting from social disconnection.

Empirical studies have shown that social exclusion is significantly associated with increased levels of FoMO, as individuals seek to remain socially connected and avoid feelings of being left out (Zhang et al., 2024). FoMO, in turn,

has been found to predict problematic smartphone use and addiction, as individuals frequently check their devices to maintain virtual social presence (Elhai et al., 2020). Furthermore, smartphone addiction has been linked to compulsive buying behaviors, as excessive smartphone use often exposes individuals to marketing cues, online shopping platforms, and impulsive consumption (Nikolinakou., et., 2023). Thus, based on theoretical reasoning and empirical evidence, we proposed that:

Hypothesis (H5): FoMO and smartphone addiction act as serial mediators through which social exclusion leads to compulsive buying behavior.

2.11 The role of self-control as a moderator:

Self-control is the inner ability to resist and manage one's actions and behaviors in response to impulses (Koc et al., 2023). People with low self-control tend to be highly linked to smart phones and SNS, and their inability to regulated smartphone use due to FoMO (Zhang et al., 2024; Li et al., 2021). In contrast, individuals with high self-control demonstrate the ability to resist and manage the impulse of continuously checking and updating their smartphones and social media applications (Kumar & Kumar, 2024). Moreover, people will be mindful and conscious of the possible negative consequences of smartphone addiction usage comprising FoMO to accomplish their responsibilities and long goals (Meng & Xyan, 2023). In addition, Koc, et al., (2023) examined the self-control as a moderator variable between FoMO and social media compulsive use. In line with this Kumar & Kumar, (2024) self-control has between found to have a negatively significant effect on the relationship between FoMO and the compulsive use of social media. Lower levels of self-control forecasted higher levels of FoMO, which in turn demonstrated higher levels of smartphone addiction. Thus, we hypothesis that:

Hypothesis (H6): Self-control moderates the relationship between FoMO and smartphone addiction.

2.11 Research Gap:

A review of previous literature reveals a lack of integrated understanding of the relationship between social exclusion, fear of missing out (FoMO), smartphone addiction, and compulsive buying, especially among young people who are highly engaged with smartphones. Most existing studies focused on only two variables at a time—such as the relationship between FoMO and smartphone addiction, or between addiction and compulsive buying—without developing a comprehensive model that shows how these factors interact in sequence.

First, there is a shortage of studies that combine Self-Determination Theory (SDT) and Compensatory Internet Use Theory (CIUT) to explain how social exclusion can lead to problematic behaviors such as smartphone addiction and compulsive buying. While each theory has been used separately in past research, very few studies have integrated them to better understand digital consumer behavior.

Second, self-control as a moderating factor has not been fully explored. Although some studies have linked low self-control with high

smartphone or social media use, its role in shaping the relationship between FoMO and smartphone addiction has not been clearly investigated.

Third, most existing studies were conducted in Western or Asian countries, while there is a clear lack of research focusing on university students in developing countries like Egypt, even though they are among the most digitally active and psychologically affected groups.

Finally, many previous studies were cross-sectional and did not examine how these behaviors may develop or change over time—for example, how long-term experiences of social exclusion may lead to harmful consumer habits.

Therefore, this study aims to fill these research gaps by developing a comprehensive model linking social exclusion to compulsive buying, mediated by FoMO and smartphone addiction, while also examining the moderating role of self-control between FoMO and smartphone addiction.

The proposed model for hypothesis testing is presented in **figure. 1**

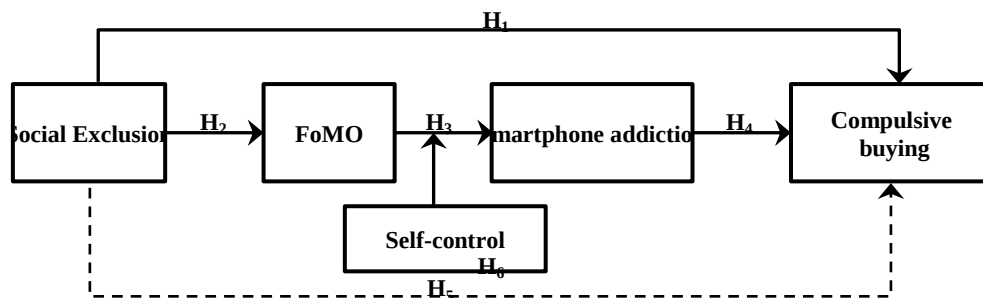


Figure. 1 The proposed model for hypothesis testing

3- Research methodology:

3.1 Constructs and Measurement items:

Measurement items in our research were adapted from the previous literature to ensure the validity of the scale. All the responses were recorded on a 5-point Likert scale ranging from 1= strongly disagree to 5=strongly agree. Except for the reverse statements, the coding was reversed. Social exclusion was measured using a 6-items adopted from study of Niu et al. (2016). FoMO was measured using a 10-items scale adopted from the study of Good & Hyman. (2020). Smartphone addiction was measured using 10-itmes adopted from Zhitamrisky- Geffet & Blau. (2016). Compulsive buying was measured using 5-itmes adapted from Edwards. (1993). Self-control was measured using 5-itmes adapted from Tangney et al., (2018). See appendix (A).

3.2 Data collection and sampling

This is a survey study employing a river sampling technique, in which data were collected at one point in time. The study population consists of Egyptian university students. The present study relied on online sampling calculators to determine the sample size, which resulted in a target of 384 Egyptian university students. Data collection took approximately two months. A total of 367 questionnaires were received. The next stage involved data cleaning, which is an essential part of the process, as erroneous or inconsistent data can significantly affect the analysis outcomes (Hellerstein, 2008). The number of

complete and usable responses is 367 out of the 384 target, resulting in a response rate of 95.6%. Accordingly, the analysis was conducted based on a final sample of 367 responses.

3.3 Respondents’ profile

Table 1 frequency distribution of demographic characteristics

demographic characteristics		Frequency (N=367)	Percentage %
Gender	Male	189	51.50
	Female	178	48.50
Age	less than 25	135	36.78
	From 25 to less than 45	232	63.22
Education level	under-graduation	123	33.51
	Graduation	196	53.41
	post-graduation	48	13.08
Electronic-purchasing rate	Once	86	23.43
	More than one and less than five times	173	47.14
	More than five times	108	29.43
Approx. time spent on a smartphone in a day	15-60 min	57	15.53
	1-2 hours	74	20.16
	2-4 hours	112	30.52
	more than 4 hours	124	33.79

Source: Prepared based on statistical analysis results

As shown in table 1, the Sample Characteristic, based on which approximately 48.5% of the respondents were female (n=178) and 51.5% male (n=189). Majority of sample age from 25 to less than 45-year-old, about 63.22% of the respondents (n=232). The greater percentage of sample educational level was graduation 53.41% of respondents (n=196), and the lowest percentage of respondents was post-graduation 13.08% of the respondents (n=48). Most of respondents had more than one and less than five electronic-purchasing rates, 47.14% of the respondents (n=173), but those who had more than five electronic-purchasing rates about 29.43% of the respondents. Regarding approximately time spent on a smartphone in a day, the majority of respondents were more than 4 hours 33.79% (n=124), and the lowest percentage of respondents was 15-60 minutes 15.53% of the respondents (n=57).

Table 2 Descriptive Statistics and correlation matrix for variables

Construct	Mean	Std. D	SE	FoMO	SA	SC
SE	3.5	.36	1			
FoMO	3.6	.23	.52**	1		
SA	4.2	.41	.29**	.24**	1	
SC	3.8	.31	.43**	(.18)**	(.23)**	1
CB	3.4	.45	.40**	.33**	.39**	(.34)**

** Correlation is significant at the 0.01 level. Source: Prepared based on statistical analysis results.

The previous table indicates that the answer's respondents agree to all variables that range between (3.4 – 4.2). Values of coefficient of Pearson's correlation between variables are significant. Correlation values range between (0.24 to 0.52). the greater values of correlation in the relationship between SE and FoMO (0.52), but the lowest values of correlation in the relationship between FoMO and SA (0.24).

3.4 Measurement Models

We use standardized loading estimates (CFA) that should be 0.5 or higher, and ideally, .7 or higher, to indicate convergent validity, Average Variances Extracted (AVE) should be 0.5 or greater to suggest adequate convergent validity, Composite Reliability (C.R) a measure of internal consistency reliability, which, in contrast to Cronbach's alpha, does not assume equally weighted indicator loadings. Composite reliability should be above 0.60 in exploratory research and above 0.70 as a general guideline (Hair et al., 2019).

The CFA was conducted to each construct to calculate the average variances extraction (AVE) which reflects convergent validity but is also used to check discriminative validity in conjunction with intercorrelations of the constructs. The previous table shows that all values of AVE, C.R and model fit indicators suggest an acceptable model fit for all variables measures.

Table 3 Factor loading, Reliability and Validity

Construct	Items	factor loading	N	Reliability and Validity	
				AVE	C.R
SE	SE1	0.749	6	0.593	0.897
	SE2	0.752			
	SE3	0.753			
	SE4	0.779			
	SE5	0.788			
	SE6	0.798			
FOMO	FOMO1	0.807	8	0.641	0.934
	FOMO2	0.828			
	FOMO3	0.774			
	FOMO4	0.847			
	FOMO5	0.823			
	FOMO6	0.816			
	FOMO7	0.677			
	FOMO8	0.821			
SA	SA1	0.779	10	0.640	0.947
	SA2	0.722			
	SA3	0.714			
	SA4	0.775			
	SA5	0.840			
	SA6	0.879			
	SA7	0.840			
	SA8	0.742			
	SA9	0.867			
	SA10	0.827			
CB	CB1	0.7	5	0.552	0.860
	CB2	0.724			
	CB3	0.767			
	CB4	0.787			
	CB5	0.735			
SC	SC1	0.844	5	0.699	0.921
	SC2	0.796			
	SC3	0.867			
	SC4	0.853			
	SC5	0.818			

Source: Prepared based on statistical analysis results

3.5 Structural equation model for moderating-mediation model

The statistical analyses relied on the PROCESS macro, which enabled a simultaneous estimation of the direct, mediation and moderating effects that underpin the proposed theoretical framework. For testing hypothesized relationships, the study used SPSS 26 and AMOS 21. We used PROCESS macro to analyze all direct, mediation and

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moderation relationships. Model no. 6 and model 1 were used for sequential mediation and moderation, respectively.

Table 4 Path coefficients of the structural model (direct relationships)

H no.	Direct effect	Beta	STDE*	t-value	P-value	Decision
H1	SE → CB	0.18	0.04	3.97	0.000	Supported
H2	SE → FoMO	0.57	0.05	11.34	0.000	Supported
H3	FoMO → SA	0.41	0.04	9.46	0.000	Supported
H4	SA → CB	0.56	0.05	11.38	0.000	Supported

* STDE= Standard Error. Source: Prepared based on statistical analysis results

The effect of social exclusion on Compulsive buying has been explored directly as well as indirectly through fear of missing out and Smartphone addiction. Four paths have been traced and the results revealed that all the paths explored in the model are significant, which is the direct effect of social exclusion on Compulsive buying where ($\beta=0.18$, $STDE=0.04$, t value =3.97, $p<0.001$). Thus, the first hypothesis was supported, which mean, social exclusion positively impacts on compulsive buying. The second path traced the direct relationship between social exclusion and fear of missing out. The coefficient for the relationship between social exclusion and fear of missing out ($\beta=0.57$, $SE=0.05$, t value=11.34, $p<0.001$), is significant which means that higher the social exclusion higher is the degree of fear of missing out. The second hypothesis was supported, which means, social exclusion positively associated with fear of missing out.

The third path traced the direct relationship between fear of missing out and smartphone addiction which is also positive ($\beta=0.41$, $STDE=0.04$, t value =9.46, $p<0.01$), which indicates that higher the fear of missing out higher is the smartphone addiction. The third hypothesis was supported. Which mean, Fear of missing out positively predicts smartphone addiction.

Finally, the fourth path reflected that the Smartphone addiction significantly affects compulsive buying ($\beta = 0.56$, $STDE= 0.05$, t value =11.38, $p < 0.001$), the fourth hypothesis was supported, which indicated that higher the Smartphone addiction is the higher compulsive buying.

• **Serial Mediation and Moderating analysis**

Table 5 Mediation and Moderating analysis result

H	Indirect paths	Beta	STD E	t value	LLCI	ULC I	P-value	Decision
H5	SE → FoMO → SA → CB	0.13	0.02	6.50	0.08	0.19	0.000	Supported
Direct effect (SE → CB)		0.18						
Total effects		0.58						
H6	FoMO * SC → SA	-0.102	0.03	-3.02	-0.16	-0.03	0.003	Supported

STDE = Standard error, LLCI=Lower Limit Confidence Interval, ULCL=Upper Limit Confidence interval, t value= Beta / SE

Source: Prepared based on statistical analysis results

This mediation approach was tested using bootstrapping procedure, because it is more efficient procedure for testing indirect effects (Preacher and Hayes 2004). In Table 5, we provide estimates of the indirect effects, along with the symmetric and 95% bias corrected bootstrapped confidence intervals for our path estimates. Also identifies the estimates from the structural path coefficients.

The study assessed the mediation with fear of missing out and smartphone addiction that mediating the relationship between social exclusion and compulsive bullying. The results revealed a significant indirect effect of social exclusion and compulsive bullying through fear of missing out and smartphone addiction ($\beta=0.13$, STDE=0.02, t value=6.5, LLCI=0.08, ULCI=0.19, $p < 0.001$) supporting H5. Hence, there is a serial mediation of fear of missing out and smartphone addiction in the relationship between social exclusion and compulsive bullying.

Also, the study assessed a positive relationship between fear of missing out and smartphone addiction would be conditional upon self-control. According to Table 5, (FoMO * SC) interaction was significant for smartphone addiction ($\beta=-0.102$, t value =-3.02, STDE=0.03, $p < 0.01$). The results reveal that this relationship is strong at a low level of self-control. Thus, self-control has been found to have a negatively significant effect on the relationship between FoMO and SA. Hence, Self-control moderates the relationship between FoMO and smartphone addiction, supporting H6.

4- Discussion of results:

Based on self-control determination theory (SDT) and compensatory internet use theory (CIUT), the study aimed to examine the influence of social exclusion on compulsive buying using a serial mediation study. In this research, fear of missing out (FoMO) and smartphone addiction are examined as mediating variables, while self-control functions as a moderating factor. The analysis employed SPSS and AMOS 24 software to conduct a serial mediation analysis, incorporating the moderator effect into the model. Data were collected via an online questionnaire from a sample of 367 university students in Egypt. The empirical findings support all the proposed hypotheses.

Firstly, the results regarding the direct effect reveal a significant and positive relationship between social exclusion and compulsive buying behavior (H1). This finding strengthens our understanding of how social exclusion can lead to compulsive purchasing tendencies. It aligns with earlier studies (Mart & Tengi Limoglue, 2023; Handa, 2020; Harnish & Bridges, 2015), which also found that individuals who experience social exclusion are more likely to engage in compulsive buying. While some previous research has concentrated on the link between social exclusion and impulsive buying behavior (Zhang et al., 2024; Yue et al., 2023), this study emphasizes the compulsive buying. Secondly, the analysis shows a significant connection between social exclusion and FoMO (H2). This finding is consistent with prior research by Alabri (2022) and Holte et al. (2022), supporting the notion that individuals facing social exclusion may experience negative emotional outcomes, such as FoMO. In addition, our study aligns with Zhang et al., (2024) and Franchina et al., (2018) which indicated that experience of FoMO is predicted by fear of social exclusion.

Thirdly, the study investigated the relationship between the FoMO and the smartphone addiction (H3). The result supports (SDT) and (CIUT) theories, which suggested that individuals with FoMO are stimulated to use smartphones application to relieve negative feeling and fulfill their psychological needs for external stimulation (Przybylski et al., 2013). This is in alignment with the findings of previous researches which revealed that there is a close relationship between FoMO and smartphone addiction (He & Zeng, 2024; Li et al., 2021). Other studies such as Elhai et al., (2020) and Panova & Carbonell, (2018) have confirmed a connection between FoMO and problematic smartphone use. While existing studies have primarily focused on the relationship between FoMO and compulsive social media use (Joshi M., 2023; Zhang et al., 2024). Additionally our study confirms the positive relationship between smartphone addiction and compulsive buying (H4). The relationship supported from Choi et al., (2019) that found a significant and positive linkage between smartphone addiction and compulsive buying. Due to the intensive mobile usage and transition from offline to online, consumers spent long time on social media, which impact on frequency of purchasing on smartphone app and boost compulsive buying tendencies of consumers (Chopdar et al., 2023). In addition, the results are consistent with Mason et al., (2022) and Jimenz et al., (2024) which asserted that smartphone addiction is positively related to online compulsive buying on Generation Z consumers. Whereas, a study by Nikolinakou et al., (2023) pointed that impulsive buying is positively predicted by social media addiction. Moreover, our study confirms the serial mediation effect proposed in (H5), which proposed that fear of missing out FoMO and smartphone addiction sequentially mediate the relationship between social exclusion and compulsive buying behavior. The results indicate that individuals who experience social exclusion are more likely to develop FoMO, which in turn increases their susceptibility to smartphone addiction, ultimately leading to higher levels of compulsive buying. This finding aligns with previous research by Franchina et al. (2018) and Elhai et al. (2020), who emphasized the role of FoMO and smartphone overuse as mechanisms through which social and emotional vulnerabilities translate into problematic digital behavior.

Finally, the research confirmed that self-control acts as a moderator in the in the relationship between FoMO and the smartphone addiction (H6). This result aligns with a previous study by Kumar and Kumar (2024), which demonstrates that individuals with lower levels of self-control are more likely to experience FoMO,

potentially leading to smartphone addiction and, subsequently, compulsive buying. In line with this result, Koc et al., (2023) mentioned that the self-control acts as a moderator between FoMO and social media compulsive use. Thus, through current study investigation, it is explored that social exclusion has a significant positive impact on compulsive buying among Egyptian university students, with FoMO and smartphone addiction employed as consecutive mediators in this association. Additionally, the research demonstrates self-control as a pivotal moderator, self-control negatively significant moderating the connection between FoMO and compulsive buying.

5- Conclusion and implications:

This study examined the psychological and behavioral mechanisms through which social exclusion contributes to compulsive buying among university students in Egypt, guided by Self-Determination Theory (SDT) and Compensatory Internet Use Theory (CIUT). The findings confirmed that social exclusion significantly predicts compulsive buying behavior, with fear of missing out (FoMO) and smartphone addiction serving as sequential mediators. Moreover, self-control moderated the relationship between FoMO and smartphone addiction, indicating that individuals with higher self-control are less likely to develop addictive smartphone behaviors even when experiencing FoMO.

Theoretically, this research advances the integration of SDT and CIUT by demonstrating how unmet psychological needs caused by social exclusion can manifest through digital dependency and problematic consumption patterns. It also expands current models by introducing a serial mediation framework, offering a more holistic view of how emotional and behavioral mechanisms interact in the digital age. Furthermore, the identification of self-control as a moderator provides new insights into individual-level buffers that may reduce the impact of FoMO on smartphone addiction.

Practically, the study offers valuable implications for educators, policymakers, and digital well-being advocates. University counseling services may benefit from early intervention strategies that address students’ emotional responses to social exclusion. Additionally, awareness campaigns that promote digital self-regulation and resilience may help reduce the risk of compulsive digital consumption. Finally, the findings may inform app developers and marketers to consider ethical design practices that minimize addictive features targeting vulnerable youth.

Overall, this research not only addresses significant theoretical gaps but also offers practical pathways for enhancing digital well-being among university students, particularly in developing countries where digital engagement continues to rise. Future studies may build upon this model to explore long-term behavioral outcomes and test interventions aimed at fostering healthier digital habits.

6- Limitations and Future research:

The study has some limitations that should be considered. First, because of the reality that university students had been the focus group of smartphone addiction, a university student sample was examined in the current study. Future studies are called to explore the relationships among the study variables in other populations, such as adolescents and children, who may exhibit similar or even more pronounced patterns of behavior. Second, although this study used river sampling, a common non-probability technique in digital research, this method may limit the generalizability of the results to the broader population. Future

studies are recommended to employ probability-based sampling methods to ensure greater representation across different social and demographic groups. Third, the study did not account for potentially influential factors such as income level, educational background, and socioeconomic status, which may play a significant role in shaping consumers' compulsive buying behavior. Future research should consider these variables to offer a more comprehensive understanding of consumer behavior in the digital environment.

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“Smartphones’ Sway: How Social Exclusion Causes Compulsive Buying Behavior among University Students in Egypt through Serial Mediation; the Moderating role of Self-control”

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Dina Abou-bakr Mohammed Mahmoud

Appendix

Statements

	1	2	3	4	5
<i>Social exclusion</i>					
▪ In general others treat me as if I were invisible.					
▪ In general others ignore me during conversation.					
▪ Others invite me to join their club, organization, or association. (opposite).					
▪ Others include me in their plans for the holidays (opposite).					
▪ Others invite to go out to eat with them (opposite).					
▪ Others invite me to join them for weekend activities, hobbies, or events. (opposite).					
<i>Fear of missing out (FoMo)</i>					
▪ I will feel bothered that I missed on opportunity.					
▪ I will feel anxious about not being with my friends.					
▪ I will worry about what I’m missing.					
▪ I will feel concerned that my friends are having more fun without met.					
▪ I will feel left out.					
▪ I will worry my friends are doing more rewarding things than me.					
▪ I will feel sorry that I didn’t experience an event with friends.					
▪ I’m afraid later I will feel sorry I didn’t go with me friends.					
<i>Smartphone addiction.</i>					
▪ It is difficult for me not to use my smartphone even during a lecture or formal meeting.					
▪ I also use my smartphone late at night and before going to bed.					
▪ My smartphone use is an important part of my life.					

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▪ People who are close to me complain that I neglect them because of my excessive use of my smartphone.					
▪ Sometimes I imagine I can hear my smartphone even when there is on notification.					
▪ It would be hard for me not to have my smartphone.					
▪ I think about my smartphone even when it is not within reach.					
▪ I get irritated when people disturb me when I am in the middle of using an app.					
▪ I am constantly checking to see if I have notifications or updates.					
▪ I am busy with my smartphone for more time than I would like or need.					
Compulsive buying.					
▪ I feel anxious/ nervous on the days I do not shop.					
▪ On smartphone, I tend to purchase items that I didn't plan to buy.					
▪ I buy things even though I cannot really afford them.					
▪ I go on buying binges.					
▪ I think others would be horrified if they knew of my shopping habits.					
Self-Control.					
▪ I do things that feel good in the moment but regret later on.					
▪ I'm good at resisting temptation.					
▪ I often act without thinking through all the alternatives.					
▪ I get distracted easily.					
▪ I have a hard time breaking bad habit.					

Please answer the following questions:

Gender

Male ()

Female ()

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Age

18-21 ()

22-25 ()

Educational level.

Under-graduation ()

Graduation ()

Post-graduation ()

Electronic-purchasing rate.

Once ()

More than one and less than five times. ()

More than five times. ()

Approx. time spent on a smartphone in a day

15-60 min ()

1-2 h ()

2-4 h ()

More than 4 h ()