



## Effects of fear of missing out, smartphone addiction, phubbing, and being phubbed on friendship satisfaction

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### ABSTRACT

The relationship between smartphone use, interpersonal interaction, and friendship satisfaction (FS) remains underexplored in literature. The present study addressed this gap by examining how smartphone-related behaviours, such as phubbing and smartphone addiction (SPA), are associated with fear of missing out (FoMO), being phubbed (BP) and FS. The study surveyed 811 university students and explored the aforementioned relationships and the dual roles of SPA as a mediator and BP as a moderator. The findings showed that FoMO positively correlated with phubbing, with SPA as a partial mediator, suggesting that reducing SPA could mitigate phubbing. Results also showed that BP moderated the relationship between these variables, influencing the effects of phubbing on FS. Notably, the findings also showed that while phubbing typically harms FS, BP can transform this negative impact into a positive one when friends share this behaviour. These findings contribute to the theoretical understanding of digital behaviours' effects on social interactions and offer practical implications. Interventions such as digital detox programmes, mindfulness training, and social skills workshops are recommended to promote healthier digital habits and improve social relationships. The need for tailored support for at-risk students and policy development that foster digital well-being in educational settings is emphasised.

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## Introduction

As internet and mobile technology have rapidly developed, smartphones have become indispensable in individuals' lives. According to 2023 statistics, 86% of the global population now use smartphones. Moreover, the average daily time spent on smartphones is 3 hours and 15 minutes, and individuals check their smartphones an average of 58 times daily (Statista, 2023). This intensive use has increased dependency on digital technologies, significantly impacting individuals' social relationships, daily communication patterns, and social interactions. Smartphones have fundamentally transformed how individuals communicate and interact, strengthening long-distance relationships but weakening face-to-face communication (Sbarra et al., 2019).

In this context, the saying “The farthest distance in the world is playing with your phone even while sitting together” reflects a common phenomenon in today's society (Gong et al., 2019). This phenomenon has brought about profound changes in contemporary social interactions, potentially creating challenges in interpersonal relationships. In the literature, this phenomenon is referred to as ‘phubbing’ which is defined as the act of individuals ignoring others in social settings by focusing solely

on their smartphone (Błachnio et al., 2021; Canelley et al., 2023; Chotpitayasunondh & Douglas, 2018; Karadağ et al., 2016). Despite its growing prevalence in social relationships, the direct effects of phubbing on FS and interpersonal interactions, especially among young populations such as university students, have not been adequately addressed in the literature. Therefore, the present study investigated how phubbing affects the quality of social relationships and university students' FS levels.

Smartphones serve as a gateway to the digital world, offering many applications, and are often viewed by some as an extension of an individual's self (Soyoof et al., 2024). Consequently, smartphones have become increasingly important for fulfilling social and psychological needs. However, this can sometimes lead to problematic use, as well as behavioral consequences such as phubbing (Chi et al., 2022). Behaviors that are pleasurable and repeated can become habits and, in extreme cases, lead to addiction (Kato et al., 2023). From this perspective, phubbing is considered a behavior associated with smartphone addiction (SPA) and is viewed as a core problem underlying the social issues that individuals face (Lal et al., 2023). Consequently, phubbing occupies a central position among behavioral challenges that individuals encounter in their daily interactions (Talan et al., 2024).

Phubbing is often a sign of an individual experiencing fear of missing out (FoMO) (Goldman et al., 2023). FoMO is a unique form of anxiety that stems from an individual's fear of missing rewarding social experiences that others may have but lack (Przybylski et al., 2013). FoMO can lead to phubbing behavior and a decline in the quality of face-to-face communication. In short, FoMO reflects the anxiety, fear, and unease that arise from not being able to partake in the satisfying experiences of the people the individual interacts with and the events unfolding in the social media environment (Jabeen et al., 2023).

In contemporary society, young individuals meet their social needs through various communication tools. The intensive use of social media among young people reinforces FoMO, and can lead to phubbing (Goldman et al., 2023). This situation can lead to heightened anxiety and loneliness due to the inadequacy of virtual interactions to replace real ones, prompting individuals to resort to phubbing as a coping mechanism (Lal et al., 2023). Ultimately, they may become more dependent on their smartphones, ignoring those around them. It has been suggested that virtual interactions weaken social bonds among individuals, increasing loneliness and negatively affecting face-to-face communication

(Al-Saggaf & O'Donnell, 2019). A study conducted with university students (Talan et al., 2024) found that the FoMO increased smartphone use among young people, which was associated with phubbing.

Sun and Samp (2022) reported that college students spend an average of 86 hours a week with their friends, but even during this interaction, they often focus on their smartphones and spend less time on direct personal interactions. This can prevent strengthening bonds between people by reducing the quality of face-to-face communication (Sbarra et al., 2019; Trepte et al., 2018; Verduyn et al., 2021). The decrease in face-to-face interactions between friends can weaken emotional bonds and jeopardize the sustainability of social relationships (Patulny & Seaman, 2017). Therefore, it is essential to examine the specific impact of SPA on social interaction and friendship satisfaction (FS) because previous studies (e.g., Childs & Holland, 2024; Chotpitayasunondh & Douglas, 2018; Jones, 2017) have often overlooked these detailed interactions. There are studies in the literature showing that phubbing not only negatively affects the quality of interpersonal relationships but also negatively affects FS (e.g., Beukeboom & Pollmann, 2021; Çikrikci et al., 2022; Stevic & Matthes, 2023; Sun & Samp, 2022; Yam, 2023).

Due to the rise of smartphone use and social networking, phubbing has spread worldwide and has become an increasing social problem in various contexts such as family relationships, and work and school environments (Bracht et al., 2023; Chotpitayasunondh & Douglas, 2016; Song & Zhao, 2023; Tandon et al. al., 2022; H. Zhang et al., 2023). Previous studies have shown that phubbing behavior occurs between (i) parents and their children (Liu et al., 2024; Pancani et al., 2021; J. Zhang et al., 2023) (ii) workers and employers (Khan et al., 2023; Saxena & Srivastava, 2023), and (iii) couples (Mosley & Parker, 2023; Yam, 2023). Therefore, studies are needed to examine the multidimensional consequences of phubbing, and is a significant gap in the literature.

Studies examining the antecedents of phubbing have focused on individuals' addiction tendencies. Perhaps the most important of these addiction types is SPA, and there is a positive relationship between SPA and phubbing (Chotpitayasunondh & Douglas, 2016; Ivanova et al., 2020; Mi et al., 2023; Talan et al., 2024; Y. Zhang et al., 2021). Moreover, some studies have reported that FoMO is an antecedent of phubbing (Al-saggaf & O'Donnell, 2019; Goldman et al., 2023; Jabeen et al., 2023; Przybylski et al.,

2013; Silva Santos et al., 2023; Talan et al., 2024). Studies on how SPA affects phubbing behavior have shown that this area is being actively researched (Al-saggaf & O'Donnell, 2019; Talan et al., 2024; Zhao et al., 2021). However, there is a significant gap in the existing literature because most studies have focused on phubbing's general effects without exploring these dynamics in specific contexts, such as FS among university students. Unlike previous literature, the present study examined FoMO, SPA, and phubbing and their effects on university students' FS in a comprehensive model.

To better understand the effects of phubbing, it is necessary to define the different roles seen in phubbing situations. It has been reported in the literature that there are two different roles in phubbing situations: phubbees and phubbers (Chotpitayasunondh & Douglas, 2018). Being phubbed (i.e., being the phubbee) can be seen as a specific form of ostracism or social exclusion, and it is associated with various undesirable outcomes such as paranoia, depression, pessimism, and low self-esteem (Duradoni et al., 2023). Phubbers, on the other hand, are individuals who focus on their smartphones while ignoring other people during social interactions (Duradoni et al., 2023). Based on these definitions, these two roles can co-occur, so it is essential to investigate these interactions by including them in the same research model.

In the present study's research model, it is posited that SPA mediates the relationship between FoMO and phubbing, while being phubbed moderates various relationships (FoMO and SPA; SPA and phubbing; FoMO and phubbing; phubbing and FS). By examining these dynamics through a comprehensive model and from the perspective of Self-Determination Theory (SDT), the present study contributes significantly to the literature. The study's model provides a new perspective on understanding individuals' social bonds and contribute to developing practical solutions for mitigating the potential harms of phubbing behavior.

## **2. Literature review**

### ***2.1. The relationships among FoMO, phubbing, and friendship satisfaction***

Self-determination theory (SDT; Deci & Ryan, 2010) posits the effects of meeting individuals' basic psychological needs—autonomy, competence, and relatedness—on motivation and psychological well-being. According to SDT, meeting these needs positively affects individuals' motivational processes,

while failure to meet these needs can lead to motivational and psychological problems. From the perspective of SDT, the emergence of FoMO and phubbing can be understood as behavioral outcomes of unmet psychological needs. More specifically, FoMO may arise when an individual's need for relatedness is not fulfilled, driving them to seek connections using social media. In contrast, phubbing behavior may emerge from the failure to satisfy autonomy and competence, and where individuals may resort to smartphone use to escape social pressures or to feel in control of their interactions. Bajwa et al. (2023) confirmed that SPA had a positive relationship with phubbing behavior and that FoMO and social comparison orientation partially mediated this relationship. Both mediators appear to be critical in understanding how unmet psychological needs manifest in phubbing behavior. For this reason, the effects of FoMO and phubbing on individuals and their possible effects on social relationships have become prominent research topics (Chi et al., 2022; Paul et al., 2024; Tandon et al., 2022).

Due to the rapid rise of the internet, and especially smartphones, FoMO can cause individuals to spend long periods on social media (Li et al., 2020, 2022; Przybylski et al., 2013), and constantly check their social media platforms (Roberts & David, 2020). People experiencing FoMO try to meet their need for connection through social media use. Over time, this behavior replaces face-to-face interactions, causing phubbing because individuals increasingly rely on their smartphones to satisfy their unmet need for relatedness. The literature shows that FoMO positively affects phubbing. Buglass et al. (2017) concluded that the phubbing of individuals by those experiencing FoMO increased due to their use of social media, which negatively affected their face-to-face interactions. Moreover, Alt (2015) found that university students experiencing FoMO spent more time on social media, and this increased their phubbing.

Similarly, Karadağ et al. (2016) reported that individuals experiencing greater FoMO were more likely to engage in phubbing. According to these previous studies, individuals' constant dependence on social media prevents them from focusing on face-to-face interactions, causing them to become distracted and, as a result, increase their phubbing. Joshi (2023) found that during the COVID-19 pandemic (when social media use was more intense), phubbing increased among university students experiencing greater FoMO. Here, FoMO had a significant adverse effect on students and that phubbing partially mediated this relationship. Muggianu et al.'s (2024) study on the relationship between FoMO and phubbing among

university students' results were similar. Here, FoMO increased phubbing through SPA, indicating that SPA mediated the relationship between these two variables. It appears that FoMO is a phubbing antecedent that negatively affects university students' social relationships. A recent meta-analysis by Ansari et al. (2024) examining the relationship between FoMO and phubbing found a positive and significant relationship between FoMO and phubbing, and that FoMO significantly increases phubbing.

Through the lens of SDT theory, the negative impact of phubbing on FS can be explained by individuals' unmet basic psychological needs. As aforementioned, SDT posits that individuals have three basic psychological needs: autonomy, competence, and relatedness (Deci and Ryan, 2010). Phubbing can reduce FS because it hinders the satisfaction of these essential needs. Autonomy can be defined as individuals feeling free to make choices by controlling their behavior (Deci and Ryan, 2010). Phubbing causes individuals to be unable to focus on others during social interaction. This behavior may result in unmet individual autonomy needs, causing others to feel neglected (Knausenberger et al., 2022). Because competence is related to individuals' need to feel competent and effective, phubbing may cause individuals to perceive themselves as inadequate in social interactions (Shen & Xie, 2024). These negative interactions in FS reinforce the feeling that individuals lack social skills and relationships (Roberts & David, 2016).

Relatedness is the desire of individuals to have closer and more meaningful relationships with other people (Deci and Ryan 2010). There are various studies demonstrating that FoMO increases phubbing and that phubbing, in turn, weakens social relationships (e.g. Gao et al. 2023; Li et al. 2023; Paul et al. 2024). Phubbing negatively affects relationship-building processes by distracting individuals from face-to-face relationships. This causes emotional distance in friendship relationships, creating negativity in meeting relationship needs (Chotpitayasunondh and Douglas 2016; Chu et al. 2024). Garrido, Delgado, and Esteban (2024) examined the effects of phubbing on psychological well-being and proposed that phubbing disrupts social interactions. Roberts and David (2016) showed that phubbing negatively affects FS and, consequently causes the people they communicate with to perceive themselves as neglected. This leads to emotional distance in FS, reducing mutual FS.

Chotpitayasunondh and Douglas (2018) examined the effects of phubbing on social interactions and found that phubbing reduced satisfaction in friendship relationships. Davey et al. (2018) investigated the adverse effects of phubbing on social interactions and how these effects affected FS among adolescents and young adults in India. They reported that phubbing was associated with emotional detachment in FS and suggested that this led to reduced FS. Karadağ et al. (2015) found that the adverse effects of phubbing on communication quality, empathy, and understanding negatively affected friendship satisfaction. Based on these findings, it can be said that the negative effect of phubbing on FS can be attributed to the failure to meet the basic needs as articulated by SDT. Phubbing reduces FS by creating a barrier to individuals satisfying their needs for autonomy, competence, and relatedness. Therefore, it was hypothesized that (i) FoMO would be positively associated with phubbing ( $H_1$ ), and (ii) phubbing would be negatively associated with FS ( $H_2$ ).

## ***2.2. Smartphone addiction as a mediator***

As aforementioned, FoMO involves individuals' anxiety regarding the possibility of being excluded from experiences or opportunities and being constantly aware of what others are doing (Li et al., 2020; Przybylski et al., 2013). This can be understood through SDT, where unmet needs for relatedness drive individuals to seek connection through social media platforms, thereby increasing the risk of SPA (because smartphones are the primary route by which most individuals access social media) (Liu & Ma, 2019). This causes individuals to spend more time on social media applications and feel the need to constantly scroll through their online feeds. The inability to follow what is happening on social networks and what their friends are seriously doing disturbs individuals who experience FoMO (Li et al., 2022). Such individuals state that they constantly feel lonely except for the time they spend on social networks and that they try to obtain the love and affection that are missing in their daily lives only by sharing and spreading information (Li et al., 2022; Sommantico et al., 2023). For these reasons, participation in social networks becomes a desirable situation for those experiencing FoMO (Dossey, 2014). For these individuals, the pursuit of connection through social media appears as a negative emotional state because it stems from unmet social relationship needs (Elhai et al., 2021).

According to research, FoMO is a critical contributor to problematic online behavior (Lal et al., 2023; Talan et al., 2024). Some studies have reported that FoMO is strongly associated with problematic social media use and problematic smartphone use (Elhai et al., 2020; Li et al., 2020; Servidio et al., 2022; Tugtekin et al., 2020; Wang et al., 2019). For example, Wang et al. (2019) in a study of Chinese students reported that FoMO had a positive relationship with SPA. Elhai et al. (2020) found that FoMO had a positive and significant relationship with SPA and that individuals with greater FoMO were more dependent on their smartphones. SPA increases individuals' need to be constantly active on social media and digital platforms, creating a distraction in face-to-face interactions and also causing an increase in phubbing. Zhang et al. (2023) reported a high correlation between FoMO and SPA (i.e., the greater the FoMO, the higher the level of SPA). Franchina et al. (2018) reported that FoMO increased phubbing through social media addiction. The study found that FoMO was associated with SPA, which increased phubbing by directing individuals' attention to their smartphones during face-to-face interactions. According to Gao et al. (2023), FoMO increases the likelihood of problematic smartphone behaviours, such as phubbing, making it a significant risk factor for depressive symptoms. Moreover, Gao et al. also reported that FoMO and phubbing negatively impacted normal social functioning and interpersonal connections, potentially leading to social exclusion.

From the perspective of SDT (Deci & Ryan, 2010), FoMO occurs when individuals' needs for autonomy, competence, and relatedness are not met, and this causes individuals to try to meet their relationship needs through social media platforms. SPA reinforces individuals' need to constantly stay connected online, leading to further distraction in face-to-face interactions. Here, phubbing increases, and the strength and quality of individuals' social relationships decreases (Buglass et al., 2017; Elhai et al., 2020). Therefore, it was hypothesized that SPA would have a mediating effect on the relationship between FoMO and phubbing (H<sub>3</sub>).

### ***2.3. Being phubbed as a moderator***

Social individuals spend most of their free time with their family and friends in their daily lives. These close relationships are necessary for meeting individuals' basic psychological needs (Luijten et al., 2023)

and for life satisfaction and FS (Lee & Ha, 2023). BP ignores the other person because individuals focus on their smartphones during social interactions (Chotpitayasunondh and Douglas, 2018). This concept is essential to understanding the adverse effects on social relationships due to the increased use of smartphones. BP is a moderator in the present study's research model, increasing the impact of FoMO on SPA. This effect causes individuals to be more preoccupied with their smartphones during social interactions, causing phubbing to become widespread.

Knausenberger et al. (2022) examined the effects of BP on basic needs, mood, and trust. They reported that phubbing triggers negative moods and feelings of exclusion and threatens basic needs. These effects became more vital as the frequency of recurrence of phubbing increased. Similarly, Karaman and Arslan (2024) investigated the impacts of social media addiction on phubbing and relationship satisfaction and found that BP plays a regulatory role in these effects. In a study examining the effects of phubbing in romantic relationships, Roberts and David (2016) found that partners exposed to phubbing experienced negative emotional consequences such as depression and low self-confidence. They posited that this caused people who were exposed to phubbing to feel neglected. Elhai et al. (2020) reported that FoMO had a positive relationship with SPA and that SPA increased phubbing by increasing individuals' need to remain constantly active on social media and digital platforms.

Additionally, BP has an exacerbating effect on individuals' feelings of social isolation and low self-esteem. Chotpitayasunondh and Douglas (2018) reported that BP was associated with increased feelings of social isolation and a higher level of SPA when combined with FoMO. They suggested that this process would cause individuals to feel lonelier and more excluded in social interactions, causing phubbing to occur more frequently. Davey et al. (2018) concluded that phubbing among youth increased the negative associations between FoMO, SPA, and phubbing. Muggianu et al. (2024) examined the relationship between FoMO and SPA and discussed the role of BP in this interaction. Their findings indicated that the relationship between levels of FoMO and SPA was stronger than compared to other variables. More specifically, the effect of FoMO on SPA was more pronounced when compared to other potential factors, such as social media use. This result can be interpreted as BP may increase the effect of FoMO, which makes the individual more prone to SPA and may further reinforce the addiction.

Li et al. (2022) reported that BP was positively associated with individuals' SPA levels, and increased phubbing. This finding suggests there are adverse effects of phubbing on social relationships. Chotpitayasunondh and Douglas (2018) found that BP was negatively associated with individuals' social relationships and that the quality and satisfaction of these relationships was reduced. The study highlighted that phubbing creates dissatisfaction and distrust in FS by weakening social ties. Therefore, it was hypothesized that BP would strengthen the relationships between (a) FoMO-SPA ( $H_{4a}$ ), (b) FoMO-phubbing ( $H_{4b}$ ), (c) SPA-phubbing ( $H_{4c}$ ), and (d) phubbing-FS ( $H_{4d}$ ). In sum, the present study empirically examined the theoretical relationships between FoMO, SPA, phubbing, BP, and FS. To achieve this, cross-sectional methodology was employed by surveying students from a public university. Figure 1 shows the research model.

*Figure 1 here*

### **3. Method**

#### ***3.1. Participants and procedure***

Participants were recruited from a public university's economics and business faculty. There were some important reasons for surveying this population. First, university students stand out as a group prone to using technology, especially smartphones. Behaviors such as FoMO, phubbing, SPA, and BP are commonly observed among individuals in this age group. Therefore, it was assumed that examining these variables with university students would provide meaningful and generally valid results. Second, university students actively maintain their social relationships, and the level of satisfaction they obtain from these relationships is an essential part of their lives. Therefore, these participants constitute an ideal sample group for examining the FS variable. Social interactions of university students provide a suitable behavior to evaluate the effects of phubbing and being phubbed in social relationships. Third, university students are generally highly motivated to participate in research and are a demographic group frequently preferred by researchers (convenience sampling). Voluntary participation of research participants provides a significant advantage in terms of the accuracy and reliability of the data. Additionally, this group presents diverse demographic characteristics and sociocultural backgrounds, increasing the generalizability of the research. Finally, the comprehensive coverage of similar studies

on university students in the literature allows the findings to be compared with previous studies and to make meaningful contributions to the literature. Therefore, the results of the study have the potential to enrich the existing literature on FoMO, phubbing, SPA, being phubbed, and FS.

To collect the data, the authors distributed a ‘pen- and-paper’ survey to students in the public university classroom at the Faculty of Economics and Administrative Sciences of the first author’s university. The faculty comprised seven academic departments, namely Economics, Business Administration, Public Finance, Political Science and Public Administration, International Relations, Labour Economics and Industrial Relations, and Econometrics. At the time of the study, there were 4043 students enrolled in the faculty. Of these students, 1749 were female and 2294 were male. However, only 1975 of these students could be reached because they participated in the courses. Among these students who participated in the courses by simple random sampling method, 477 female and 395 male students voluntarily accepted to participate in the study. Surveys were collected from 872 students enrolled in various academic departments. The actual margin of error (0.024) calculated for the total population that could be sampled ( $N = 1975$ ) and the final sample that participated in the study ( $N = 872$ ) with a 95% confidence level is below the targeted margin of error (0.05). Therefore, the sample was sufficient to make a reliable analysis (Krejcie and Morgan 1970). With the given confidence level and sampling error, the effect size of the sample was found to be between medium and large effect size (Cohen’s  $d = 0.51$ ). Sixty-one participants failed to complete attention checks or resulted in a low standard deviation ( $SD < 0.02$ ). After removing these data, the remaining number of participants was 811 (44% response rate). Among the 811 participants, 53.3% were female and 46.7% were male, 52.4% were aged between 21–24 years old, 31.4% were in first grade, 15% in second grade, 29.1% in third grade, and 24.4% in fourth grade. The participants’ mean time spent using the internet was 4.18 hours daily ( $SD = 1.93$ ), and 57.1% felt they had sufficient internet access.

### **3.2. Measures**

***Fear of missing out.*** The Fear of Missing Out Scale (developed by Przybylski, Murayama, DeHaan, & Gladwell, 2013; adapted by Wegmann, Oberst, Stodt, & Brand, 2017 Turkish version: Gokler, Aydin,

Nal, & Metintas 2016). The scale has two subscales: trait FoMO and state FoMO. The authors used the state FoMO subscale with regard to the study objective. This subscale has seven items rated on a five-point Likert (1 = totally disagree, 5 = totally agree). An example item is “*I am continuously online in order not to miss out on anything.*” The total scale scores range from 10 to 50, and higher scores indicate greater FoMO. The internal consistency reliability of the subscale in the present study was .82 (Cronbach alpha).

**Smartphone addiction.** The Smartphone Addiction Scale (Kwon et al., 2013; Turkish version: Noyan et al., 2015) was used to assess SPA. The scale has ten items and one factor, and items are rated on a five-point Likert scale (1 = totally disagree, 5 = totally agree). An example item is “*Feeling impatient and fretful when I am not holding my smartphone.*” The total scale scores range from 10 to 50, and higher scores indicate greater risk of SPA. The internal consistency reliability of the scale in the present study was .90 (Cronbach alpha).

**Phubbing.** The Phubbing Scale (Karadağ et al., 2015; reduced version: Stevic and Matthes, 2023) was used to assess phubbing. The authors adapted the reduced version into Turkish following Hambleton and Patsula’s (1999) scale adaptation guidelines. The scale has six items and one factor, and items are rated on a five-point Likert scale (1 = totally disagree, 5 = totally agree). An example item is “*My eyes start wandering on my phone when I’m together with others.*” The total scale scores range from 6 to 30, and higher scores indicate greater phubbing. The internal consistency reliability of the scale in the present study was .88 (Cronbach alpha). An exploratory factor analysis with direct oblimin rotation explained 64.96% of the variance and resulted in one factor.

**Being phubbed.** BP was assessed using three items of the being phubbed scale (Chotpitayasunondh & Douglas, 2018). Following Hambleton and Patsula’s (1999) scale adaptation guidelines, the scale was translated into Turkish. The guidelines provided to the participants indicated: “The subsequent statements illustrate actions that a close friend may display during your time together, along with the reactions you might have to those actions. When I am in the company of others, I frequently observe that they (1) check their social media updates even though I am there; (2) completely forget that I am still there when they are using their mobile phone; (3) have a hard time putting their mobile phone

away.” Items are rated on a five-point Likert scale (1 = never, 5 = always). The total scale scores range from 3 to 15, and higher scores indicate higher levels of BP. The internal consistency reliability of the scale in the present study was .75 (Cronbach alpha). An exploratory factor analysis with direct oblimin rotation explained 67.28% of the variance and resulted in one factor.

***Friendship satisfaction.*** The Relationships Assessment Scale (Hendrick, 1981) was used to assess FS. The scale has seven questions. The authors modified it to measure FS with items and adapted it to Turkish following Hambleton and Patsula’s (1999) scale adaptation guidelines. The scale has seven items which are rated on a on a 5-point Likert scale (1 = totally disagree, 5 = totally agree). The seven items are: (1) I am pretty satisfied with my relationship with my friends. (2) I am generally satisfied with the communication with my friends. (3) Compared to most people, my relationships with my friends are good. (4) I often regret my relationships with my friends. (5) My relationships with my friends fulfill my initial expectations well. (6) I like my friends very much. (7) I often have problems in my relationships with my friends. Items 4 and 7 are reverse-coded. The internal consistency reliability of the scale in the present study was .88 (Cronbach alpha). An exploratory factor analysis with direct oblimin rotation explained 59.23% of the variance and resulted in one factor.

#### ***Demographic and other control variables***

The literature has shown that various factors, including gender, age, and level of education, may affect FS (Amati, Meggiolaro, Rivellini, & Zaccarin, 2018; Kang, 2023; Stevic & Matthes, 2023). Therefore, the survey included questions regarding age, gender, grade, daily internet use, and whether participants had sufficient internet access. Gender, internet use, and having sufficient internet access were used as control variables in the analysis.

#### ***3.4. Data analysis***

The authors conducted a structural equation model (SEM) in AMOS 23.0 to test the overall model and Hayes’ PROCESS Macro analysis in SPSS 27.0 to test the moderating effect of BP. To address the multicollinearity problem, predictor variables were centered before creating interaction terms for moderating analyses.

## 4. Results

### 4.1. Common method bias, measurement model validity, and reliability

Using self-report measures may introduce common method bias (CMB). Therefore, the common latent factor approach with the baseline model was employed to mitigate this issue. A comparative analysis of the chi-square values between the baseline and common latent factor models was conducted. The findings indicated that the chi-square difference between the two models was not statistically significant, suggesting that both models exhibited invariance [ $\Delta\chi^2(21) = 30.803, p > .05$ ]. This analysis implied that CMB did not significantly compromise the integrity of the study's findings (Fuller, Simmering, Atinc, Atinc, & Babin, 2016).

The conformity of the scale items to a normal distribution was evaluated. Skewness and kurtosis values were within the acceptable range (from -0.746 to 0.664) as specified by Sposito et al. (1983). The convergent and discriminant validity of the measurement model was evaluated using confirmatory factor analysis (CFA). CFA showed that the factor loadings of all items were between 0.54 and 0.88. Table 1 shows average variance extracted (AVE), composite reliability (CR), Cronbach alpha, and maximum shared variance (MSV) values. Except for FoMO, which approached the threshold at 0.48, all variables' AVE surpassed 0.50. Therefore, it was deemed that all measures demonstrated acceptable convergent validity. Following the Fornell-Larcker criterion (1981), the square root of each construct's AVE values should exceed the correlations with other constructs. The analysis confirmed that the AVE values exceeded MSV. The Fornell-Larcker criterion provided evidence of discriminant validity for the latent constructs. Furthermore, CR and Cronbach's alpha values, both exceeding 0.70, suggested the reliability of the scales used in our study. Finally, a CFA using AMOS 23.0 was conducted to explore the uniqueness of the study variables based on chi-square statistics and fit indices. CFA results showed that the measurement model produced a good fit to the data ( $\chi^2(424) = 1197.945, \chi^2/df = 2.825, CFI = 0.938, SRMR = 0.044, RMSEA = 0.047, PClose = 0.904$ ) (Hu & Bentler, 1999).

*Table 1 here*

### 4.2. Correlational analysis

Table 2 presents the variables' means, standard deviations, and correlations. Only gender significantly correlated with friend satisfaction ( $r = .11, p < .00$ ; gender was coded: 1 = male, 2 = female). Daily internet use correlated with BP ( $r = .08, p < .05$ ), SPA ( $r = .28, p < .001$ ), FoMO ( $r = .28, p < .001$ ), and phubbing ( $r = .26, p < .001$ ). Having sufficient internet access was significantly correlated with SPA ( $r = .12, p < .001$ ) and phubbing ( $r = .10, p < .001$ ). FoMo was significantly correlated with SPA ( $r = .68, p < .01$ ), phubbing ( $r = .53, p < .01$ ), and BP ( $r = .32, p < .01$ ). SPA was significantly correlated with phubbing ( $r = .55, p < .01$ ), BP ( $r = .25, p < .01$ ), and FS ( $r = -.08, p < .05$ ). Phubbing was significantly correlated with BP ( $r = .36, p < .01$ ) and FS ( $r = -.11, p < .01$ ), and BP was significantly correlated with FS ( $r = -.19, p < .01$ ). Among the study variables, only the mean for FS exceeded the midpoint (3), while BP had the lowest mean.

*Table 2 here*

#### **4.3. Structural equation modeling and regression analysis**

To test H<sub>1</sub>, H<sub>2</sub>, and H<sub>3</sub>, SEM analysis using AMOS was conducted. They included the demographic variables to model for controlling their effect. The SEM model provided a good fit for the data ( $\chi^2[454] = 1235.874, \chi^2/df = 2.722, CFI = 0.935, SRMR = 0.047, RMSEA = 0.046, PClose = 0.981$ ). These indices indicated that the model effectively depicts the characteristics of the data. Table 3 shows the results of SEM.

The SEM analysis supported the hypothesized model (H<sub>1</sub>, H<sub>2</sub>, and H<sub>3</sub>). FoMO's direct effect on phubbing was significant. The indirect impact of FoMO on phubbing through SPA was also significant, indicating partial mediation. SPA's effect on FS through phubbing and FoMO's effect on FS through SPA and phubbing were also significant. All indirect effects indicated partial mediation.

*Table 3 here*

To test H<sub>4</sub>, regression analysis with PROCESS macro (Hayes, 2013) were conducted. Demographic variables were included in the regression model. The results showed (Table 4) that gender significantly and negatively affected SPA, indicating that as students' age increased, SPA decreased. It also showed

that as internet use increased, SPA and phubbing increased, and gender significantly and positively affected FS. This latter result indicated that female participants had more FS than males.

Results showed that the moderating effect of BP in the relationship between FoMO and SPA was non-significant ( $\Delta R^2 = 0.01$ ,  $p < .05$ ,  $CI\% = -.01, .13$ ). Therefore, the result did not support H<sub>4a</sub>. BP's moderating effects on the relationship between FoMO and phubbing, SPA and phubbing, and PHUBBING and FS were all significant. These results supported H<sub>4b</sub>, H<sub>4c</sub>, and H<sub>4d</sub>.

*Table 4 here*

An interaction graph using conditioning values was constructed to better understand the moderating effect. Figures 2, 3, and 4 provide a comprehensive overview of how BP influenced the relationship between FoMO and phubbing, SPA and phubbing, and phubbing and FS. Figures 2 and 3 indicate that high BP strengthened the ties between FoMO–phubbing and SPA–phubbing. Students exposed to high phubbing exhibited more phubbing than those exposed to low phubbing. The high BP perception of the students appeared to transform the negative effect of phubbing on FS into a positive (Figure 4). In other words, when students think that others are phubbing them while they are phubbing, this increases peer satisfaction. In sum, mutual phubbing of students appeared to increase FS.

*Figures 2 to 4 here*

## **5. Discussion**

The present study investigated the complex interrelations among FoMO, SPA, phubbing, and FS while assessing BP's potential impact on these interactions. The results of this study demonstrated how the relationships between FoMO, SPA, and phubbing influenced students' friendship satisfaction. Initially, the findings confirmed the expected positive association between FoMO and phubbing, with SPA as a partial mediator. The findings align with prior studies indicating that individuals experiencing elevated levels of FoMO are more inclined to develop SPA to remain connected and informed about social events (Elhai et al., 2020; Li et al., 2022; Oberst et al., 2017; Servidio et al., 2022). Such addiction frequently leads to increased phubbing, where individuals prioritize their smartphones over face-to-face interactions with friends (Karadağ et al., 2015).

This finding aligns with the literature suggesting that FoMO is associated with SPA, and that SPA increases phubbing by diverting individuals' attention to their smartphones during face-to-face interactions. For instance, Elhai et al. (2020) highlighted the effects of FoMO on social media addiction and SPA finding that FoMO mediated the relationship between depression severity and non-social smartphone use, as well as the severity of SPA. Franchina et al. (2018) reported that FoMO increased phubbing behavior through SPA. These findings suggest that FoMO may contribute to smartphone dependency and potentially disrupt face-to-face social interactions. However, it is emphasised that other variables may also play a role in this relationship, necessitating further research to fully understand these dynamics.

Additionally, the present study provided further insight regarding the relationship between phubbing and FS. Although SPA negatively influenced FS through heightened phubbing, the moderation analysis provided a more nuanced understanding. More specifically, BP influenced the relationships in relation to FoMO, SPA, phubbing, and FS. Higher levels of BP intensified the relationship between FoMO and both SPA and phubbing. The literature indicates that BP is associated with outcomes such as social isolation and low self-esteem (Davey et al., 2018; Knausenberger et al., 2022). Although social isolation and low self-esteem were not directly addressed in the present study, the role of BP in strengthening the relationships between FoMO, SPA, and phubbing may indirectly relate to weakened social bonds and diminished quality of face-to-face communication. The influence of BP, as a factor altering the quality of interpersonal interactions, may reinforce behaviors that directly impact the quality of social connections. The finding that high levels of BP strengthened the relationships between FoMO and phubbing in the present study support those of previous studies (e.g., Balta et al., 2020; Chotpitayasunondh & Douglas, 2016).

Additionally, BP was found to intensify the association between SPA and phubbing. This finding also supports those of previous studies (e.g., Chotpitayasunondh & Douglas, 2018; Roberts & David, 2016). The present study's findings suggest that students who perceive themselves as BP by their friends increase their phubbing, thereby perpetuating the process of social isolation. Notably, the perception of BP also moderated the relationship between phubbing and FS, transforming the generally adverse effect

of phubbing on FS into a positive one. This finding suggests a form of mutual recognition or shared behavior among friends. In sum, when both individuals engage in phubbing, it may enhance their overall satisfaction.

### ***5.1. Theoretical implications***

The findings of the present study provide significant theoretical contributions in understanding the relationships between FoMO, SPA, phubbing, and BP from the perspective of SDT. SDT posits that failing to fulfill basic psychological needs – relatedness, autonomy, and competence – can lead to maladaptive behaviours (Deci and Ryan 2010).

The study's findings suggest that FoMO emerges as a process resulting from unmet relatedness needs, subsequently increasing phubbing behavior through SPA. This finding aligns with SDT's assertion that unmet needs can drive individuals toward maladaptive behaviors. The mediating role of SPA illustrates how individuals may develop a dependency on their smartphones to fulfill their need for relatedness, ultimately harming the quality of face-to-face social interactions through increased phubbing (Franchina et al., 2018). This process negatively impacts the quality of communication and mutual satisfaction in interpersonal relationships. However, it is essential to consider the potential involvement of other variables in these relationships, and warrants further research. The moderating effect of BP offers a novel perspective within the SDT framework for understanding the quality of individuals' social experiences. The findings indicate that BP strengthens the relationships between FoMO, SPA, and phubbing, demonstrating how contextual factors shape these behaviours. More specifically, individuals with high BP perceptions may experience situations where the typically negative effects of phubbing on FS are mitigated or even reversed. This can occur because mutual perceptions of phubbing between friends create a shared behavioural norm, fostering a sense of understanding and satisfaction. These results suggest that BP not only intensifies the dynamics between FoMO, SPA, and phubbing but also alters the way phubbing impacts social satisfaction, highlighting the need to consider contextual and relational factors in future research.

From the SDT perspective, the study's findings present a novel framework for understanding how unmet psychological needs affect social relationships. The failure to fulfill relatedness needs intensifies FoMO, subsequently increasing SPA and phubbing. Similarly, BP emerges as a contextual factor that alters perceptions and behaviours in social relationships. This highlights the necessity of focusing not only on individual variables but also on the social context and mutual perceptions to understand the quality of interpersonal interactions.

The present study's findings broaden the theoretical scope of SDT by demonstrating how behaviors associated with smartphone use can lead to complex outcomes in interpersonal interactions. The findings contribute to theoretical knowledge by addressing the challenges individuals face in their social relationships and the context-sensitive aspects of these interactions. The study offers a comprehensive framework for future research to further explore the complex relationships between smartphone use and social interactions (Elhai et al., 2020).

### ***5.2. Practical implications***

The findings of the present study offer concrete, practical recommendations for understanding and managing the outcomes of the relationships between FoMO, SPA, phubbing, and BP on individuals' social interactions. The results highlight that addressing the social challenges associated with smartphone use can provide effective strategies at both individual and community levels for strengthening social bonds. Given the cross-sectional nature of this study, the findings emphasize the associations between the variables rather than establishing causal links. Accordingly, the practical implications are formulated with this limitation in mind.

The study showed that FoMO and SPA were associated with phubbing behaviors. This underscores the need for awareness programs and educational interventions aimed at reducing their effects. For high-risk groups, such as university students, educational initiatives promoting mindful use of social media could help individuals meet their relatedness needs through offline social connections. Such interventions may be effective in mitigating the negative effects of SPA and phubbing on social interactions.

The finding that BP strengthened the relationships between FoMO, SPA, and phubbing highlights the role of social context in shaping interpersonal interactions. Notably, the dual nature of phubbing – where it may weaken social bonds in some cases but be perceived as normative behavior in others – suggests the importance of context-sensitive strategies. Interventions should focus on fostering healthier interactions during smartphone use. For example, face-to-face communication-promoting activities or ‘digital detox’ programs are practical methods to strengthen social connections. Encouraging face-to-face interactions is vital for enhancing interpersonal bonds. Initiatives to improve the quality of social settings could involve events designed to limit smartphone use and promote stronger social connections. Group activities on university campuses that restrict technology use could also deepen social bonds.

Psychological counseling and support programs are essential tools for helping individuals manage social interaction challenges related to FoMO, SPA, and BP. Such services can enable individuals to meet their relatedness needs healthier, ultimately improving the quality of their social interactions. In educational environments, policies regulating digital device use and promoting digital literacy may help students maintain a balanced relationship with social media and smartphones. For instance, limiting smartphone use in classrooms or providing social media literacy training could enhance students’ face-to-face communication skills.

The study’s findings can contribute to the development of effective strategies for better managing social interactions shaped by variables such as SPA, phubbing, and BP. The study provides valuable insights into initiatives aimed at strengthening individuals’ social bonds and addressing the impact of smartphone use on social relationships more deliberately and informedly.

## **6. Limitations**

The present study’s design was cross-sectional in which participants were examined at a specific point in time, and data were collected over a specific period. Therefore, causality between any of the study variables could not be determined (Spector, 2019). The study’s cross-sectional design also limited the ability to examine changes over time and long-term effects. Only longitudinal and experimental studies can delineate such relationships. The study sample comprised volunteer students studying at a state

university's Faculty of Economics and Business Administration (i.e., convenience sampling), therefore the findings cannot necessarily be generalized to other types of university student (Henrich et al., 2010) both inside and outside of Türkiye. Finally, all the data were self-report, and although the study tried to mitigate common method bias, self-report data may also introduce several other potential biases, such as social desirability and recall bias (Podsakoff et al., 2003).

## **7. Future research**

This present study provides valuable insights into the relationships between FoMO, SPA, phubbing, BP, and FS, offering a foundation for future research to build upon. However, given the study's cross-sectional design, the findings are limited to associations between variables, and causal relationships cannot be established. Future research could address this limitation through longitudinal or experimental designs, allowing for a more robust exploration of how these variables evolve and influence one another.

One important direction for future research is to investigate additional variables that may mediate or moderate the relationships identified in this study. For example, personality traits, such as extraversion or neuroticism, could influence the extent to which FoMO and SPA impact phubbing and FS. Similarly, cultural differences in smartphone use and social norms may provide an important context for understanding the generalizability of these findings across diverse populations.

Furthermore, while this study focused on university students, future research could explore these relationships in other demographic groups, such as adolescents, working professionals, or older adults. Different age groups and life stages may experience FoMO, SPA, and phubbing differently, offering new perspectives on the effects of smartphone use on social interactions and satisfaction.

Another promising avenue for research is the exploration of intervention strategies designed to mitigate the negative effects of FoMO, SPA, and phubbing on social relationships. Studies could evaluate the efficacy of digital literacy programs, social media usage awareness campaigns, or “digital detox” interventions in reducing smartphone dependency and enhancing face-to-face communication. Experimental studies assessing these interventions' short-term and long-term impacts would provide practical insights for improving social relationship outcomes.

Additionally, the moderating role of BP in the relationships between FoMO, SPA, and phubbing warrants further investigation. Future studies could delve deeper into how perceptions of being phubbed influence individual behaviors and relationship satisfaction in different social contexts. For instance, examining BP in workplace or familial relationships could expand the understanding of how phubbing dynamics vary across different interpersonal relationships.

Lastly, as technology evolves, future research should consider the impact of emerging technologies, such as artificial intelligence and virtual reality on the variables examined in this study. These technologies may introduce new dimensions to how individuals engage with digital tools and manage their social relationships, necessitating updated frameworks and models to address these changes.

In summary, future research should aim to overcome this study's limitations by adopting longitudinal and experimental designs, exploring additional mediators and moderators, expanding the demographic scope, and evaluating interventions. Such studies will enhance the theoretical understanding of the relationships between FoMO, SPA, phubbing, BP, and FS and provide practical insights for addressing the challenges posed by smartphone use in contemporary social contexts.

## **8. Conclusions**

The results of the present study expand the understanding of the effects of behaviors shaped by the use of smartphones on university students' FS. Understanding the complex relationships between the FoMO, SPA, and phubbing variables in the research model will help provide better understanding and interpretation to the social interactions of today's youth.

The results showed that FoMO increased phubbing through SPA, negatively affecting face-to-face interactions. Interestingly, BP played a critical role in these relationships. When the BP level was high, the effects of FoMO and SPA on phubbing were more visible. BP may reduce the adverse impacts of phubbing on FS, strangely resulting in a mutual understanding or typical behavioral style among friends. These results show a different perspective on understanding the effects of young people's behavior on their social relationships, which are shaped through smartphones. It is noteworthy that problematic behaviors such as phubbing can alienate young people from society and isolate them, while at the same

time, in some cases, they can increase social satisfaction. Based on this, the present study's findings underline the need to consider in more detail the balance between addictive behaviors resulting from the use of digital devices and the quality of social interactions.

The present study contributes to the literature by improving the understanding of the effects of changing individual behaviors due to the use of smartphones on social relationships. The findings carry valuable information for both practitioners and academic researchers. Consequently, the present study contains results that will be useful in understanding the complex relationships between FoMO, SPA, and phubbing. It offers a different perspective for researchers who want to examine the effects of these relationships on university students' future.

## **Declarations**

**Ethical Approval:** The study was conducted by the declaration of Helsinki and approved by the University's Social and Human Sciences Scientific Research and Publication Ethics Committee (Protocol code: 535; Approval date: December 6, 2023).

**Informed Consent:** Informed consent was obtained from all participants included in the study.

**Funding:** This research received no external funding.

**Conflicts of interest:** The authors have no conflicts of interest to declare relevant to the paper's content.

**Consent to participate:** All the authors of this work agree with the content and give their explicit consent to submit it.

**Consent for publication:** All the participants consented to submit findings for publication.

**Data availability:** The data supporting the present study's findings are available from the corresponding author upon request.

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Table 1. CR, AVE, MSV, and Cronbach alpha

|                      | CR    | AVE   | MSV   | Cronbach alpha |
|----------------------|-------|-------|-------|----------------|
| Fear of missing out  | 0.865 | 0.480 | 0.392 | 0.864          |
| Smartphone addiction | 0.905 | 0.543 | 0.392 | 0.904          |
| Phubbing             | 0.982 | 0.581 | 0.260 | 0.888          |
| Being phubbed        | 0.760 | 0.516 | 0.096 | 0.756          |
| Friends Satisfaction | 0.884 | 0.530 | 0.028 | 0.884          |

Table 2. The means, standard deviations, and correlation values

|                                      | Mean | SD   | 1     | 2     | 3     | 4     | 5     | 6      | 7      |
|--------------------------------------|------|------|-------|-------|-------|-------|-------|--------|--------|
| 1. Gender                            | 1.53 | 0.49 | -     |       |       |       |       |        |        |
| 2. Daily internet use                | 4.18 | 1.93 | .02   | -     |       |       |       |        |        |
| 3. Having sufficient Internet access | 1.44 | 0.51 | .01   | .15** | -     |       |       |        |        |
| 4. Fear of missing out               | 2.28 | 0.69 | -.04  | .28** | .09*  | -     |       |        |        |
| 5. Smartphone addiction              | 2.18 | 0.74 | .01   | .28** | .12** | .68** | -     |        |        |
| 6. Phubbing                          | 2.13 | 0.69 | -.04  | .26** | .10** | .53** | .55** | -      |        |
| 7. Being phubbed                     | 1.78 | 0.61 |       | .08*  | .04   | .32** | .25** | .36**  |        |
| 8. Friend satisfaction               | 3.96 | 0.77 | .11** | -.05  | -.06  | -.01  | -.08* | -.11** | -.19** |

\*  $p < .05$ , \*\*  $p < .01$  (two-tailed), Gender = 1-male; 2-female; Having sufficient Internet access = 1-sufficient, 2-insufficient

Table 3. Results of SEM

| Path                                   | Coefficient ( $\beta$ ) | SE    | $p$   | 95% CI       |
|----------------------------------------|-------------------------|-------|-------|--------------|
| FoMO $\rightarrow$ SPA                 | 0.667                   | 0.048 | <.001 | [.59, .75]   |
| SPA $\rightarrow$ Phubbing             | 0.318                   | 0.046 | <.001 | [.24, .39]   |
| FoMO $\rightarrow$ Phubbing            | 0.272                   | 0.049 | <.001 | [.19, .35]   |
| FoMO $\rightarrow$ Phubbing (Indirect) | 0.212                   | 0.034 | <.001 | [.15, .27]   |
| Phubbing $\rightarrow$ FS              | -0.107                  | 0.043 | .005  | [-.19, -.04] |
| SPA $\rightarrow$ FS (Indirect)        | -0.038                  | 0.014 | .004  | [-.06, -.01] |
| FoMO $\rightarrow$ FS (Indirect)       | -0.057                  | 0.021 | .004  | [-.09, -.02] |

FoMO = Fear of missing out, SPA = Smartphone addiction, FS = Friend satisfaction

Table 4. Results of moderation analyses

| Dependent variable                | SPA          |          | Phubbing     |          | FS           |          |
|-----------------------------------|--------------|----------|--------------|----------|--------------|----------|
|                                   | $\beta$ (SE) | <i>p</i> | $\beta$ (SE) | <i>p</i> | $\beta$ (SE) | <i>P</i> |
| Constant                          | 2.03 (0.09)  | <.001    | 1.87 (0.11)  | <.001    | 3.91 (0.15)  | <.001    |
| Age                               | -0.08 (0.02) | <.001    | 0.01 (0.03)  | .76      | -0.01 (0.04) | .93      |
| Gender                            | 0.04 (0.03)  | .23      | -0.07 (0.03) | .85      | 0.15 (.05)   | <.001    |
| Daily Internet use                | 0.03 (0.01)  | <.001    | 0.04 (0.01)  | <.001    | -0.01 (0.01) | .49      |
| Having sufficient internet access | 0.06 (0.03)  | .07      | 0.04 (0.03)  | .21      | -0.07 (0.05) | .16      |
| FoMO                              | 0.69 (0.03)  | <.001    | 0.41 (0.03)  | <.001    | -            | -        |
| BP                                | 0.04 (0.03)  | .15      | 0.25 (0.03)  | <.001    | -.23 (0.04)  | <.001    |
| FoMO x BP                         | 0.01 (0.04)  | .68      | .12 (0.05)   | .01      | -            | -        |
| Phubbing                          | -            | -        | -            | -        | -0.01 (0.04) | .73      |
| Phubbing x BP                     | -            | -        | -            | -        | -0.17 (0.06) | <.001    |
| Constant                          | -            | -        | 1.87 (0.10)  | <.001    | -            | -        |
| Age                               | -            | -        | 0.04 (0.02)  | .11      | -            | -        |
| Gender                            | -            | -        | -0.27 (0.03) | .47      | -            | -        |
| Daily Internet use                | -            | -        | 0.04 (0.01)  | <.001    | -            | -        |
| Having sufficient internet access | -            | -        | 0.02 (0.03)  | .43      | -            | -        |
| SPA                               | -            | -        | 0.43 (0.03)  | <.001    | -            | -        |
| BP                                | -            | -        | 0.28 (0.03)  | <.001    | -            | -        |
| SPA x BP                          | -            | -        | 0.16 (0.04)  | <.001    | -            | -        |

FoMO = Fear of missing out, SPA = Smartphone addiction, FS = Friend satisfaction, BP = Being phubbed

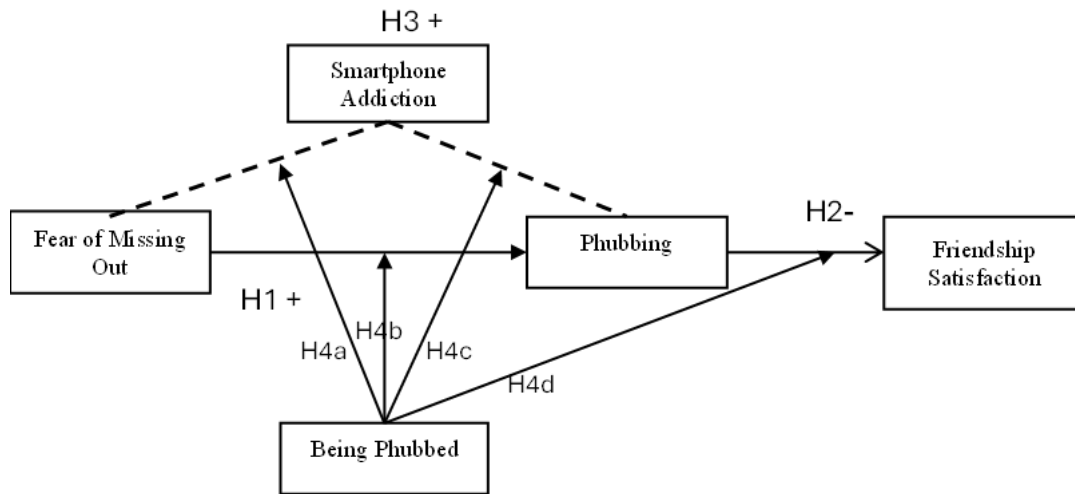


Figure 1. The research model

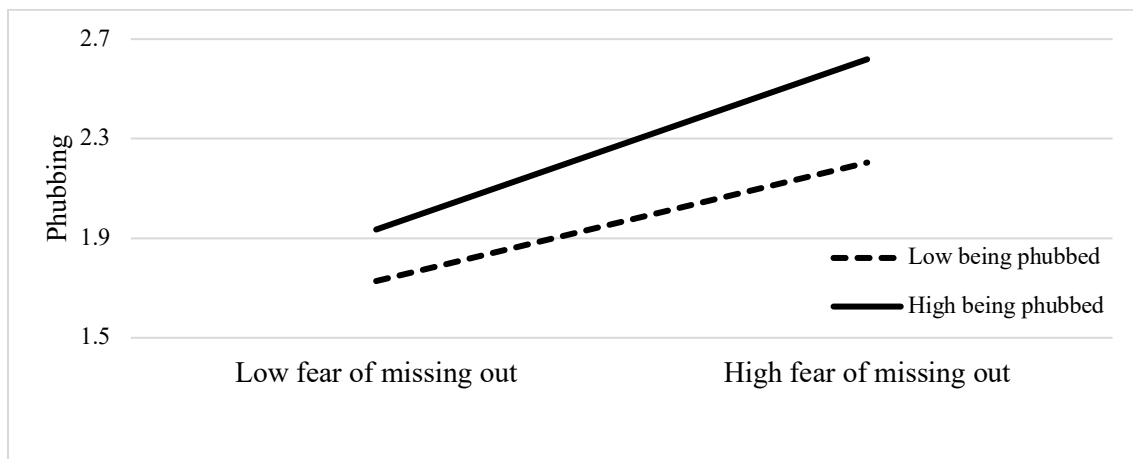


Figure 2. The interaction graph of fear of missing out and being phubbed

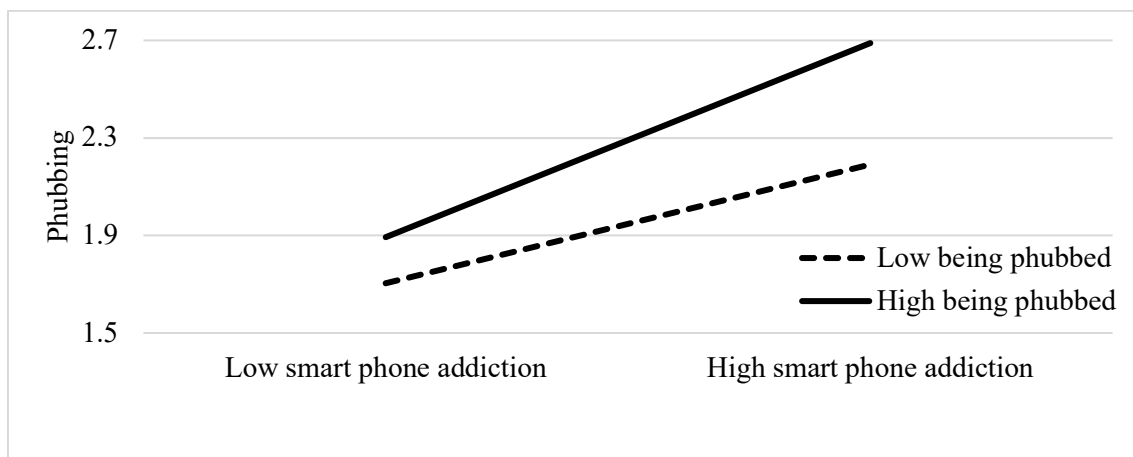


Figure 3. The interaction graph of smartphone addiction and being phubbed

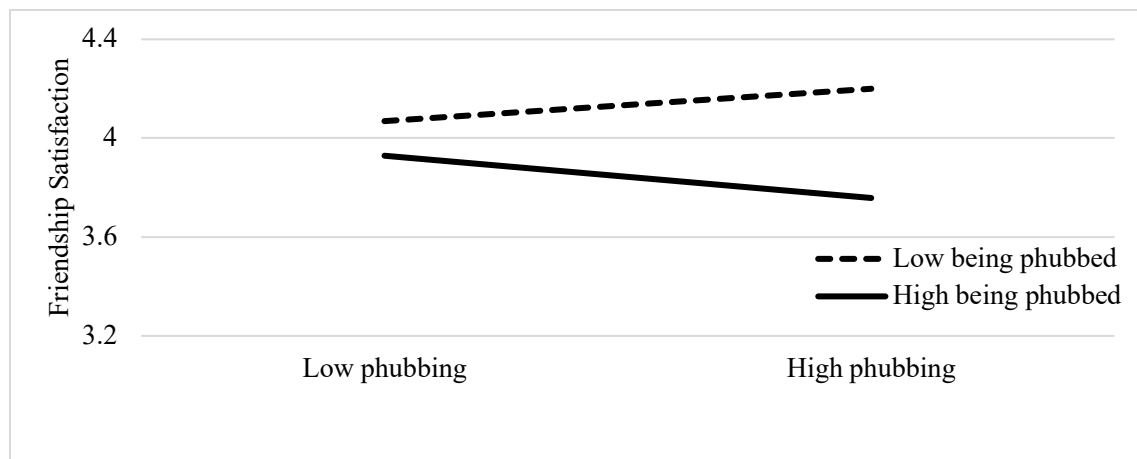


Figure 4. The interaction graph of phubbing and being phubbed