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Phubbing behaviors among Italian and Turkish university students: The role of fear of missing out, addictive smartphone behaviors, gender, and age

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ABSTRACT

Several studies have identified recent social and psychological phenomena related to technological tools, including phubbing behaviours, addictive smartphone behaviours, and the Fear of Missing Out (FoMO). This research analyzed data from 599 university students in Italy and Türkiye using structural equation modeling to explore the direct and indirect associations between age, gender, and phubbing behaviours (measured using the General Scale of Phubbing), with FoMO (measured using the FoMO Scale) and addictive smartphone behaviours (measured using the Smartphone Addiction Scale Short Version) as mediators.

The results show that FoMO directly affects both addictive smartphone behaviours and phubbing, with addictive smartphone behaviours positively influencing phubbing. FoMO also indirectly impacts phubbing through addictive smartphone behaviours. As age increases, both FoMO and phubbing behaviours decrease. Additionally, FoMO mediates the relationship between age and phubbing behaviours.

These findings enrich the existing literature by providing an in-depth analysis of the relationships between phubbing behaviour, gender, age, addictive smartphone behaviours, and FoMO. They also offer a valuable foundation for designing effective prevention and intervention programs aimed to reducing phubbing behaviour among university students.

1. Introduction

According to Data Reportal, (2024), 81.55 million smartphone connections were active in Italy, corresponding to 138.7% of the population, while 42.80 million individuals (72.8% of the population) were social media users, equally split between males and females. In the same period, Italy's population was 58.79 million, indicating that smartphone connections exceeded the number of residents. Although slightly lower than in Italy, the statistics for Türkiye also revealed substantial diffusion: at the beginning of 2024, 80.69 million smartphone connections were active, corresponding to 93.8% of the population, and 57.50 million people (66.8% of the population) were social media users, of whom 47.1% were female and 52.9% male.

These findings highlight the pervasive role of smartphones in everyday life. Through social networking and social media, smartphones allow individuals to communicate simultaneously with many others (Hetz et al., 2015) and provide increasingly abundant real-time information about activities and events (Abel et al., 2016), enabling people to remain connected beyond traditional space-time constraints (Kuss & Griffiths, 2017).

This constant digital connectedness has contributed to the emergence of new relational experiences linked to smartphone use, including phubbing behaviour (Garrido et al., 2021, 2024; Puligheddu et al., 2025).

Phubbing occurs when a person, the *phubber*, pays more attention to the smartphone than to the interlocutor, the *phubbee* (Schneider & Hitzfeld, 2021). Although normative and acceptable in some digitalized contexts, especially when reciprocated (Chotpitayasunondh & Douglas, 2016; Guazzini et al., 2019), phubbing's negative consequences are well documented. On the one hand, phubbers report higher levels of depression and distress (Davey et al., 2018); on the other hand, those who are phubbed report lower life satisfaction and psychological wellbeing (Roberts & David, 2016). Smartphones use during face-to-face conversations is also associated with the risk being judged negatively, especially by those who refrain from such behaviour (Moser et al., 2016), reduces the quality and meaningfulness of interpersonal

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exchanges, lowers relationship satisfaction and closeness (Beukeboom & Pollmann, 2021; Roberts & David, 2016; Vanden Abeele et al., 2016). Given its growing diffusion and relational costs, identifying phubbing's risk factors is an important research task (Wu & Yang, 2021).

The present study examines phubbing behaviours among Italian and Turkish university students by considering the role of Fear of Missing Out (FoMO), addictive smartphone behaviours, gender, and age.

1.1. Fear of missing out and phubbing behaviour

A key predictor of phubbing is the *Fear of Missing Out* (FoMO), defined as a pervasive feeling of anxiety that others may be having rewarding experiences without one's participation (Przybylski et al., 2013). Drawing from Self-Determination Theory (SDT; Deci & Ryan, 2000), it can be understood as a negative emotional state that emerges when individuals perceive a threat to their social connectedness. This pervasive anxiety compels individuals to use their smartphones to regain a sense of social connectedness (relatedness), often at the expense of their immediate social environment, resulting in the phenomenon of phubbing.

Empirical evidence supports this theoretical link and found that FoMO is associated with higher phubbing levels (Balta et al., 2020; Chi et al., 2022; Tandon et al., 2022) and predicts phubbing directly and indirectly through problematic social media use (Balta et al., 2020; Franchina et al., 2018; Younas et al., 2022).

1.2. Fear of missing out and addictive smartphone behaviours

FoMO has important implications for addictive smartphone behaviours (Buyukbayraktar, 2020). Conforming the lens of SDT (Deci & Ryan, 2000; Sheldon & Prentice, 2019), FoMO has been identified as a significant motivator for smartphone and social media use (Przybylski et al., 2013), as individuals experiencing FoMO may rely on digital tools to alleviate social unease and satisfy unmet psychological needs, even in situations that require attention elsewhere (Servidio, 2021). In line with this framework, the smartphone is adopted as a self-regulation tool aimed at mitigating exclusion anxiety and restoring a sense of social connectedness. However, when device use is driven by controlled motivation – characterized by internal pressures and weak coping strategies – it tends to evolve into problematic and compulsive usage patterns (Beyens et al., 2016; Przybylski et al., 2013).

Research has shown that smartphone use is more prevalent among individuals with higher FoMO, and that FoMO may be a stronger predictor of addictive smartphone behaviours than other factors, such as length of smartphone ownership (Li et al., 2022). More generally, FoMO has been associated with increases in smartphone use and with problematic patterns that can negatively affect daily routines and individuals' appreciation of reality (Bragazzi & Puente, 2014; Wolniewicz et al., 2018). These findings indicate that FoMO may represent an important psychological mechanism linking unmet relatedness needs to excessive smartphone use.

1.3. Addictive smartphone behaviours and phubbing behaviour

A second major correlate of phubbing is *addictive smartphone use*. Smartphone addiction is considered a central component of phubbing behaviour (Karadağ et al., 2015), representing a state where behavior is no longer driven by autonomous choice, but by the pressure to alleviate psychological tension or satisfy thwarted needs (Sheldon & Prentice, 2019). The robust association between addictive smartphone behavior and phubbing can be fundamentally explained through the SDT concept of autonomous versus controlled motivation (Ryan & Deci, 2000, 2022). From this perspective, phubbing is not merely a habit, but a behavioral manifestation. The urgency of the digital stimulus bypasses the individual's autonomous goals, leading to the neglect of physically present social partners.

Empirical studies have confirmed a positive association between addictive smartphone behaviour and phubbing, and the inclusion of smartphone addiction items in some phubbing scales further supports the closeness of these constructs (Lai et al., 2022; Talan et al., 2024). These findings suggest that compulsive smartphone use may play a central role in the development and maintenance of phubbing behaviour.

1.4. Age and gender

The literature suggests that individual differences such as age and gender may function as risk factors for technological addiction, including smartphone and internet addiction (Erdem & Uzun, 2022; Sechi et al., 2021).

Adolescents and young adults experience an intensified drive for peer affiliation and social belonging (Beyens et al., 2016) and, according to SDT (Ryan & Deci, 2000, 2022), when these needs are thwarted or remain unfulfilled, individuals experience a psychological deficit that manifests as FoMO (Przybylski et al., 2013). Because younger populations are in a critical stage of social identity formation, they could be more susceptible to this state of anxiety regarding social exclusion. Younger users, who are still developing robust volitional regulation, are more prone to this shift from functional to compulsive use of smartphone. Consequently, the urgency of digital connection overrides immediate social obligations, resulting in higher levels of phubbing compared to older cohorts with more matured self-regulatory capacities.

Przybylski et al. (2013) found that younger people, particularly young males, reported higher levels of FoMO, but the association between age and FoMO remains unclear. Some studies reported that younger age is linked to higher FoMO (Coco et al., 2020; Rozgonjuk et al., 2021), whereas others found no significant age-related differences (Barry & Wong, 2020).

Findings are similarly inconsistent regarding age and addictive smartphone behaviours. Several studies have identified a negative correlation, with younger age predicting higher levels of smartphone addiction (Wolniewicz et al., 2020), and adolescents being especially involved in such behaviours (Argumosa-Villar et al., 2017; Chiang et al., 2019). However, other studies found generational differences that do not follow a simple linear pattern (Zhitomirsky-Geffet & Blau, 2016), while others reported no significant relationship between age and addictive smartphone behaviour (Barnes et al., 2019; Wen et al., 2023).

With respect to age and phubbing behaviour, the literature is more limited. One of the most relevant studies on the topic showed that older adults were less tolerant of phubbing than younger adults (Rainie & Zickuhr, 2014). These findings are consistent with more recent studies reporting a negative association between age and phubbing, such that phubbing decreases as age increases and younger individuals consider more phubbing situations acceptable than older individuals do (Al-Saggaf, 2021; Schneider & Hitzfeld, 2021; Winkelmann & Geber, 2022).

Furthermore, the literature on gender differences is also inconclusive. Recent studies have produced conflicting results, with some identifying higher FoMO among males (Brailovskaia et al., 2023; Swinkles et al., 2025), others among females (Alshowkan & Shdaifat, 2025; Coco et al., 2020), and others finding no gender differences (Li et al., 2022; Peleg & Boniel-Nissim, 2024; Rozgonjuk et al., 2021; Servidio, 2021; Zhao et al., 2025). This inconsistency may be related to cultural differences, age cohorts, and methodological variations across studies.

Evidence concerning gender and addictive smartphone behaviour is likewise mixed. Some studies suggest that females may be more vulnerable because they report higher social stress and stronger relatedness needs (Servidio, 2021), whereas other studies, such as those conducted in Indian samples, found higher levels among males, potentially for sociocultural reasons (Nayak, 2018). Still other research reported no gender differences in addictive smartphone behaviour, despite gender differences in awareness and usage patterns (Barnes et al., 2019;

Erdem & Uzun, 2022; Li et al., 2022; Mostert, 2025).

Regarding gender and phubbing behaviour, some studies found that males phub more than females, for example among young Pakistani adults (Younas et al., 2022) and Chinese undergraduate students (Chi et al., 2022), whereas other studies found higher levels among females, including Turkish student samples (Balta et al., 2020; Şimşek & Başaran, 2025) and Spanish adolescents (Cebollero-Salinas et al., 2022). Other research suggests that gender differences may not lie in phubbing itself but in variables associated with it. For example, Chotpitayasunondh and Douglas (2016) found that gender moderated the perception of being phubbed as a social norm, with stronger effects for males. They explained this result by arguing that males tend to use smartphones as empowering tools, whereas females more often view them as means of social interaction and perceive phubbing as more disrespectful. More recent evidence also indicates that females tend to perceive conversation quality as lower than males do in phubbing contexts (Stevic et al., 2025).

1.5. Current study

The study is based on the Self-Determination Theory (SDT) (Deci & Ryan, 2000), which explains an individual's psychological wellbeing as resting on the satisfaction of three psychological needs: competence, relatedness, and autonomy. In particular, the unfulfilled need of relatedness, defined as "the need to feel belongingness and connectedness with others" (Ryan & Deci, 2000, p. 73), may lead the person to use a mechanism of compensatory motivation, finding alternative ways to connect to others.

By integrating Fear of Missing Out, addictive smartphone behaviours, and phubbing within a single theoretically grounded model, the present study aims to provide a more comprehensive understanding of the psychological mechanisms underlying phubbing behaviour among university students. Although previous research has examined associations among FoMO, addictive smartphone behaviours, and phubbing, the literature still presents several limitations. First, findings regarding the role of demographic variables such as age and gender are inconsistent. Second, although these constructs are highly relevant in contemporary digital society, fewer studies have examined them comparatively across different national contexts. In the present study, we focused on Italy and Türkiye to help address the remaining gaps in this topic. This comparison is meaningful because both countries are characterized by widespread smartphone and social media use, yet they also differ in relevant cultural dimensions. Previous research has adopted similar cross-national approaches to investigate social networking behaviours (Menesini et al., 2012; Palladino et al., 2017).

Comparing Italy and Türkiye offers a culturally meaningful framework for understanding phubbing behaviour. The two countries share certain Mediterranean sociocultural features, but also differ in key dimensions that may shape digital communication practices. According to Hofstede's cultural model (Hofstede, 2001), Italy scores higher in individualism, emphasizing autonomy and personal expression, whereas Türkiye shows stronger collectivistic orientations in which interpersonal connectedness is central. Supporting the relevance of these differences, cross-country comparative research has shown that cultural values influence smartphone-related behaviours, including the perceived acceptability and interpersonal consequences of phubbing (Blachnio et al., 2021). Thus, the Italy–Türkiye comparison adds conceptual value by situating phubbing within broader cultural, technological, and relational contexts.

1.6. Aims and research model

The purpose of this study was to examine phubbing behaviours among Italian and Turkish adults, considering the roles of FoMO, addictive smartphone behaviours, gender, and age. Consistent with Self-Determination Theory (Ryan & Deci, 2000), FoMO can be conceptualized as a negative affective condition arising from frustration of the need for relatedness (Elhai et al., 2018). Building on the contributions of Przybylski et al. (2013) and Chotpitayasunondh and Douglas (2016), individuals who experience higher FoMO may attempt to satisfy their unmet relatedness needs through frequent smartphone use, developing patterns indicative of addictive smartphone behaviour. As a result, they may prioritize smartphone use over in-person interaction and display phubbing behaviours.

The proposed model was also informed by empirical evidence showing that age and gender may act as risk factors for technological addiction (Al-Sagaaf, 2021; Sechi et al., 2021; Wolniewicz et al., 2020), and that FoMO is a significant predictor of both addictive smartphone behaviours (Li et al., 2022; Servidio, 2021; Yang et al., 2021) and phubbing (Chi et al., 2022; Tandon et al., 2022; Younas et al., 2022). In addition, prior research suggests that specific forms of problematic smartphone-related use may mediate the association between FoMO and phubbing (Balta et al., 2020; Fang et al., 2020; Franchina et al., 2018).

These theoretical and empirical considerations suggest that FoMO may influence phubbing behaviour both directly and indirectly through addictive smartphone behaviours, while demographic factors such as age may also shape these dynamics. Indeed, although the study includes participants from two national contexts, the comparison was exploratory.

On this basis, the following hypotheses were formulated:

- H1: Fear of missing out is positively correlated with phubbing behaviours;
- H2: Fear of missing out is positively correlated with addictive smartphone behaviours;
- H3: Addictive smartphone behaviours are positively correlated with phubbing behaviours;
- H4a: Increasing age is negatively correlated with fear of missing out;
- H4b: Increasing age is negatively correlated with addictive smartphone behaviours;
- H4c: Increasing age is negatively correlated with phubbing behaviours.

Given the variability and inconsistency of previous findings, no specific a priori hypotheses were formulated regarding possible gender differences in FoMO, addictive smartphone use, or phubbing behaviours. Likewise, although the study involved two culturally distinct countries, an exploratory approach was adopted with respect to potential differences between the Italian and Turkish samples.

2. Materials and methods

2.1. Sample and procedure

The current study was designed as a cross-sectional study and was conducted following the ethical requirements established by the National Board of Italian Psychologists Code of Ethics for the Psychologist.

The data were collected through a digital questionnaire published on Italian and Turkish forums and social networks (non-probabilistic sampling). Participation in the study was entirely voluntary and was preceded by approval from the Ethics Committees of the participating universities. The research objectives and procedures were clearly explained to all potential participants, who were required to read an information sheet and provide informed consent before accessing the questionnaire. Students were informed that they could withdraw from the survey at any time without any consequences and that they could contact the research team for further information or clarification if needed. The online format allowed broad dissemination and facilitated participation. Only one response per participant was permitted. These procedures were implemented to ensure adherence to ethical standards, respect for participants' autonomy, and the scientific reliability of the data.

In total, 643 individuals participated in the study. The inclusion criteria required that all participants were over 18 years old, enrolled as university students residing in either Italy or Türkiye, and regularly attending university classes. Incomplete questionnaires were removed, and participants without smartphones were excluded from participation. This resulted in a total of 599 complete responses that could be used for the data analysis.

The group of participants consisted of 318 females (53.1%) and 281 males (46.9%). The participants' ages ranged from 18 to 57 years, with a mean age of 24.7 years (*SD* = 5.58). The participants included 313 Italian individuals (52.3%) and 286 Turkish individuals (47.7%). All Italian participants lived in Italy; likewise, all Turkish participants lived in Türkiye.

2.2. Measures

To measure the fear of missing out (FoMO), we used the Fear of Missing Out Scale (FoMOs) developed by Przybylski et al. (2013). The scale includes 10 items rated on a five-point agreement scale (from 1 = "Not at all true of me" to 5 = "Extremely true of me"). Example items include "I fear others have more rewarding experiences than me" and "I get worried when I find out my friends are having fun without me." In the present study, the FoMOs had a high level of internal consistency (α = .83 for Italians and α = .87 for Turkish participants).

To measure addictive smartphone behaviours, we used the Smartphone Addiction Scale, Short Version (SASSV) developed by Kwon et al. (2013). The scale includes 10 items rated on a six-point agreement scale (from 1 = "Strongly disagree" to 6 = "Strongly agree"). Example items include "Missing planned work due to smartphone use" and "The people around me tell me that I use my smartphone too much." In the present study, the SASSV had a high level of internal consistency (α = .83 for Italians and α = .89 for Turkish participants).

Phubbing behaviour was measured using the General Scale of Phubbing (GSP) developed by Chotpitayasunondh and Douglas (2018). The scale contains 15 items rated on a seven-point Likert scale (from 1 = "Never" to 7 = "Always"). The scale consists of four subscales: nomophobia (NP), interpersonal conflict (IC), self-isolation (SI), and problem acknowledgment (PA). Example items include "I feel anxious if my phone is not nearby" and "I get rid of stress by ignoring others and paying attention to my phone instead." In the present study, the GSP had a high level of internal consistency (α = .88 for Italians and α = .93 for Turkish participants).

2.3. Data analysis

Means, standard deviations, skewness, kurtosis, and correlations among variables are reported in Tables 1 and 2. An independent samples *t*-test was performed to determine whether there were differences in the study variables based on the participants' countries (Table 1).

To test our hypothesized model (Fig. 1), we applied structural equation modeling (SEM) using Amos 23.0. Following the procedure for lower bounds for sample sizes in SEM determined by Westland (2010), the minimum sample size for SEM was estimated to be 87 according to an effect size of .1, a statistical power level of .8, one latent variable, and eight observed variables. Thus, because our study sample (N = 599) extended beyond the estimated sample size, we felt we had sufficient power to test our hypotheses.

Evaluation of model fit was based on chi-squared plus recommended criteria for a set of fit indices as follows: the comparative fit index (CFI), the Tucker-Lewis index (TLI), the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA) along with its 90% confidence interval (CI). Fit indices were considered good if they were greater than .90 for CFI and TLI and less than .08 for SRMR and RMSEA (Kline, 2015). The significance of the effects was examined using a 95% bootstrapped confidence interval estimate. Post hoc multigroup analyses were conducted to determine whether the hypothesized model performed equivalently across countries.

Table 2
Standardized direct and indirect effects.

Link	Direct	Indirect	Total effect
Fear of Missing Out - Phubbing Behaviours	.31** CI = .25 to .37	.32** CI = .27 to .36	.63** CI = .57 to. 69
Fear of Missing Out - Addictive smartphone behaviours	.46** CI = .40 to.52	_	.46** CI = .40 to. 52
Addictive smartphone behaviours - Phubbing Behaviours	.70** CI = .65 to.75	_	.70** CI = .65 to.75
Gender-Fear of Missing Out	.08 CI = .01 to .15		.08 CI = .01 to .15
Gender -Addictive smartphone behaviours	−.07 CI = −.12 to −.00	.04 CI = .01 to.07	−.03 CI = −.09 to .04
Gender- Phubbing Behaviours	.04 CI = .00 to .09	.00 CI = −.06 to.06	.05 CI = −.02 to .12
Age - Fear of Missing Out	−.13** CI = −.19 to −.05		−.13** CI = −.19 to −.05
Age - addictive smartphone behaviours	.06 CI = .00 to .13	−.06** CI = −.09 to −.02	−.01 CI = −.06 to .08
Age -Phubbing Behaviours	−.07* CI = −.13 to −.02	−.04 CI = −.10 to.03	−.11* CI = −.20 to −.02

Note. The confidence intervals (CIs) are based on the findings from the bootstrapping analysis (1500 samples). ***p* < .01; ****p* < .001.

3. Results

3.1. Preliminary analysis

Means, standard deviations among variables are reported in Table 1.

The application of *t*-test revealed that Italian individuals reported significantly higher scores on SASSV and IC, and PA subscales than Turkish individuals. Conversely, Turkish individuals reported

Table 1
Means and Standard Deviations (total sample and country groups).

	Total sample N = 599	Italy N = 313	Türkiye N = 286	*t*	*d*
	M (*SD*)	M (*SD*)	M (*SD*)		
Fear of Missing Out	2.42 (.79)	2.39 (.78)	2.45 (.81)	−1.02	0.1
Addictive smartphone behaviours	2.87 (1.01)	3.21 (.97)	2.50 (1.0)	8.96**	1.03
Nomophobia	3.60 (1.5)	3.70 (1.47)	3.49 (1.52)	1.68	0.14
Interpersonal Conflict	2.09 (1.21)	2.21 (1.26)	1.96 (1.20)	2.51*	0.20
Self-Isolation	2.06 (1.22)	1.94 (1.19)	2.19 (1.23)	−2.46*	0.20
Problem Acknowledgment	3.09 (1.42)	3.25 (1.35)	2.92 (1.48)	2.89**	0.23

***p* < .001; **p* < .01.

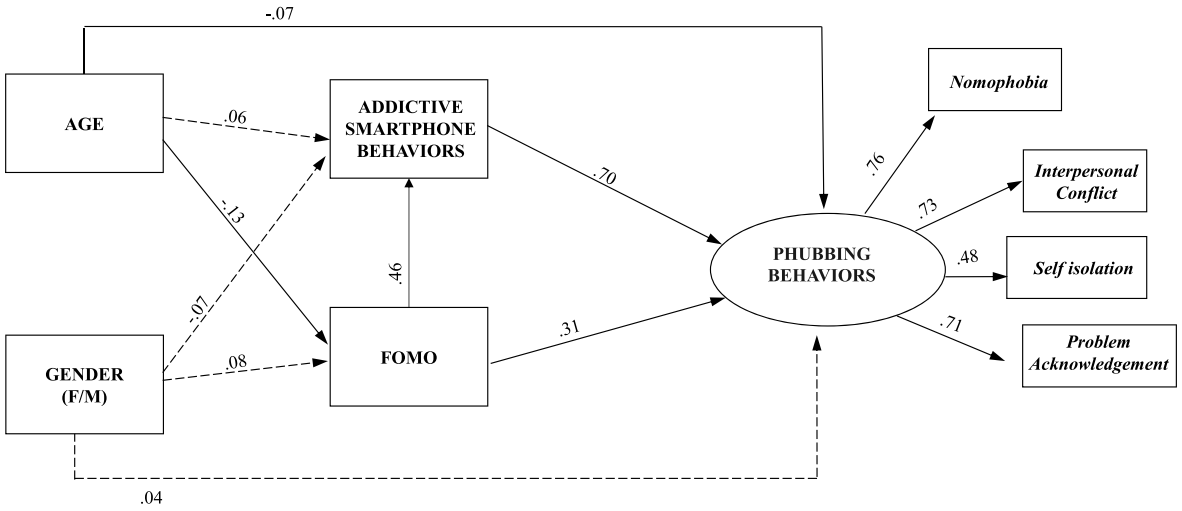

Fig. 1. Path model with standardized path coefficients.
Note: The dotted line refers to non-significant path.

significantly higher scores on SI subscale scores than Italian individuals (Table 1). No significant country difference was found in the FoMOs scores and NP subscale scores.

3.2. Structural and path model

The fit indicators obtained from testing the validity of the causal structure of the hypothesized model (see Fig. 1) are as follows: χ^2 = 54.175 df = 15, p < .001, CFI = .97, TLI = .95, RMSEA = .07 (90% [CI]: .05 to .09), SRMR = .04. Fig. 1 shows the path models with coefficients.

3.3. Overview of the hypotheses

As seen in Fig. 1 and Table 2, FoMO directly influences addictive smartphone behaviours and phubbing behaviour, confirming hypotheses H1 and H2. Additionally, there is an indirect influence of FoMO on phubbing behaviour following the path through addictive smartphone behaviours.

Hypothesis H3 is supported: addictive smartphone behaviours have a positive influence on phubbing behaviour.

Age negatively influences FoMO, supporting hypothesis H4a. We did not find a significant influence of age on addictive smartphone behaviours, rejecting hypothesis H4b.

Finally, the effect of age on phubbing behaviour is negative, so hypothesis H4c is supported. Age shows both a direct and indirect (via FoMO) effect on phubbing behaviour.

We did not observe significant gender differences between men and women in levels of FoMO, addictive smartphone use, or phubbing behaviour.

3.4. Post hoc multi-group analyses

Post hoc multi-group analyses were conducted to test whether the path model performed equivalently for Italian and Turkish individuals.

First, we specified an unconstrained model in which all path coefficients were freely estimated across the two country groups and compared it to a constrained model in which all path coefficients were fixed to be equal. This comparison allowed us to test whether model fit differed significantly across countries, thereby indicating potential cross-national differences in the structural relations. Second, each path was examined separately by comparing its constrained and unconstrained versions to determine whether the coefficients differed significantly between the groups.

Results showed that both the unconstrained model, $\chi^2(30) = 79.66$, p < .001, CFI = .97, TLI = .94, RMSEA = .05, 90% CI [.04, .07], SRMR = .06, and the constrained model, $\chi^2(42) = 106.40$, p < .001, CFI = .96, TLI = .94, RMSEA = .04, 90% CI [.04, .06], SRMR = .08, demonstrated a good fit to the data. The difference in Chi-square values between the two models was not significant, $\Delta\chi^2(12) = 26.74$, p = .08, indicating that the hypothesized model functioned equivalently for Italian and Turkish participants.

4. Discussion

The present study examined the relationships between Fear of Missing Out (FoMO), addictive smartphone behaviours, and phubbing behaviour while also considering the role of demographic factors such as age and gender. Overall, the results support the proposed theoretical model grounded in Self-Determination Theory (SDT), suggesting that FoMO may represent an important psychological mechanism linking unmet needs for relatedness with excessive smartphone use and phubbing behaviour. We applied Structural Equation Modelling (SEM) to examine the multivariate relationships among the variables included in our theoretical framework. While SEM is inherently correlational and based on the analysis of covariances, it can be used to test theoretically informed models that specify hypothesized causal directions. However, given the cross-sectional nature of our data, our goal was not to establish definitive causal claims, but rather to assess whether the observed data are consistent with a theoretically grounded model of directional relationships.

As hypothesized in H1, our findings show that individuals with higher levels of FoMO are also those with high levels of phubbing behaviour. These results corroborate the findings of previous studies (Chi et al., 2022; Fang et al., 2020; Tandon et al., 2022).

To our knowledge, all studies conducted on samples from various cultures confirm the positive relationship between FoMO and phubbing behaviour, except for the study by Talan et al. (2024) on a sample of university students in southeastern Türkiye, which did not confirm this relationship. Overall, our results support the international consistency of the positive relationship between FoMO and phubbing.

Concerning the relationship tested in H2, the results suggest that higher levels of Fear of Missing Out (FoMO) are reliably associated with addictive smartphone behaviours. This association has been observed across age groups (Gezgin, 2018) and cultural contexts, as well as across diverse methodological designs and assessment tools (Li et al., 2022).

The findings support Hypothesis H3 and are consistent with previous research (Bajwa et al., 2023; Lai et al., 2022; Talan et al., 2024), which documented a positive association between addictive smartphone

behaviours and an increased likelihood of engaging in phubbing behaviour. Moreover, the present study provides further evidence that addictive smartphone behaviours play a mediating role in the association between Fear of Missing Out (FoMO) and phubbing behaviour, highlighting their relevance within the proposed cross-sectional model. From the literature review, to date, it emerged that only one other study (Chotpitayasunondh & Douglas, 2016) detected similar results. In accordance with the SDT model, a possible explanation for this finding is that university students use smartphones to alleviate negative feelings associated with FoMO and to meet their psychological needs by staying constantly informed about others' activities (Ahmed et al., 2023). This constant need for information leads to addictive smartphone behaviours, making it difficult for them to exercise control (Davey et al., 2018) over this behaviour.

Regarding age, Hypothesis H4a is confirmed. We found that FoMO decreases with age, consistent with previous research (Coco et al., 2020; Rozgonjuk et al., 2021). Some scholars have underlined that young people with high levels of FoMO often engage excessively with social networks to compensate for unmet psychological needs (Saladino et al., 2024; Tseng & Huang, 2025). This pattern aligns with SDT's assertion that when psychological needs are unmet, individuals can manifest problematic or socially disruptive digital habits such as phubbing, which emerges as a behaviour motivated not by autonomous choice but by socially driven pressures (Albalá-Genol et al., 2025; Ryan & Deci, 2022). The absence of likes and comments on pictures, videos, and messages on one's social networks can be particularly stressful for youths and adolescents, impacting their emotional wellbeing (Sirisety et al., 2025).

However, the relationship between age differences and FoMO seems, nowadays, unclear because in some studies there did not appear to be any association (Barry & Wong, 2020). In particular, investigations conducted on adult and adolescent participants suggest that the link between FoMO and other personal aspects, such as low self-esteem, low self-compassion, and high levels of loneliness, is more important than the relationship with a specific developmental stage. The literature on this topic presents divergent findings, indicating the need for further research and insights in the future.

In line with other research (Al-Sagaff, 2021; Schneider & Hitzfeld, 2021), our findings showed that younger individuals are more prone to developing phubbing behaviour than older individuals, confirming Hypothesis H4c. Specifically, we observed a reduction in phubbing behaviour as age increases. One possible explanation for these results is that older adults appear to be less tolerant than young individuals toward phubbing behaviour (Rainie & Zickuhr, 2014).

Moreover, the present research revealed the role of FoMO as a mediator in the relationship between age and phubbing behaviour. These findings can also be interpreted through the theoretical lens of SDT (Deci & Ryan, 2000). The mediating role of FoMO in the relationship between age and phubbing behaviour may therefore reflect processes that thwart the need for relatedness. Specifically, younger individuals might experience greater pressure to maintain constant social connectivity in order to preserve feelings of relatedness, thereby heightening FoMO and increasing the likelihood of phubbing. From this perspective, the observed indirect effect underscores the theoretical relevance of FoMO as a motivational mechanism rooted in unmet needs for relatedness. Consequently, the indirect relationship between age and phubbing strengthens the central role of FoMO in anti-phubbing programmes. Youths, especially those who receive emotional support from social media, show higher levels of FoMO and, consequently, exhibit higher levels of phubbing behaviour (Fang et al., 2020). This behaviour could be linked to the tendency of individuals with high levels of FoMO to ruminate, constantly thinking about what they might be missing out on (Elhai et al., 2018).

Conflicting with our expectations, Hypothesis H4b was not confirmed; the results of the present research showed that age has no effect on the levels of addictive smartphone behaviours.

Research on this topic reveals significant discrepancies: while some studies suggest that younger age correlates with higher levels of smartphone addiction (Wolniewicz et al., 2020), others find no such relationship (Barnes et al., 2019; Wen et al., 2023).

Our findings may be explained by the existence of predictors of addictive smartphone behaviours that are more influential than age itself. Smartphone usage is prevalent across all age groups, and factors other than age should be considered in order to fully understand smartphone addiction. Indeed, Randler et al. (2016) highlighted that chronotype, rather than age, may be a more critical predictor of smartphone addiction.

Although considering age as one of the most important predictors of addictive smartphone behaviours is a valid approach, this aspect led to the underestimation of risk among atypical cases in low-risk age groups (Wang et al., 2019).

The present study attempted to contribute to the discussion regarding the impact of gender on the risk of developing FoMO, addictive smartphone behaviours, and phubbing behaviour. Our results showed that gender has no effect on the levels of FoMO, addictive smartphone behaviours, or phubbing behaviour.

Regarding the levels of FoMO, our results agree with previous studies that did not detect gender differences (Li et al., 2022; Peleg & Boniel-Nissim, 2024; Rozgonjuk et al., 2021; Servidio, 2021; Zhao et al., 2025). However, they contrast with studies that found higher FoMO levels in males (Brailovskaia et al., 2023; Swinkles et al., 2025) or in females (Alshowkan & Shdaifat, 2025; Coco et al., 2020), scholars are not unanimous on which gender is at higher risk of developing addictive smartphone behaviours. While our study corroborates the results of previous research (Erdem & Uzun, 2022; Li et al., 2022; Mostert, 2025) that did not find gender differences, it is in contrast to other research that found that levels of addictive smartphone behaviours are higher in females (Servidio, 2021) or in males (Nayak, 2018).

In relation to gender differences in phubbing behaviour, our results, having found no differences between males and females, are in agreement with prior findings (Muñoz-Carril et al., 2025). However, they are in contrast to previous research that found that males phub more than females (Chi et al., 2022; Younas et al., 2022) and vice versa (Cebollero-Salinas et al., 2022; Şimşek & Başaran, 2025).

Research on gender differences in smartphone usage continues to produce conflicting results. These discrepancies could be attributed to differences in cultural contexts (e.g., Western European vs. East Asian samples), age cohorts, methodologies, or measurement tools. Our study suggests that, in Italy and Türkiye, there are no differences between males and females in terms of addictive smartphone behaviours, FoMO, or phubbing behaviour. As underlined by the results of previous research in Italy, there are no gender differences in problematic internet use (Di Carlo et al., 2021), addictive internet behaviours (Sechi et al., 2021), internet gaming disorders (Triberti et al., 2018) problematic smartphone use (Mancinelli et al., 2022), and smartphone addiction (Mancinelli et al., 2021). Similarly, in Türkiye, prior studies have reported no gender differences in nomophobia and FoMO (İdil et al., 2022), digital addiction levels (Bağcı, 2019), social media addiction (Tutgun-Unal, 2020), or problematic mobile phone use (Dayapoglu et al., 2016).

We posit that gender differences in the use of technological tools are diminishing, potentially due to increased global access to the Internet (Sechi et al., 2021) and the broad functionality of smartphones, which are accessible regardless of individual or gender-specific factors. Recent studies found that, in Italy, there is no significant difference between the amount of time that women and men spend online (Marazziti et al., 2020) and that the number of women with addictive internet behaviours is growing (Sechi et al., 2021). Conflicting findings on this topic may be explained by the various risk factors associated with the use of technological tools, such as social anxiety, negative emotions, and loneliness, which can exhibit both similarities and differences between men and women (Venuleo et al., 2020).

The mean differences observed between the two groups may be

partly explained by broader sociocultural patterns shaping digital behaviour, social expectations, and interpersonal norms. Research consistently shows that cultures differ in how they interpret and regulate smartphone-related behaviours, including phubbing, social media use, and digitally mediated social comparison. For instance, the perception of co-present phone use as socially inappropriate varies significantly across societies depending on norms of attentiveness and relational harmony (Büttner et al., 2025). Similarly, cross-national studies indicate that levels of problematic internet use and its psychological correlates differ across countries due to variations in social norms, emotional expression, and expectations of connectedness (Cebollero-Salinas et al., 2025; Varchetta et al., 2024). Moreover, evidence indicates that in cultures where social comparison pressures and collective belonging are stronger, FoMO-related behaviours and problematic social media use may be more pronounced (Servidio et al., 2024). Taken together, these findings underscore that the mean differences identified in our study likely reflect culturally grounded variations in relational expectations, digital communication norms, and the social meaning of smartphone use.

The fact that the data were collected during the COVID-19 period constitutes an important contextual factor that may have shaped the levels and dynamics of FoMO and phubbing observed in this study. During the pandemic, increased dependence on digital communication, prolonged social restrictions, and reduced face-to-face interactions heightened individuals' psychological need for connection, which in turn amplified smartphone-mediated behaviours. Recent findings demonstrate that digital behaviours associated with compensatory social engagement—such as excessive smartphone use, elevated FoMO, and phubbing—became more pronounced during and immediately after the pandemic period (Al-Saggaf & Hogg, 2024; Elsayed, 2025). Furthermore, studies have shown that smartphone use often served as a regulatory mechanism to manage loneliness and maintain relational satisfaction during periods of limited offline social contact, intensifying the link between FoMO, phubbing, and well-being indicators (Kerse et al., 2025).

Given these pandemic-specific conditions, the associations identified in our study may have been stronger than might be expected in fully normalized contexts. Nonetheless, emerging post-pandemic evidence indicates that many digital habits developed during the pandemic—such as persistent smartphone checking, increased social monitoring, and digitally mediated relational regulation—have continued beyond the period of strict restrictions (Ha'Levi et al., 2025; Tufan et al., 2026). Therefore, while cautious interpretation is warranted regarding generalizability, the continued relevance of these digital patterns suggests that the relationships observed in this study remain meaningful for understanding post-pandemic social and psychological functioning.

5. Limitations

Several limitations of the present study should be acknowledged. First, the cross-sectional design precludes conclusions regarding the temporal ordering or causal direction of the observed associations. Second, the use of a non-probabilistic convenience sampling strategy—necessitated in both countries by constraints related to the COVID-19 pandemic—limited the possibility of adequately stratifying the sample and ensuring the representativeness of the target populations. Moreover, recruitment through online forums and social media platforms may have introduced self-selection bias, thereby further restricting the generalizability of the findings.

In addition, the sample was composed predominantly of university students, with a mean age of 24.7 years, resulting in limited demographic variability. This homogeneity constrains the extent to which the findings can be generalized to broader age groups and non-student populations. Accordingly, the developmental and contextual characteristics associated with emerging adulthood should be carefully considered when interpreting the results.

Finally, an additional limitation relates to the historical context in which the data were collected, namely during the COVID-19 pandemic. Pandemic-related social isolation and health-related restrictions may have contributed to increased reliance on digital technologies, potentially amplifying the phenomena under investigation and influencing the observed associations.

Future research could benefit from longitudinal studies that examine these constructs over time, especially in relation to the pandemic's progression and the ongoing enforcement of physical distancing and isolation measures, which may have contributed to the phenomena of phubbing and FoMO.

Future studies could also include a cross-cultural approach, comparing different countries in which gender differences could be revealed.

Lastly, all measures relied on self-reported data, which may have introduced social desirability bias. Tto improve the accuracy and reliability of assessments, future studies should consider using alternative methods, such as interviews.

6. Implications

One of the main strengths of the present study lies in the integration of Fear of Missing Out, addictive smartphone behaviours, and phubbing behaviour within a single theoretically grounded framework based on Self-Determination Theory. By examining these constructs simultaneously, the study provides a more comprehensive understanding of the psychological mechanisms underlying phubbing behaviour, extending previous research that often examined these variables separately. The results reinforce the theoretical relevance of SDT in explaining how unmet psychological needs shape maladaptive digital behaviours, even within a university student population drawn from two distinct cultural contexts, Italy and Türkiye. Moreover, our findings indicate that age-related differences play a central role in these dynamics. From an SDT perspective, the role of FoMO as a mediator between age and phubbing extends theoretical assumptions by demonstrating how need-frustration processes differ across age groups and how these differences shape socially driven, digitally mediated behaviours.

In terms of practical implications, our findings offer a valuable foundation for designing effective prevention and intervention programmes aimed at reducing phubbing behaviour among university students.

Academic institutions could consider conducting workshops for undergraduates to raise awareness about the negative impacts of phubbing, which can be perceived as unkind behaviour and can harm interpersonal relationships. In addition, guidelines and psychoeducational actions targeting university students could promote digital well-being by implementing strategies such as setting time limits for social media use (Tandon et al., 2022) and managing smartphone settings, such as notifications (Guazzini et al., 2019). Training programmes focused on phubbing, FoMO, and smartphone addiction could also be provided to counsellors working within university services.

Finally, it is crucial to consider young age as a significant predictor of problematic technology use when designing prevention-oriented programmes for lower levels of education. These programmes should aim to mitigate early access to smartphones among children.

7. Conclusion

The present study contributes to the growing literature on digital behaviours by examining Fear of Missing Out, addictive smartphone behaviours, and phubbing within a single theoretically grounded model. The findings highlight the central role of FoMO as linking unmet needs for relatedness with problematic smartphone engagement and phubbing behaviour. In addition, the study provides further insight into the role of age in these dynamics, while suggesting that gender differences may be less pronounced than previously assumed. Overall, the results support

the usefulness of Self-Determination Theory for understanding phubbing behaviour and underscore the importance of promoting healthier and more mindful patterns of smartphone use among young adults.

CRediT authorship contribution statement

Cristina Cabras: Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Conceptualization. **Çağla Girgin:** Writing – review & editing, Writing – original draft, Investigation, Data curation, Conceptualization. **Francesca Muggianu:** Writing – review & editing, Writing – original draft, Investigation, Data curation, Conceptualization. **Mirian Agus:** Methodology, Investigation, Data curation, Conceptualization. **Cristina Sechi:** Writing – original draft, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Ethics approval and consent to participate

All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional research committee and with the principles of the 1964 Declaration of Helsinki and its subsequent amendments or comparable ethical standards. Ethical approval for the study was obtained from the Ethics Committee of the University of Cagliari on 20 October 2020 (Protocol No. 0208700 - 21/10/2020). Informed consent was obtained from all participants prior to their inclusion in the study.

Declaration of the use of AI

The authors did not use artificial intelligence (AI) tools or AI-assisted technologies in the preparation, writing, analysis, or revision of this manuscript.

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Cristina Cabras reports article publishing charges was provided by University of Cagliari. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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