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Regular Article

The relationship between fear of missing out and social media addiction among Turkish Muslim students: A serial mediation model through self-control and responsibility

Ayşen Kovan [a], Murat Yıldırım [b,c,*], Arzu Gülbahçe [a]

[a] Department of Psychological Counseling and Guidance, Atatürk University, Erzurum, Turkiye
[b] Department of Psychology, Faculty of Science and Letters, Ağrı İbrahim Çeçen University, Ağrı, Turkiye
[c] Department of Social and Educational Sciences, Lebanese American University, Beirut, Lebanon

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ABSTRACT

Objectives: Social media addiction (SMA) contributes to significant challenges for the well-being and mental health of young adults, placing a heavy burden on both mental and educational resources. While the association between fear of missing out (FoMO) and SMA is established, the mechanisms by which FoMO influences SMA in young adults remain unclear. This study aimed to investigate a serial mediating effect of self-control and responsibility in the relationship between FoMO and SMA among undergraduate students.

Sample and settings: A cross-sectional study was conducted comprising 256 Turkish Muslim university students (80% female), aged 18–30 years (M = 20.31 years; SD = 2.29). An online survey was used, including the following questionnaires: Fear of Missing Out Scale, Bengen Social Media Addiction, and Self-discipline Scale.

Results: Findings indicated that FoMO directly influenced SMA through three significant mediation pathways: (i) through self-control; (ii) through responsibility; and (iii) through both self-control and responsibility. Overall, FoMO was significantly associated with SMA, with self-control and responsibility acting as serial mediators in this relationship.

Conclusions: Improving the self-control and responsibility of young adults may prevent or reduce the effect of FoMO on SMA. Therefore, it is crucial to develop students' self-control and responsibility skills to manage FoMO and SMA risks effectively. The study highlights the importance of awareness-raising programs and psycho-education to assist students in establishing healthy boundaries for digital media use. It provides valuable insights for tailored interventions and support strategies in the context of social media use among university students.

1. Introduction

The pandemic has highlighted certain concepts, particularly those related to social media, which have become integral to our daily routines. One such concept is the fear of missing out (FoMO), defined as a state of anxiety arising from the constant need to stay updated with current events and have instant access to information (Przybylski et al., 2013). It, especially when combined with the rapid information flow of social media, is highly related to individuals' desire to keep up with social, cultural, and economic changes (Heidemann et al., 2012). Furthermore, a sense of insecurity arising from being bombarded with information can exacerbate FoMO. For instance, although the COVID-19 pandemic has affected all of us as global citizens (Cinelli et al., 2020), in Turkey, the Kahramanmaraş-based earthquake in February 2023 had a direct impact on Turkish society. During this traumatic event, there was a significant amount of information overload (Aydın, 2023). In other words, in situations where social communication dynamics are affected, the dissemination of false or misleading information can lead to social panic and chaos by causing disinformation. Since such events are under the influence of modern communication technologies, concepts are open to constant change and concepts such as FoMO have a constantly changing structure with the influence of social media. However, with the instant access provided by social media, the risk of questioning the reality of events and being exposed to misinformation increases

* Corresponding author. Department of Psychology, Faculty of Science and Letters, Agri Ibrahim Cecen University, Fırat Mahallesi Yeni Üniversite Caddesi No: 2 AE/1 04100 Merkez, Ağrı, Turkiye.
E-mail addresses: ayseen26@hotmail.com (A. Kovan), muratyildirim@agri.edu.tr, muratyildirimphd@gmail.com (M. Yıldırım), arzugulbahce@atauni.edu.tr (A. Gülbahçe).

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(Alutaybi et al., 2020). Therefore, social media use seems to play an important role in terms of both information acquisition and well-being.

Besides that, this fear of information can drive individuals to become more active users of social media. However, this can also lead to social media addiction (SMA) over time, as keeping up with the constant flow of information can be overwhelming (Vaghefi et al., 2023). Studies have shown that the capacity of social media to provide unlimited content and the intense interaction brought about by continuous use can make individuals prone to SMA (Brailovskaia & Margraf, 2024; Kovan & Ormancı, 2021). MOBISAD's (2023) report points to the widespread adoption and utilisation of connected devices and services, along with Turkey's rapid progress in the digital space. According to the report, 95% of Turkey's total population of 85.6 million use smartphones. Furthermore, 83% of the surveyed population were identified as Internet users, and 73% of them were active social media users. It is stated that individuals spend an average of 7 h and 24 min per day on the Internet. One of the remarkable findings in the report, especially the statistic that 84% of individuals between the ages of 18 and 29 actively use and intensively adopt these technologies, reflects the interaction of the young generation with the digital world. This situation signals that social media use and social media addiction have reached an alarming level, especially among young individuals. The relationship between social media addiction (SMA) and excessive use of social media is important for understanding the underlying causes, mechanisms, coping skills, and their effectiveness.

1.1. Relationships between FoMO and SMA

The relationship between FoMO and social media use is significant in understanding the impact of the rapid flow of information in modern society and the expectation of staying up-to-date (Roberts & David, 2020). Instant access to information through social media platforms (SMPs) exposes individuals to FoMO (Alutaybi et al., 2020). This situation can motivate individuals to use social media more actively. Additionally, the desire to keep up with developments can lead to more intensive use of social media for information exchange, social interaction, and personal networking (Bessarab et al., 2021). That is, in modern society, the correlation between social media use and FoMO is a prominent concept in understanding how individuals respond to the rapid flow of information and the pressure to stay up-to-date. The fact that SMPs provide instant access to information may make individuals fearful of missing out on updates, while at the same time increasing their use of social media. Moreover, the desire to keep up with technological developments may lead to more intensive use of social media for various purposes, which may increase the importance of factors such as information exchange, social interaction and personal networking (Andreassen et al., 2016). In this context, the impact of social media on society and how individuals use these platforms shows that FoMO is an important concept that affects individuals' interest in and use of SMPs.

Social media addiction (SMA) is the excessive and uncontrolled dependence of individuals on SMPs. It is associated with the constant need to follow, share, and interact with social media content. The constantly updated and expanding content of social media can lead individuals to be active on SMPs continuously. Over time, SMA can cause individuals to neglect other important daily activities, damage their social relationships, and reduce their quality of life (Zhao et al., 2022). One of the main triggers of SMA is FoMO (Andreassen et al., 2016; Kovan & Ormancı, 2021). This is because the FoMO can lead individuals to constantly observe and follow social media, and SMPs can provide a space that can alleviate this fear with their instant and constantly updated content. Individuals can interact frequently and continuously on social media due to the FoMO experienced on these SMPs (Alutaybi et al., 2020). Therefore, FoMO is a significant factor that fuels SMA. Individuals can use social media intensively to cope with this fear and to have instant access to information.

Studies in the literature generally show a positive relationship between FoMO and SMA (Andreassen et al., 2016; Kovan & Ormancı, 2021). This suggests that the constant need for up-to-date information, particularly when combined with the rapid information flow of social media, increases social media use and addiction. Individuals can use social media more actively and intensively to cope with FoMO, which can lead to addiction over time. Recently, there has been increased interest in the relationship between FoMO and SMA, and the literature offers a wealth of potential variables that mediate this relationship. In general, the variables mediating this relationship are personality traits (Blackwell et al., 2017), smartphone addiction (Bakioğlu et al., 2022; Li et al., 2022), sleep quality (Li et al., 2020), self-esteem (Garg, 2023), well-being (Roberts & David, 2020), loneliness (Hunt et al., 2018) and so on. However, studies on the mediation of self-discipline and related variables, which are individual coping mechanisms, have been limited. Therefore, it is important to understand the coping mechanisms that can buffer the negative effects of FoMO on SMA.

1.2. The mediating role of self-control

The reduction of FoMO effects through self-control can be a plausible mechanism contributing to SMA. Self-control can be defined as the ability to consciously regulate and manage one's internal impulses, desires, and reactions, and is also associated with the capacity to focus on goals, make long-term plans, and regulate thoughts and emotions (Mamayek et al., 2017). It even includes important skills such as resistance to instant gratification, the ability to procrastinate, intellectual flexibility and maintaining the necessary motivation to perform desired behaviours (Converse et al., 2019). In a way, self-control can help one achieve greater balance and success in one's life, as it improves one's ability to manage one's inner drives. Resisting instant gratification can contribute to focusing on and achieving one's long-term goals. Furthermore, the ability to self-control can help an individual cope more effectively with stress and improve mental health. Therefore, the ability to regulate one's behaviour can generally lead to positive outcomes in many areas of life such as healthy life, academic success, social adaptation and so on (Duckworth et al., 2019).

Several studies in the literature have highlighted the crucial role of self-control in behavioural addictions, particularly in the context of SMA (Ekşi et al., 2019; Koç et al., 2023), internet addiction (Kim et al., 2017; Li et al., 2021), and smartphone addiction (Servidio, 2021; Sun et al., 2022; Świątek et al., 2023). These investigations demonstrate the significant impact of self-control in moderating and mitigating addictive behaviours across various SMPs. Additionally, the literature has extensively explored the relationship between low self-control and mental health problems (Kim et al., 2022; Tangney et al., 2018, pp. 173–212). These findings suggest that individuals with insufficient self-control can be more vulnerable to experiencing mental health challenges. The significance of self-control extends beyond specific addictive behaviours and also impacts the overall well-being of individuals. Existing studies highlight the multidimensional role of self-control in shaping mental health outcomes, including digital addictions (Mei et al., 2016). Comprehending the intricate correlation between self-control and behavioural and psychological aspects is essential for creating specific interventions and support strategies in the field of mental health and addiction research.

Self-control is a valuable skill with numerous benefits. One of the most significant advantages of this skill is that it enables students to concentrate their attention and energy on long-term objectives (Greene et al., 2024). Students who possess self-control can more effectively achieve their long-term academic goals, particularly in studying, developing learning strategies, and preparing for exams (Duckworth et al., 2019). According to Zhao et al. (2021), students can improve their time management and reduce procrastination by resisting instant gratification and avoiding impulsive decisions. Therefore, self-control is an important tool for enhancing students' academic performance and achieving long-term goals. Moreover, self-control plays a significant role

in managing social media use. Students with high levels of self-control can regulate their time spent on SMPs more effectively (Kim et al., 2017; Sagar, 2021). This statement suggests that students with high levels of self-control are better equipped to reduce distractions, focus on academic responsibilities, and participate more actively in learning processes. Conversely, students with low levels of self-control can be more susceptible to instant stimuli on SMPs, which can negatively impact their study processes and academic performance (Ekşi et al., 2019). Therefore, the impact of self-control on students' academic achievement and learning experiences through the management of their social media use is significant.

The Interaction of Person-Affect-Cognition-Execution (I-PACE) model is a suitable framework for examining the factors that influence an individual's internet use (Brand et al., 2016). It suggests that an individual's self-control abilities can mediate the relationship between FoMO and SMA. This is because individuals with high levels of self-control can effectively manage FoMO (Sun et al., 2022), and consciously regulate their social media use, which can have a positive impact on SMA and reduce potential risks (Mei et al., 2016). However, for individuals with low levels of self-control, FoMO can increase addictive tendencies, leading to excessive and out-of-control use of social media (Servidio, 2021). Therefore, it is important to understand the mediating role of self-control in this relationship to develop effective intervention strategies. In this context, the model that addresses the interaction between an individual's emotions, thoughts, behaviour, and self-control can help to understand the relationships in SMA.

1.3. The mediating role of responsibility

Responsibility is an important aspect of life as the ability and determination of an individual or a community to fulfil specified tasks, obligations or similar responsibilities while being responsible involves acting in accordance with ethical norms, societal expectations and personal values (McGrath & Whitty, 2018). Furthermore, Herzog (2014, pp. 185–195) highlights the significance of an individual's capacity to anticipate the outcomes of their actions, take accountability for their mistakes, and remain committed to their tasks. These statements show the importance of individual and societal responsibility, as responsibility includes not only the fulfilment of duties and obligations but also the harmonisation of actions with ethical norms and personal values. Moreover, the importance of the proactive aspect of responsibility, of accepting mistakes and fulfilling tasks diligently, is emphasised. By integrating ethical considerations and personal values into decision-making processes, individuals can develop a sense of responsibility that fosters trust and integrity in communities. In other words, responsibility serves as a cornerstone for ethical behaviour, social cohesion and personal development, representing the relationship between individual actions and social relations. Thus, it can be argued that responsibility is a crucial aspect of personal and social development that evolves during an individual's maturation process.

Responsible individuals can display a conscious and effective attitude towards managing FoMO (Modzelewski, 2020). At this point, responsibility can be associated with the skills of defining one's own information needs, following reliable sources, managing the process of accessing information and actively evaluating this information. Being responsible in social media environments with fast and continuous information flow can help individuals become equipped with accurate and up-to-date information (Arora & Kaur, 2019). In this context, responsibility is an important factor that affects an individual's knowledge management processes towards FoMO. Individuals with a high level of responsibility can manage their FoMO more effectively and exhibit a more conscious attitude towards the use of social media (Tandon et al., 2022). Furthermore, social media use can decrease the risk of SMA by influencing an individual's emotional and cognitive processes, which in turn affects their behavioural execution (Güler et al., 2019). Specifically, an individual's sense of responsibility can promote a more balanced and intentional use of social media. However, FoMO can increase social media usage in individuals with lower levels of responsibility (Hayran & Anik, 2021), potentially leading to SMA. The I-PACE model can provide a suitable framework for explaining the relationship between responsibility and SMA. It is believed that individuals who are responsible can better manage their FoMO levels, leading to a healthier balance in their use of social media.

One study conducted with female university students found a relationship between their level of responsibility and their method of using SMPs (Zeky & Mustafa, 2018). To further interpret this finding, several potential explanations could be considered. Firstly, the specific activities or behaviours of SMPs can influence the students' sense of responsibility. The perceived responsibility of interactions and engagements on SMPs can be influenced by their nature (Shah et al., 2019). Students who engage in positive and constructive interactions, related to academic or extracurricular pursuits, can exhibit higher levels of responsibility (Janković et al., 2016). Conversely, those involved in passive or time-consuming activities can display lower levels of responsibility. Finally, individual differences in how students approach and use SMPs can also influence responsibility. Personal traits, motivation, and values can shape both online behaviour and a sense of responsibility (Potocan et al., 2020). The literature reveals limited studies on students' responsibility, perceptions and awareness, social media use, and SMA levels. Therefore, this study is important in closing the gap in the literature.

1.4. Relationships between self-control and responsibility

According to the I-PACE model, self-control is considered a component of an individual's cognitive processes. Self-control involves resisting impulsive internet use, regulating one's behaviour, and employing control mechanisms. As a result, it can help regulate the balance and management of internet use by interacting with an individual's emotional states, intellectual processes, and behavioural practices (Li et al., 2021). Therefore, self-control is a critical factor in regulating an individual's cognitive and behavioural relationship with the internet. Those with high levels of self-control are better equipped to focus on long-term goals, manage their time effectively, fulfil their responsibilities, and resist distractions (Converse et al., 2019). This can reduce the risk of addiction. At this point, while the importance of self-control is emphasised in maintaining a healthy balance in internet use, it also helps the individual to exhibit disciplined, successful and healthy behaviours in general life. In this context, it has been stated that the development and maintenance of self-control can enable the individual to adopt a healthier lifestyle by reducing the risk of behavioural addiction. At this point, the importance of strategies to strengthen individuals' self-control abilities can be emphasised. In summary, self-control is a crucial factor in exhibiting disciplined, successful, and healthy behaviours.

In the context of students' social media use, self-control and responsibility are crucial components. High self-control skills are linked to students' ability to effectively manage their time on SMPs and focus on their academic responsibilities (Duckworth et al., 2019). Students with high levels of self-control can resist impulsive behaviours related to social media use and consciously manage their time (Brevers & Turel, 2019). At the same time, students can effectively fulfil their responsibilities and maintain academic performance despite the rapid information flow of social media use (Johnson & Johnson, 2013, pp. 777–803). Responsibility ensures that students use social media in a balanced and purposeful manner (Duffy & Ney, 2015). Understanding the interrelatedness of self-control and responsibility variables in evaluating students' social media use, together with the individual's ability to regulate his/her behaviour and to exist responsibly in the digital environment, can provide an important perspective, especially in terms of educational strategies and support mechanisms.

Self-control and responsibility are crucial in determining an

individual's ability to regulate themselves and fulfil tasks (Koval et al., 2015). Inadequate self-control can weaken an individual's ability to resist impulsive behaviours and consistently fulfil responsibilities. Difficulties in focusing on long-term and academic responsibilities can arise due to exposure to distracting digital platforms such as social media, and this can be attributed to a lack of self-control (Duckworth et al., 2019). Therefore, an individual's level of self-control can influence their attitude and performance towards their responsibilities, ultimately affecting their personal and academic achievement (Shing & Rameli, 2020). In this context, self-control can be considered a predictor of responsibility. It is an important factor in understanding individuals' behaviour and developing support strategies.

1.5. Serial mediation role of self-control and responsibility

Based on the I-PACE model, it can be reasoned that responsibility is a crucial element that can influence an individual's internet use processes. This is because the model examines how an individual's level of responsibility interacts with their emotional states and cognitive processes, ultimately affecting their behavioural execution in internet use (Kumalaratih & Margono, 2023). Individuals who have a high level of responsibility can demonstrate a more conscious and balanced approach to internet use. This is because responsibility is a personal characteristic that influences how an individual interacts with their environment and digital content (Vysotskaya et al., 2021). Because when individuals have a high sense of responsibility, their tendency to foresee and accept the consequences of their actions may increase. This may help them to exhibit a more careful and conscious approach to internet use. Responsible individuals may be more effective in controlling and limiting themselves while consuming digital content. In addition, individuals with a sense of responsibility may tend to communicate effectively and develop positive interactions in the digital environments around them and may be more successful in avoiding harmful habits by making decisions about internet use more consciously (Kumalaratih & Margono, 2023). Therefore, this model can offer valuable insight into understanding and assessing an individual's level of responsibility when using social media.

Furthermore, research has shown that students with high levels of self-control are more likely to succeed in managing their time, focusing their attention, and fulfilling their responsibilities (Duckworth et al., 2019). Self-control can enhance students' ability to resist impulsive behaviours and concentrate on their objectives, thereby increasing their capacity to fulfil their responsibilities. To sum up, self-control and responsibility have a positive relationship that can aid in the personal and academic development of students (Cecchini et al., 2007). Additionally, responsible students can effectively manage their social media use and prioritize their academic responsibilities. However, FoMO can cause students to frequently engage with social media, increasing the risk of SMA (Kovan & Ormancı, 2021). FoMO can cause students to constantly control their SMPs. Students need to take responsibility for their actions and avoid succumbing to FoMO. Students' risk factors for SMA, which can affect their academic performance (Duckworth et al., 2019), include lack of responsibility and FoMO. In this context, an important perspective for the creation and development of appropriate intervention and support programs can be gained by understanding the interaction between conscientiousness and FoMO when assessing students' social media use. This study examines the correlations between FoMO and SMA among students. One effective approach for mitigating the adverse psychological consequences of addictive behaviours is to bolster robust psychological elements such as well-being and cultivate self-regulation skills (Foroughi et al., 2019). Recognising the link between FoMO and SMA is crucial for enhancing intervention programs designed to foster self-regulation. By exploring these connections, interventions can be more precisely tailored to address the specific dynamics between FoMO and SMA, ultimately contributing to the development of more effective strategies for enhancing self-regulation.

1.6. Present study

The primary aim of our study is to investigate the influence of FoMO on SMA using serial mediation analysis within the I-PACE model. Additionally, we aim to assess the potential buffering roles of self-control and responsibility against SMA. Our claim posits that elevated levels of self-control and responsibility can mitigate the impact of SMA among university students. To operationalize this aim, we formulated several hypotheses.

H1. Self-control mediates the relationship between FoMO and SMA.

H2. Responsibility mediates the relationship between FoMO and SMA.

H3. Self-control and responsibility serially mediate the relationship between FoMO and SMA.

2. Methods

2.1. Participants

Ensuring an adequate sample size is a critical aspect of research methodology. We also employed the power analysis method to ascertain the appropriate sample size for this study. Utilizing a priori analysis with G*Power (v. 3.1) software for analysis (Faul et al., 2009), we determined that a minimum of 134 individuals was required. The parameters were set for variables, an α level of .05, 1-β of .95, and a medium effect size. With a total sample size of 256 individuals, we assert that the sample population is adequately representative. The outcomes of the power analysis suggest a medium-level effect size (Faul et al., 2009). Our study addressed this criterion by recruiting a total of 256 Muslim students studying psychological counselling and guidance undergraduate students at a state university in Turkey, falling within the recommended range. This ensures that our chosen sample size provides sufficient statistical power to detect the desired effect. The participants, aged between 18 and 30 years ($M = 20.31$, $SD = 2.29$), consisted of 204 female, representing 80% of the sample. In terms of social media usage, 4.7% of students were classified as low users, 71.2% as moderate users, and 24.1% as high users, indicating a diverse representation across social media engagement levels.

2.1.1. Procedure

The research materials and procedures underwent a thorough evaluation by the ethics committee before data collection began. Participants were informed of the voluntary nature of their involvement and explicitly told that they could decline or discontinue their participation at any time. Informed consent was obtained from all participants before administering the scales. The data collection process was carried out using GoogleForms which enabled participants to respond to the scales, and measures were implemented to ensure the confidentiality of participants throughout the process. A strict security protocol was used to ensure that participant identities remained undisclosed in all aspects. Consequently, this research rigorously adhered to ethical principles and demonstrated the utmost respect for participants' rights, contributing to the integrity and reliability of this study.

2.2. Measures

Fear of Missing Out Scale (FoMOS). is designed to evaluate an individual's anxiety and apprehension regarding exclusion from social events, experiences, or information. It measures the extent to which they perceive themselves as potentially missing out on rewarding opportunities in their social circle (e.g., *"I feel anxiety when I don't know what my friends are doing"*). The original scale was developed by Przybylski et al. (2013) and adapted into Turkish by Gökler et al., 2016. The 10-item FoMO with one-dimensional and a five-point Likert type (1 = not at all true, 5 = extremely true). Higher scores indicate a higher FoMO level.

In addition, in the adaptation study, Cronbach's α coefficient was found to be .81, item-total score correlation values were greater than .30, and the test-retest reliability coefficient was .81. Interval consistency was very good in this study (α = .83).

Bergen Social Media Addiction Scale (BSMAS). Aims to assess and quantify individuals' degree of addiction or dependency on SMPs. It provides a standardized measure to evaluate the potential compulsive use and negative impact of social media engagement on daily life (e.g., *"Have you felt the desire to use social media more and more?"*). It was developed by Andreassen et al. (2016) and adapted into Turkish by Demirci (2019). The six-item BSMAS with one-dimensional and a five-point Likert type (1 = very rarely, 5 = quite frequently). The internal consistency reliability coefficient of this scale, which consists of six items and a five-point Likert type, was found to be .83 in the EFA sample, .82 in the CFA sample, .82 in the criterion-related validity sample, and .84 in the test-retest first application and .83 in the second application sample. Three weeks later, the test-retest reliability coefficient of the scale was found to be .83. Interval consistency was excellent in this study (α = .91).

Self-discipline Scale (SDS). Aims to assess an individual's ability to regulate and control their behaviour, actions, and impulses quantitatively. It provides a standardized measure of self-disciplinary traits across various domains of life. The 13-item SDS and five-point Likert type (1 = strongly disagree, 5 = strongly agree), with two-sub dimensions self-control (e.g., *"I lack willpower"*), comprising seven items, and as responsibility (e.g., *"I take care to keep my appointments"*), encompassing six items, developed by Şimşir and Dilmaç (2022). The internal consistency of the scale was determined to be satisfactory, with a coefficient of .80, indicating a reliable measure for evaluating the participants' levels of self-discipline across the specified dimensions. Interval consistency was very good in this study (α = .82).

2.3. Data analysis

Before conducting the analysis, we thoroughly examined the assumptions underlying multivariate statistics. We confirmed the normality of variables, as evidenced by skewness and kurtosis absolute values falling within the range of ±1.5. The reliability coefficients, all-surpassing .70, indicated sufficient internal consistency (Viladrich et al., 2017). Moreover, none of the Mahalanobis values exceeded 15, which confirms the absence of problematic values in the dataset, and also the absence of multicollinearity was confirmed, as the interrelations among the variables did not exceed the threshold of .90. Lastly, to evaluate the potential presence of Common Method Bias (CMB), we scrutinized the model using Harman's single factor score. In this analysis, all items were loaded with a threshold to derive a single factor. The findings indicate that a single factor accounted for 37.90% of the total variance extracted for the items, a value below the conventional threshold of 50% (Bozionelos & Simmering, 2022). Therefore, these results suggest that CMB did not emerge as a significant concern for this study.

The analyses were carried out in sequential steps. First, the descriptive statistics and correlations among the variables were investigated with IBM SPSS. Then, a serial mediation model (Model 6) with the Process Macro with self-control (first-order mediator) and responsibility (second-order mediator) was conducted to test the proposed model. To test the significance of indirect effects, 5000 bootstrap samples were used to create 95% confidence intervals (CIs), which are significant if the 95% CI did not include zero.

3. Results

3.1. Preliminary analyses

Descriptive and bivariate Pearson correlation analyses were performed to determine the relationships between FoMO, self-control, responsibility and SMA levels shown in Table 1 which showed that FoMO was significantly and negatively correlated with self-control and responsibility, and positively correlated with SMA. The results also demonstrated that SMA was significantly and negatively correlated with self-control and responsibility.

3.2. Serial mediation analysis

The obtained results revealed significant associations among the examined variables. FoMO demonstrated a substantial predictive relationship with both self-control ($\beta = -.25, p < .001$) and responsibility ($\beta = .23, p < .001$). Furthermore, self-control exhibited a positive influence on responsibility ($\beta = .21, p < .001$). Both self-control and responsibility were identified as significant contributors to SMA ($\beta = -.51, p < .001$) for self-control ($\beta = -.11, p < .01$) for responsibility. Additionally, the comprehensive impact of FoMO on SMA was found to be significant, with a coefficient of ($\beta = .25, p < .001$). Remarkably, even after accounting for the effects of self-control and responsibility, the direct effect of FoMO on SMA persisted, with a coefficient of ($\beta = .20, p < .001$). These results are presented in the model in Fig. 1.

Additionally, both self-control and responsibility play mediating roles in the association between FoMO and SMA, with coefficients of ($\beta = -.10$) and ($\beta = -.08$), respectively. The 95%CI for these mediating effects were (−.05, −.13) for self-control and (−.06, −.15) for responsibility. Additionally, a serial mediating effect was identified, indicating that FoMO influences SMA through a serial mediation process involving self-control and then responsibility, with a coefficient of $\beta = -.07$, 95%CI [−.00, −.12] as seen in Table 2.

The study aimed to determine the most effective serial mediator model. Reverse models were examined for this purpose. The original model included FoMO, self-control, and responsibility as variables, which collectively accounted for 28% of the variance in the dependent variable, SMA. In the first alternative model, FoMO was treated as the dependent variable, SMA as the independent variable, and responsibility and self-control as the mediators. The first alternative model explained 25% of the variance in the dependent variable. The second alternative model, which set responsibility as the dependent variable, self-control as the independent variable, and SMA and FoMO as the mediators, accounted for 19% of the variance in the dependent variable. Based on the explanatory power of the dependent variable, it can be concluded that the serial mediation model used in the study was the most optimal choice.

4. Discussion

This study evaluated the mediating roles of self-control and responsibility in the relationship between FoMO and SMA. The findings showed that self-control and responsibility both mediated the relationship between FoMO and SMA and that the relationship between FoMO and SMA was serially mediated by both self-control and responsibility. Therefore, all hypotheses of this study were confirmed. The study's first

Table 1
Descriptive statistics and correlations.

Variable	1.	2.	3.	4.
1.FoMO	1			
2.SC	−.25[a]	1		
3.R	−.25[a]	.27[a]	1	
4.SMA	.28[a]	−.50[a]	−.27[a]	1
Mean	30.65	20.20	16.76	50.56
SD	10.35	7.88	6.74	11.74
Skewness	.12	−.07	−.09	.06
Kurtosis	−.11	.14	−.13	−.14

Note. FoMO: Fear of missing out, SC: Self-control, R: Responsibility, Social media addiction: SMA.
[a] $p < .001$.

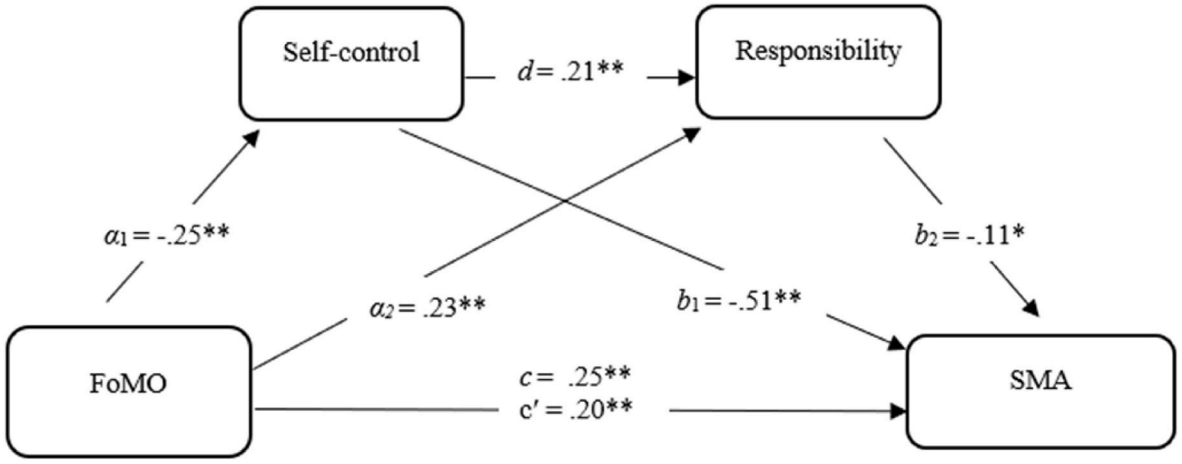

Fig. 1. *Serial mediation model.*
Note. α_1 = direct effect of FoMO on self-control; α_2 = direct effect of FoMO on responsibility; b_1 = direct effect of self-control on SMA; b_2 = direct effect of responsibility; c = total effect of FoMO on SMA; c' = direct effect of FoMO on SMA; d = direct effect on self-control on responsibility. $^{**}p < .001$; $^{*}p < .01$.

Table 2
Direct and indirect estimates of fear of missing out on social media addiction.

			95%CI	
	Paths	Standardised coefficient	LL	UL
Direct effect	FoMO → SMA	.25	.13	.32
	FoMO → SC	−.25	.42	.12
	FoMO → R	.23	.17	.32
	SC → SMA	.21	.12	.33
	R → SMA	−.11	−.19	−.05
Indirect effects	FoMO → SC → SMA	−.10	−.05	−.13
	FoMO → R → SMA	−.08	−.06	−.15
	FoMO→ SC →R → SMA	−.07	−.00	−.12

hypothesis posits that an increase in FoMO can have a negative impact on individuals' self-control, weakening their ability to regulate their behaviour. This, in turn, can lead to increased social media use and SMA, as individuals can feel the need to frequently check these SMPs to stay up to date (Kircaburun et al., 2020). The hypothesis is based on the idea that individuals can connect to SMPs more frequently and for a longer time with FoMO. Because FoMO may cause individuals to feel the need to constantly monitor the lives and activities of others. This may lead individuals to tend to constantly check their SMPs, and this constant attachment state and process may weaken individuals' self-control, contributing to spending more time in digital environments and increasing SMA (Kovan & Ormancı, 2021). As a result, the increase in FoMO may lead individuals to show more interest in SMPs and spend longer time on these platforms, which may negatively affect self-control.

FoMO is a flow-dependent process on SMPs that can lead to a lack of self-control. This lack of self-control, resulting from a decrease in self-discipline skills, can make individuals more active in their relationship with social media (Koç et al., 2023; Servidio, 2021). The study found that an increase in FoMO can cause a decrease in individuals' sense of responsibility. Subsequently, individuals, especially students, can be drawn towards SMPs and develop SMA due to decreased levels of responsibility. This finding confirms our second hypothesis. Previous research has demonstrated that SMPs can negatively impact students' self-control and put their self-regulation skills at risk (Sagar, 2019), leading them to procrastinate (Nwosu et al., 2020) or neglect their responsibilities (Lian et al., 2018). Therefore, it can be argued that students' awareness of their primary goals and responsibilities can help prevent SMA. The more responsible the students are, the less time they spend on SMPs, which can prevent the formation of SMA (Gómez-Galán et al., 2020). Students' awareness of their responsibilities and increasing their level of responsibility can prevent problematic internet and social media use.

Lastly, we found that FoMO was associated with reduced self-control, self-control was associated with reduced responsibility, and both self-control and responsibility were associated with reduced SMA, confirming our third hypothesis. The literature has focused on self-control as a self-regulation skill for self-discipline, while research on responsibility is limited. Therefore, this study aims to investigate the relationship between FoMO and self-control, responsibility, and SMA, which has not been previously addressed. Previous research in social media studies has shown that individuals who lack self-discipline are more likely to spend excessive amounts of time on screens (Gökalp et al., 2023; Şimşir-Gökalp, 2023), which can lead to a decrease in self-control levels. Additionally, self-control is closely related to responsibility, as it encompasses the sub-dimensions of the scale used. The study suggests that a high level of self-control among students can positively impact their sense of responsibility and potentially prevent the development of technological dependence (Gökalp et al., 2023; Mei et al., 2016). The findings support the conceptual views that can lead to the development of FoMO.

To stay up-to-date with the latest information and global developments, students can feel compelled to frequently check SMPs (Subrahmanyam & Šmahel, 2011). However, this can jeopardise their self-control and responsibility skills (Okpara, 2017), and weaken their time management abilities, ultimately affecting their academic performance (Duckworth et al., 2019). In this context, FoMO can impact students' SMA levels, as well as their ability to maintain responsibilities and exercise self-control (Koç et al., 2023; Świątek et al., 2023). Therefore, an increase in students' self-control and responsibility levels could result in a significant decrease in their FoMO and SMA levels. Thus, focusing on developing students' self-control and responsibility skills to increase their academic achievement can reduce the effects of FoMO and make social media use more balanced. In this context, by providing students with support in time management and self-discipline, keeping social media use under control without harming academic goals can be encouraged. In addition, educational institutions can also make a difference by developing strategies for coping with FoMO and enabling students to use SMPs more healthily. That is, by increasing students' self-control and responsibility levels, they can have a positive impact on their FoMO and SMA levels and improve their academic performance.

4.1. Novelty, limitations and directions for future studies

Our study explores the interplay between FoMO, SMA, and subdimensions of self-discipline such as self-control and responsibility among Turkish psychological counselling and guidance undergraduate students. The research contributes to the existing literature by examining the serial mediation role of self-control and responsibility in the relationship between FoMO and SMA. Studies examining these relationships in the Turkish context and providing new insights into cultural and educational factors that may influence the dynamics of social media use and its potential psychological consequences among university students are quite limited. Our study provides a fresh perspective on understanding of social media-related behaviours and their underlying mechanisms by focusing on these unique aspects.

Although our study has made valuable contributions, it is important to acknowledge its limitations. Firstly, the cross-sectional nature of our research design prevents us from establishing causation between FoMO, self-control, responsibility, and SMA. Longitudinal studies would be beneficial for capturing the dynamic changes in these variables over time. Furthermore, it should be noted that our sample only includes undergraduate students in the field of psychological counselling and guidance, which can limit the generalizability of our findings to other academic disciplines or age groups. Additionally, the sample group is quite unbalanced in terms of gender, with 80% being female, which may affect the generalizability of the results to a broader population. Additionally, the use of self-report measures can introduce response biases. To provide a more comprehensive understanding of students' social media behaviours, future studies could benefit from incorporating objective assessments or qualitative and mixed-methods approaches.

Future research can further investigate the cultural influences on social media use and addiction, taking into account diverse student populations in Turkey and beyond. Longitudinal studies could explore the developmental trajectories of FoMO, self-control, responsibility, and SMA, shedding light on the temporal dynamics of these constructs. Interventions aimed at improving self-control and responsibility in the context of social media use could be implemented and evaluated for their effectiveness. Additionally, incorporating qualitative research methods, such as interviews or focus groups, can provide a more comprehensive understanding of the subjective experiences and perceptions related to social media behaviours among students, and also mixed-methods research can combine quantitative and qualitative research findings. Finally, to provide a more comprehensive understanding of the intricate interactions at play in the realm of social media and well-being, it can be worthwhile to explore potential moderating factors, such as cultural norms or technological advancements.

5. Conclusion

This study supports the positive relationship between FoMO and SMA. Furthermore, an increase in FoMO was found to decrease students' level of self-control, potentially putting their responsibility at risk. These factors can contribute to an increase in SMA among students. The findings highlight the importance of developing students' self-control and responsibility skills to cope with FoMO and SMA. In this context, students need to understand that controlling and consciously managing their use of digital media can help them develop coping skills, particularly in dealing with FoMO and SMA. Awareness-raising programs and psycho-education can guide students in identifying the limits of digital media use, increasing self-control, and strengthening their ability to take responsibility. Universities can offer a range of resources and counselling services to support students in achieving a balance between their academic and social lives.

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Ethical approval statement and informed consent

The Social and Human Sciences Ethics Committee at Atatürk University has approved (E−56785782-050.02.04–2400045138). Informed consent was also obtained from all participants.

Data availability statement

The data during the current study are available from the corresponding author upon reasonable request.

CRediT authorship contribution statement

Ayşen Kovan: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Murat Yıldırım:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Formal analysis, Conceptualization. **Arzu Gülbahçe:** Project administration.

Declaration of Competing Interest

Declaration of Competing Interest: There is no competing interest to declare.

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