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Research Article

Moving beyond an Addiction Framework for Phubbing: Unraveling the Influence of Intrinsic Motivation, Boredom, and Online Vigilance

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Phubbing affects an individual's social life and well-being. It has been found to affect romantic relationships, communication and social skills, and emotional and behavioral problems. Some relationships that phubbing has with, for example, smartphone addiction, Internet addiction, social media addiction, FoMO, and neuroticism are well known and established in the literature. However, phubbing is not exclusively reducible to addiction or personality-driven dynamics. For this reason, this study is aimed at exploring the motivations behind phubbing behavior. Firstly, the research is aimed at confirming the relationships between phubbing and technology-related addictions (e.g., social media addiction and mobile phone addiction) and personality traits (e.g., neuroticism and conscientiousness). In addition, the study is aimed at examining the relationship between phubbing and three potential individual-level factors for possible phubbing modeling: intrinsic motivation, boredom state, and online vigilance. A total of 551 participants took part in the study (mean age = 32 years; SD = 14.15). After confirming the relationships that phubbing has with the abovementioned variables, a hierarchical regression model was produced in order to model the phubbing phenomenon as comprehensively as possible. The final model explained approximately 72% of the variance in phubbing. The primary contributors to the explained variance were variables related to the dependent use of new technologies, dimensions of online vigilance, boredom, and intrinsic motivation for using new technologies. Sociodemographic factors and personality traits accounted for a smaller portion of the variance (3.4% and 9.1%, respectively). These findings suggest that the individual-level factors driving phubbing behavior are related to intrinsic motivation, online vigilance, and boredom, rather than sociodemographic factors or personality traits. The study encourages further research to explore and expand upon the range of motivations underlying phubbing behavior, while considering factors related to dysfunctional or addictive technology use.

1. Introduction

The pervasive role of smartphones in our daily lives has changed the way people socialise [1, 2], creating new social contexts that have transformed "social situations" by transcending physical space and encompassing both real and virtual environments [3]. Today, we are able to stay in touch with friends and family regardless of their distance, talk to someone on the other side of the world without leaving home [4], and stay in touch with people we have never met in person [5]. By 2023, more than 5 billion people will use smartphones, 68% of the world's total population, with 4.76 billion active social media users [6]. Adolescents in particular are particularly inclined to use their smartphones, with 95% of teenagers reporting having a smartphone and 45% of them saying they are online "almost constantly" [7].

It is no secret that information and communication technologies (ICTs) have infiltrated every sphere of our lives, from work to family, and have changed the way we communicate with each other; for example, social media has become a "normal" part of modern life [8] and of many people's daily routines [9]; for example, a study by Verma et al.

[10] revealed that the first thing people do when they wake up in the morning and when they go to sleep is to continuously check their phones. However, while technology has made it easier to stay in touch with people we care about, it has also made it easier to disconnect from them [11]. The impact of these technologies and their pervasiveness in our daily lives means that phubbing has become a "normative," characterising, common element in our daily interactions [12].

Chotpitayasunondh and Douglas [12] define phubbing as the act of snubbing others in social interaction, preferring to be busy on the phone rather than listening attentively or interacting with them. Haigh [13] defines phubbing as the act of ignoring people who are physically present around us in order to focus on our smartphones or other electronic devices. Two actors are usually identified in the literature in phubbing; in a social interaction, a "phubber" can be defined as a person who initiates phubbing to his peers, and a "phubbee" can be defined as a person who receives the phubbing behavior [12].

1.1. Adverse Effects of Phubbing.

For both roles involved in phubbing, phubber and phubbee, it has negative consequences for interpersonal communication, ranging from impaired relationship satisfaction and feelings of personal well-being [12, 14] to feelings of jealousy [15] and reduced intimacy [16], up to an increase in negative effects [17]. However, it is important to note that there are different negative consequences for both roles involved in phubbing: "phubber" and "phubbee." From a phubber's perspective, some of the factors associated with phubbing are higher levels of mobile phone addiction, Internet addiction, social media addiction, video game addiction, depression, social anxiety, social withdrawal, and nomophobia [18–24] and experience higher distress [22, 25]. While, as regards the one who is phubbed, the phubbee, being phubbed can be seen as a specific form of ostracism or social exclusion [12], and it is associated with a variety of undesirable outcomes such as pessimism, paranoia, low self-esteem, and depression [12, 14, 24, 26–30]. In a recent daily diary study, Thomas et al. [31] found that on days when daily partner phubbing was high, phubbees reported higher anger/frustration.

Notwithstanding the claim by Montag et al. [32], excessive smartphone use is a form of Internet use disorder and can have negative effects on mental and physical health, such as sleep disturbances [33], anxiety, loneliness, depression [34], satisfaction with life [35], social relationships [36], substance addictions [37], and attention deficit and hyperactivity disorder [37]; it is important to note that phubbers and phubbed can be spotted everywhere in modern society [13]; for this reason, normative phubbing is a worrisome issue as it can lead to a lack of engagement and connection with others and can also contribute to the normalization of antisocial behavior and a fall in social skills [38].

1.2. Introduction to Factors Influencing Phubbing.

As is already known from the literature on the topic, phubbing is negatively correlated with age [20, 39–42], while with regard to gender, the effects on phubbing are somewhat con-

tradictory. On the one hand, some studies have found a correlation between being female and a higher likelihood of phubbing [1, 43–45], while other studies have found no such effect on acting phubbing [39, 41, 46, 47]. Regarding the literature on the correlation between phubbing and personality (specifically the Big Five), we know that phubbing correlates positively with neuroticism [20, 48] and negatively with conscientiousness [41, 46], and this can be explained by the fact that highly conscientious individuals are able to control their impulses by not habitually and frequently accessing the smartphone, especially in inappropriate environments [49]. In addition, individuals with lower emotional stability have been associated with more problematic smartphone use and, thus, more likely to use the smartphone as a means of coping with stressful life events [50]. In this regard, it has been seen that negative emotionality serves as a positive determinant of phubbing behavior, while open-mindedness serves as a negative determinant [21]. But the literature on the topic highlights how personality traits can be classified as risk and protective factors for problematic smartphone use [51, 52].

Another strand of literature to predict phubbing behavior has focused more specifically on the dynamics of addiction to new technologies. In particular, the strongest determinants of phubbing behavior are Internet, social media addiction, and smartphone addiction [20, 21, 27, 45, 53]; more simply, problematic use (e.g., smartphones, Internet, social media, games, and text messaging) is positively correlated with phubbing [10, 54].

There is evidence to support a positive correlation between the time spent on smartphones and the behavior of phubbing; individuals who use their phones for more than 10 hours per day are more likely to exhibit phubbing compared to those who use their phones for less than 6 hours per day [40]. This could be due to the addictive nature of smartphones and the habit of overuse. However, this behavior cannot be entirely explained by these factors. One possible explanation is that the use of social media and smartphones allows individuals to fulfill their need for social belonging by facilitating interactive communication, sharing common interests, and gaining social support. This is supported by previous research [55, 56].

However, while the findings on phubbing appear sufficiently settled and robust, however, some recent scientific evidence and theories seem to suggest other potential factors related to phubbing. In particular, boredom, intrinsic motivation, and online vigilance have been identified as potentially interesting for the study of predictive factors of phubbing [42, 57–59]. The constant awareness of telephone users that online communications and content are permanently available and the fact that they are motivated to be close and stay in touch with others have been termed "online vigilance" (e.g., [60, 61]). Online vigilance is a form of communication that provides Internet users with a sense of "constant touch" while leaving their real-life peers alone [61]. According to Klimmt et al. [60], this cognitive state of online vigilance may even motivate users to stop their offline activities to monitor those in the online sphere and thus potentially lead individuals to act phubbing [42, 59].

Furthermore, the literature has found that phubbing is positively related to boredom [58], which is also influenced by the mediating effects of fear of missing out (FOMO) and online vigilance [59]. This boredom predisposition refers to an individual's inability to feel adequate satisfaction needs in scenarios where internal and external stimuli are low, showing persistent attentional difficulties, low arousal, and motivational deprivation [62]. Therefore, when a person is bored with the context or situation they are in, they may be more likely to pull out their phone and engage in phubbing behavior [63].

Another construct related to phubbing could be hedonic or intrinsic motivation, which refers to the pursuit of pleasure and avoidance of pain [64]. It is the driving force behind many of our behaviors and decisions, as we seek to maximize our pleasure and minimize our discomfort [65, 66]. Smartphone use can be intrinsically motivated when the person uses it for entertainment or to pursue their own interests, but at the same time, it can be hedonically motivated when the person also uses it to avoid pain or stress, such as surfing social media to distract themselves from an unpleasant situation or to avoid feelings of loneliness and to feel relief from negative emotions [67]. In general, people often use smartphones driven by intrinsic motivation, as many smartphone activities can provide both enjoyment and personal fulfillment [68].

1.3. Aim of the Study and Hypothesis Development. As recognized by Lewin [69], phenomena are inherently influenced by the complex interaction between individual and social contextual factors. Since phubber's self-reported measures might not have yielded adequate information on the social aspects of phubbing due to issues of social desirability and participants' perceptions of the behavior, we decided to adopt an individual-level perspective and contribute to clarify individual-level potential predictors of phubbing apart from addiction. The aim of our study is, therefore, to find a set of individual-level factors (motivational factors, cognitive states, and affects) that explain phubbing behavior as comprehensively as possible, with different measures of phubbing, complementing the factors that now seem to have a robust and sedimented relationship with the phenomenon (e.g., mobile phone addiction, texting addiction, social media addiction, Internet addiction, gaming addiction, and Big Five personality dimensions) with other factors from different theoretical models that have not yet been fully and comprehensively studied (intrinsic motivation and online vigilance).

For this reason, this article will examine both the already known relationships of phubbing, such as those with mobile phone addiction, sexting addiction, social media addiction, Internet addiction, gaming addiction, and the Big Five personality dimensions, and at the same time, as our hypothesis makes explicit, those factors whose relationship with phubbing has been insufficiently or not at all explored, such as intrinsic motivation and online vigilance. In addition, this study will attempt to confirm the already known relationships of phubbing with age and gender [12, 45].

1.4. Why Phubbing Should Be Related to Intrinsic Motivation. The "uses and gratification theory" (UGT) [70] has found widespread application in various media and mass content,

particularly in the field of ICT, encompassing mobile devices, the Internet, social networking sites, and social media. Several factors have been identified as determinants of media usage, including attitudes, community involvement, social support, demographics, locus of control, and news credibility. However, the central aspect for predicting smartphone use insists on the satisfaction/gratification derived from use, and thus, the aspect of intrinsic motivation becomes essential if we are to understand ICT use within a social situation. Following a similar approach, according to compensatory Internet use theory (CIUT) [71], smartphone use can be understood as a strategy by individuals to try to feel relief from negative emotions and feel good [67] and to alleviate everyday stress [72].

Smartphones serve as multifaceted tools, catering to both task-oriented and entertainment-oriented needs, and this includes using the device for communication, entertainment, and relaxation. Generally, these motivations can be divided into two categories: habitual (or ritualistic) motivations and instrumental (or content) motivations [73]. Hassenzahl [68] also distinguishes between utilitarian (extrinsic) and hedonic (intrinsic) aspects of user experience in human-computer interaction. Intrinsic motivation, often associated with the need for social connectedness (self-determination theory; [74]), plays a significant role in smartphone attractiveness, possibly contributing to phubbing behavior.

Other aspects that link the use of new technologies to intrinsic motivation derive precisely from their technological characteristics for example smartphones are engineered to elicit intrinsic motivation among users through hedonic attributes, such as vivid and saturated color schemes [75–77], while also engaging the user's attentional system [78, 79]. Recent scholarly investigations involving the removal of color displays from smartphones have indicated that such alterations lead to reduced user satisfaction and subsequently result in diminished smartphone utilization [80, 81]. Given that the satisfaction users derive from their device is intertwined with its usage, we anticipate this to be a catalyst for phubbing behavior, which is a particular case of use.

We conclude by assuming that phubbing positively correlates with intrinsic motivation, in line with what we already know about the relationship between the latter and ICTs. The more people perceive the smartphone and related activities as more enjoyable and interesting, the more they will use the phone, even in a social situation, while ignoring their interlocutor and engaging in phubbing behavior [40, 41].

H1: phubbing is positively correlated with intrinsic motivation.

1.5. Why Phubbing Should Be Related to Online Vigilance. Another aspect that this study is aimed at investigating is related to phone users' constant awareness that online communications and content are permanently available, referred to as "online vigilance" (e.g., [60]). Online vigilance refers to individual differences in three aspects of users' psychology: cognitive orientation, chronic attention, and motivational disposition to the online sphere [61]. These characteristics manifest themselves in three subdimensions: (1) individuals high in online vigilance frequently and intensely think about their personal online sphere even when not using their

mobile device (salience of the online world); (2) they demonstrate a readiness to promptly react to cues from (mobile) online communication, even if it means interrupting other important activities (reactibility); (3) the final aspect of online vigilance involves actively observing one's online communication environment while engaging in offline activities (monitoring).

This leads us to speculate that online vigilance could partly explain the phubbing behavior, because people may be distracted or focused by the arrival of a new communication, or they may compulsively check their smartphone to see if it has arrived or not [42].

Furthermore, online vigilance has already been proven to be associated with the dysfunctional use of technology. For instance, online vigilance could be a manifestation or symptom of Internet addiction [61]. More in line with the focus of this article, very recent works found online vigilance to be positively associated with phubbing behavior [59, 82].

H2: phubbing is positively correlated with online vigilance.

1.6. Why Phubbing Should Be Related to Boredom. Studies have shown that boredom plays a significant role in shaping attitudes toward cell phone use, with bored students more likely to adopt lenient views [83]. This connection between state boredom and attitudes toward cell phone use aligns with the principles of the uses and gratification theory (UGT) [70]. According to this theory, individuals actively seek media and technology to fulfill specific needs and gratifications. Boredom can be seen as a state of discomfort resulting from unmet psychological needs for stimulation and engagement [62]. In response to this state of understimulation, individuals may turn to their smartphones as a means of escape, distraction, or entertainment, seeking gratification through online activities and social interactions. Additionally, state boredom has been linked to problematic smartphone use [84], suggesting that it may also be a driver of phubbing behavior [85]. The relationship between state boredom and maladaptive smartphone use highlights its potential impact on interpersonal interactions and social behaviors in mobile communication settings. Furthermore, given that the literature has shown that smartphone use can be understood as an individual strategy to seek relief from negative emotions or compensate for uninspiring contexts [67], we would expect that people who experience boredom more often, even in social settings, would use their smartphones more often to escape this "negative" state and, thus, engage in phubbing behavior.

H3: phubbing is positively correlated with boredom state.

2. Material and Methods

2.1. Materials

2.1.1. Phubbing Behavior [86]. A three-item instrument was constructed to investigate phubbing behavior. The three questions are "How often do you use your mobile phone during a conversation at a bar or restaurant?", "How often are you engaged with your phone during a conversation?",

and "How often do you check social media on your phone during a personal conversation?". These are measured on a 5-point Likert scale, from 1 (never) to 5 (always) ($\alpha = 0.77$) [86].

2.1.2. Phubbing Scale (PS) [45]. Karadağ et al. [45] developed this scale, and this scale is used to measure phubbing behavior. This scale consists of ten items, grouped into two subscales, phone obsession (item 7: "When I wake up in the morning, I first check the messages on my phone") and communication disturbance (item 4: "I'm busy with my mobile phone when I'm with friends"), and measures phubbing behavior on a 5-point Likert scale, with 10 items added to the total score, and the higher the score, the more phubbing behavior. The reliability of this scale is $\alpha = 0.87$ for 5 items of communication disturbance and $\alpha = 0.85$ for another five items of phone obsession [45].

2.1.3. Items to Measure Phubbing Behavior [46]. Grieve and March developed a 7-item questionnaire to measure phubbing behavior:

"I check my smartphone when I am spending time with friends/family"; "If I am talking to my friends/family in person, and I receive a text message, I will read the text message"; "If I am talking to my friends/family in person, and I receive a text message, I will answer the text message"; "I get distracted by my smartphone when I am spending time with friends/family"; "When I am spending time with friends/family, I keep my smartphone where I can see it"; "If my phone rings/beeps, I will look at it, even if I am in the middle of a conversation"; and "I glance at my smartphone when others are talking to me." Participants reported the frequency with which they engaged in each phubbing behavior, where $1 =$ never, $2 =$ rarely, $3 =$ sometimes, $4 =$ often, and $5 =$ all the time. Cronbach's alpha indicated very good reliability, $\alpha = 0.89$ [46].

2.1.4. General Scale of Phubbing (GSP) [12]. The scale contains 15 items and is measured at a seven-point Likert scale (1: never; 7: always). The scale consists of four subscales: nomophobia (NP) (e.g., I feel anxious if my phone is not nearby), interpersonal conflict (IC) (e.g., I have conflicts with others because I am using my phone), self-isolation (SI) (e.g., I would rather pay attention to my phone than talk to others), and problem acknowledgment (PA) (e.g., I pay attention to my phone for longer than I intend to do so). The measurement has a good internal reliability (IR) of 0.85 to 0.92 and convergent validity [12].

2.1.5. The Mobile Phone Usage Addiction Scale [45]. Scale of 15 items measured on a 5-point Likert scale, from 1 (completely disagree) to 5 (completely agree), investigates mobile phone addiction. The 3 factors are (i) deprivation (7 items, $\alpha = 0.86$; e.g., "I cannot think of a life without my mobile phone"), (ii) control difficulties (3 items, $\alpha = 0.78$; e.g., "The people around me say that I spent too much time dealing with the mobile phone"), and (iii) application (5 items, $\alpha = 0.85$; e.g., "I keep my mobile phone applications update").

2.1.6. Short Message Service (SMS) Addiction Scale [45]. The "SMS Addiction Scale" consists of six items and aims to assess addiction through the frequency of daily SMS use. It consists of only one factor. Answers were given on a 5-point Likert scale, from 1 (completely disagree) to 5 (completely agree) ($\alpha = 0.80$; item 3: "I feel a need to reply the messages instantly").

2.1.7. Social Media Addiction Scale [45]. Scale of 10 items measured on a 5-point Likert scale, from 1 (completely disagree) to 5 (completely agree). Investigates social media addiction. The 2 factors are (i) sharing (6 items, $\alpha = 0.82$; item 3: "I share what I did, what is going on with life and momentary events in social media") and (ii) control (4 items, $\alpha = 0.79$; item 2: "I check over my social media accounts whenever possible").

2.1.8. Internet Addiction Scale [45]. A scale of 6 items measured on a 5-point Likert scale, from 1 (completely disagree) to 5 (completely agree), investigates Internet addiction, with only one factor ($\alpha = 0.83$; item 1: "I spend time using the Internet more than I plan to").

2.1.9. Game Addiction Scale [45]. A scale of 8 items measured on a 5-point Likert scale, from 1 (completely disagree) to 5 (completely agree), investigates online gaming addiction. The scale has only one factor ($\alpha = 0.90$; e.g., "I have a need to replay a game aiming to win if I lost one").

2.1.10. The Situational Motivation Scale (SIMS) [87]. The situational motivation scale (SIMS) is a 16-item self-report instrument designed to assess four constructs in accord to self-determination theory [65, 66]: intrinsic motivation (intrinsically motivated behavior typically occurs in the absence of any apparent external rewards), identified regulation (when a behavior is valued and perceived as being chosen by oneself), external regulation (when behavior is regulated by rewards or in order to avoid negative consequences), and amotivation (when individuals experience a lack of contingency between their behaviors and outcomes). Each construct is investigated by four items, measured on a 7-point Likert scale, ranging from 1 (absolutely not) to 7 (very much). Cronbach's α values for the subscales were relatively adequate (intrinsic motivation = 0.95; identified regulation = 0.85; external regulation = 0.62; amotivation = 0.83) [87].

Examples of items: intrinsic motivation: item 1 = "Because I think that this activity is interesting"; identified regulation: item 2 = "Because I am doing it for my own good"; external regulation: item 3 = "Because I am supposed to do it"; amotivation: item 4 = "There may be good reasons to do this activity, but personally I don't see any."

2.1.11. Online Vigilance Scale (OVS) [61]. In total, the OVS consists of 12 items that are equally assigned to three subscales, namely, salience (e.g., My thoughts often drift to online content), monitoring (e.g., I constantly check what is happening online), and responsiveness (e.g., When I receive a message online, I immediately give it my full attention). The items are measured on a 5-point Likert scale, from 1 (not at all) to 5 (very much). Cronbach's α values for the subscales were as follows: Salience = 0.91; Reactibility = 0.83; Monitoring = 0.91 [61].

2.1.12. Italian Ten-Item Personality Inventory (I-TIPI) [88]. Instrument consists of 10 items that investigate the five personality dimensions.

The dimensions include extraversion ($\alpha = 0.97$); agreeableness ($\alpha = 0.82$); conscientiousness ($\alpha = 0.94$); neuroticism ($\alpha = 0.88$); and openness ($\alpha = 0.90$); $\alpha = 0.90$ for the full scale. Items are measured on a 7-point Likert scale, from 1 (completely disagree) to 7 (completely agree).

2.1.13. Multidimensional State Boredom Scale (MSBS) [89]. The multidimensional state boredom scale (MSBS) [89] is comprised of 29 items arranged on a 7-point scale ranging from "1" (strongly disagree) to "7" (strongly disagree). The MSBS is comprised of the following five factors: disengagement (10 items; e.g., "I wish I was doing something more exciting"), high arousal (5 items; e.g., "I feel agitated"), inattention (4 items; " I am easily distracted"), low arousal (5 items; "I feel down"), and time perception (5 items; "Time is passing by slower than usual"). The coefficient alpha values for the MSBS scale were 0.88 for disegagement, 0.84 for high arousal, 0.86 for low arousal, 0.80 for inattention, 0.92 for time perception, and 0.95 for the full scale.

2.2. Sample and Procedure. To determine the optimal sample size for our study, we conducted a thorough power analysis using G*Power [90, 91]. Since our inferential data analysis was thought to be done using the Pearson correlations and hierarchical regression, we calculated the power analysis specifically for both types of analyses. Based on the power analysis for Pearson's correlation, it was determined that a sample size of 462 participants would be necessary to achieve a statistical power of 0.80, assuming a relatively small-typical effect size of 0.13 and a significance level of 0.05. For hierarchical regression, 436 participants would be required to meet the same statistical power of 0.80 while assuming a similar effect size in terms of f^2 (0.05). Considering our study had recruited a total of 551 participants, we deemed our sample size to be sufficient for our research objectives. The participants were recruited between July 2022 and December 2022. The participants were mainly students (40.1%) and permanent employees (26.3%). There is no particular sex bias, with 302 (54.8%) participants being cisgender females and 233 (42.3%) being cisgender males. The average age of the sample is 32 years (SD = 14.15). It is important to note that data collection adhered to Italian data protection regulations (Legislative Decree DL-101/2018) and EU regulations (2016/679). The study involved an anonymous online survey using the Google Forms platform. The Google Forms was set to allow only one response per user and included two attention checks to identify incorrect responses. Inclusion criteria were age 18 years or older and Italian citizenship. Fulfillment of the inclusion criteria was self-certified. The questionnaires were administered to the participants according to the requirements of Italian law on privacy and informed consent (Legislative Decree

DL-101/2018), EU regulation (2016/699), and APA guidelines. Participants were allowed to leave the session at any time, as clearly stated in the preliminary instructions. Seven participants did not give their informed consent and therefore left the session without answering the survey.

3. Results

3.1. Descriptive Analyses. To begin, we generated descriptive statistics for all the variables collected during the data collection process. For the metric variables, as outlined in Table 1 and Table S.1 (in supplementary material), we computed the mean and standard deviation. Furthermore, prior to conducting inferential analyses, we evaluated the skewness and kurtosis of the distributions for these variables to ensure that the assumptions required by the selected statistical tests were satisfied.

3.2. Inferential Analyses. After confirming that there were no violations of the statistical assumptions for Pearson's correlation, we proceeded with the analysis. As depicted in Table 2, age consistently exhibited a negative association with phubbing, with few exceptions. Results for the variable "sex" appeared to be more nuanced. However, in cases where the association was statistically significant, it suggested that women are more inclined toward phubbing. In terms of personality traits, extraversion did not show significant correlations with phubbing measures. On the other hand, agreeableness, conscientiousness, and openness consistently demonstrated a negative association with phubbing. Notably, neuroticism was the sole trait in the five-factor model that exhibited a positive association with phubbing measures.

Regarding the associations between measures of technological addiction and phubbing, we consistently observed a strong and unequivocally positive relationship (Table 3). In all instances, except for gaming addiction, the magnitude of the association surpassed the threshold of 0.30, indicating a significant and noteworthy connection (relatively large according to Gignac and Szodorai [92]). Results of Table 4 consistently indicate a positive association between intrinsic motivation and phubbing behavior, regardless of the measure of phubbing used. Similarly, a moderate to strong positive correlation (Pearson's $r = 0.40$ to 0.60) is observed between phubbing and online vigilance dimensions. The relationship with boredom dimensions varies depending on the phubbing measure, but it remains statistically significant and positive. These findings highlight the consistent and significant associations between intrinsic motivation, online vigilance, boredom, and phubbing behavior.

To account for the variability introduced by the collected measures, we adopted a normalization and aggregation approach to model phubbing. Specifically, we normalized the scores pertaining to phubbing and then computed an overall average. This resulted in a composite variable that served as the dependent variable in our analysis. We subsequently performed a hierarchical regression analysis in three steps to predict the composite phubbing score. Each variable that showed a significant relationship with the phubbing measures in the previous bivariate correlation analysis was included. In the first step, we included sociodemographic variables such as sex and age. We added personality traits based on the five-factor model in the second step. Finally, in the third step, we included variables related to addiction, online vigilance, intrinsic motivation, and boredom (Table 5).

The final model produced accounted for approximately 72% of the variance in the composite phubbing score ($F_{(21;550)} = 65.05$; $p < 0.001$). It is worth noting the variation in R-squared between each step of the hierarchical regression model, which reveals that sociodemographic factors and personality traits only explain a modest portion of the variance (3.4% and 9.1%, respectively). The majority of the explained variance is attributed to variables related to the dependent use of new technologies, as well as two out of the three dimensions of online vigilance, one dimension of boredom, and intrinsic motivation for using new technologies.

Examining the standardized beta coefficients, it becomes apparent that mobile phone addiction exhibits the strongest predictive power in the model. However, the dimensions of online vigilance show a stronger association compared to other variables related to problematic use, such as social media addiction and e-message addiction. Moreover, two notable effects are observed. Firstly, age initially demonstrates a negative association with phubbing in the first two steps. However, in the third step (after including other variables, including addiction-related ones), the relationship reverses the sign. Secondly, gaming addiction, when considered alongside other variables in step 3 (thus excluding the shared variance with other addictions), appears to act as an inhibiting factor for phubbing.

4. Discussion

Smartphones have become an integral part of our daily lives and have infiltrated every area of our lives, from work to friends and family, thanks to their ability to satisfy many human needs [93]. Smartphones have changed the daily routine of millions of people, and they are a fundamental part of our lives as they help us in managing our work, home, friends, and savings and even in creating new social ties. The literature on the issue suggests that smartphone users can indeed benefit from their use, but while the smartphone can foster connection with others, a sense of community, reduce stress, etc., there are also negative aspects that should not be minimized, such as the impact it can have on relationship satisfaction. The literature has previously highlighted how phubbing, one of the factors that can have the greatest impact on relationship satisfaction, can be caused primarily by addiction dynamics (e.g., smartphones, Internet, and social media addiction) [1, 94] and personality traits (e.g., neuroticism and conscientiousness) [48].

The aim of the present work was to enrich the discourse surrounding individual factors, specifically motivational factors, cognitive states, and affective states, by exploring their role in phubbing. It was imperative to move beyond the simplistic characterization of phubbing as a mere behavioral expression of addiction or personality traits.

Table 1: Descriptive statistics of the metric variables collected.

Variables	M (s.d.)	Variables	M (s.d.)
Franchina	6.46 (2.16)	Social media addiction	27.50 (7.94)
Karadag total	27.88 (6.19)	Internet addiction	13.98 (4.62)
Communication disturbance	11.56 (3.58)	Gaming addiction	15.16 (6.98)
Phone obsession	16.32 (3.41)	I.M.	11.12 (4.21)
Grieve and March	19.48 (3.89)	OV: Sal.	7.63 (3.27)
GSP-nomophobia	12.88 (5.57)	OV: React	9.09 (3.44)
GSP-interpersonal conflict	7.09 (3.81)	OV: Mon.	7.74 (3.44)
GSP-self-isolation	6.21 (3.49)	MSBS: Dis.	32.88 (13.29)
GSP-problem acknowledgment	8.49 (3.90)	MSBS: H.A.	15.55 (7.07)
GSP-total	34.68 (13.23)	MSBS: In.	13.19 (5.74)
Mobile phone addiction	40.03 (9.40)	MSBS: L.A.	14.18 (7.09)
e-message addiction	13.48 (3.87)	MSBS: T.P.	13.81 (6.53)

Note: M = mean/average score; s.d. = standard deviation; I.M. = intrinsic motivation; OV = online vigilance; Sal. = salience; React = reactibility; Mon = monitoring; MSBS = multidimensional state boredom scale; Dis. = disengagement; H.A. = high arousal; In. = inattention; L.A. = low arousal; T.P. = time perception.

Table 2: Bivariate correlation of phubbing measures with sociodemographic and personality variables.

Variables	Age	Sex	E	A	C	N	O
Franchina	-0.13**	0.05	0.07	-0.12*	-0.06	0.17***	-0.05
Karadag total	-0.17***	0.07	0.04	-0.14**	-0.12**	0.28***	-0.07
Communication disturbance	-0.11**	0.04	0.02	-0.14**	-0.15***	0.25***	-0.11*
Phone obsession	-0.19***	0.10*	0.04	-0.12**	-0.05	0.25***	-0.01
Grieve and March	-0.19***	0.14**	0.01	-0.09*	-0.04	0.21***	-0.10*
GSP-nomophobia	-0.12**	0.16***	0.05	-0.06	-0.04	0.27***	-0.06
GSP-interpersonal conflict	-0.01	0.03	0.07	-0.14**	-0.12**	0.17***	-0.11*
GSP-self-isolation	-0.08	-0.04	-0.08	-0.10*	-0.15***	0.18***	-0.07
GSP-problem acknowledgment	-0.21***	0.11*	-0.02	-0.10*	-0.15***	0.24***	-0.06
GSP-total	-0.14**	0.09*	0.02	-0.12**	-0.13**	0.28***	-0.10*

Note: E = extraversion; A = agreeableness; C = conscientiousness; N = neuroticism; O = openness; ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

Table 3: Bivariate correlation of phubbing measures with measures of addiction.

Variables	Mobile phone addiction	e-message addiction	Social media addiction	Internet addiction	Gaming addiction
Franchina	0.40***	0.41***	0.39***	0.41***	0.19***
Karadag total	0.67***	0.54***	0.60***	0.64***	0.27***
Communication disturbance	0.54***	0.47***	0.49***	0.55***	0.24***
Phone obsession	0.65***	0.49***	0.58***	0.58***	0.23***
Grieve and March	0.51***	0.50***	0.49***	0.49***	0.20***
GSP-nomophobia	0.65***	0.53***	0.52***	0.59***	0.21***
GSP-interpersonal conflict	0.50***	0.45***	0.37***	0.55***	0.30***
GSP-self-isolation	0.41***	0.41***	0.32***	0.45***	0.34***
GSP-problem acknowledgment	0.60***	0.48***	0.52***	0.55***	0.28***
GSP-total	0.70***	0.60***	0.56***	0.69***	0.35***

Note: ***$p < 0.001$.

TABLE 4: Bivariate correlation of phubbing measures with intrinsic motivation, online vigilance, and boredom.

Variables	I.M.	OV: Sal.	OV: React	OV: Mon.	MSBS: Dis.	MSBS: H.A.	MSBS: In.	MSBS: L.A.	MSBS: T.P.
Franchina	0.38***	0.41***	0.43***	0.45***	0.16***	0.16***	0.18***	0.15***	0.17***
Karadag total	0.40***	0.53***	0.54***	0.51***	0.32***	0.36***	0.39***	0.30***	0.24***
Communication disturbance	0.41***	0.51***	0.47***	0.47***	0.27***	0.28***	0.33***	0.23***	0.20***
Phone obsession	0.31***	0.42***	0.48***	0.42***	0.30***	0.35***	0.35***	0.30***	0.22***
Grieve and March	0.33***	0.44***	0.55***	0.49***	0.23***	0.26***	0.27***	0.19***	0.17***
GSP-nomophobia	0.37***	0.45***	0.54***	0.47***	0.24***	0.30***	0.30***	0.24***	0.18***
GSP-interpersonal conflict	0.32***	0.48***	0.44***	0.46***	0.20***	0.22***	0.23***	0.19***	0.17***
GSP-self-isolation	0.35***	0.47***	0.40***	0.46***	0.27***	0.29***	0.27***	0.29***	0.23***
GSP-problem acknowledgment	0.32***	0.49***	0.49***	0.48***	0.41***	0.37***	0.44***	0.34***	0.28***
GSP-total	0.44***	0.60***	0.60***	0.59***	0.35***	0.38***	0.40***	0.33***	0.27***

Note: I. M. = intrinsic motivation; OV = online vigilance; Sal. = salience; React = reactibility; Mon = monitoring; MSBS = multidimensional state boredom scale; Dis. = disengagement; H.A. = high arousal; In. = inattention; L.A. = low arousal; T.P. = time perception; ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

TABLE 5: Hierarchical regression of phubbing correlated variables on phubbing composite score.

Variables	Step 1	Step 2	Step 3
Age	-0.15***	-0.12***	0.07*
Sex	0.09*	0.06	0.04
Extraversion		0.50	0.01
Agreeableness		-0.65	-0.02
Conscientiousness		-0.07	-0.01
Neuroticism		0.24***	0.09***
Openness		-0.10*	-0.02
Mobile phone addiction			0.30***
e-message addiction			0.13***
Social media addiction			0.09*
Internet addiction			0.18***
Gaming addiction			-0.09**
I.M.			0.09**
OV: Sal.			0.16***
OV: React			0.17***
OV: Mon.			0.01
MSBS: Dis.			-0.08
MSBS: H.A.			0.07
MSBS: In.			0.04
MSBS: L.A.			-0.10*
MSBS: T.P.			0.03
ΔR^2	3.4%***	9.1%***	59.6%***
Final model R^2		72.1%	

Note: I.M. = intrinsic motivation; OV = online vigilance; Sal. = salience; React = reactibility; Mon = monitoring; MSBS = multidimensional state boredom scale; Dis. = disengagement; H.A. = high arousal; In. = inattention; L.A. = low arousal; T.P. = time perception; ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

For this reason, on the one hand, we tested the already known relationships using different measures of phubbing (and thus investigate their instrumental robustness); on the other hand, we explored the relationship of phubbing with the three constructs that theoretical models and recent empirical evidence have highlighted as additional factors for phubbing: intrinsic motivation, boredom, and online vigilance [42, 59, 82, 84, 95]. By incorporating multiple measurement instruments, we aimed to comprehensively explore the phenomenon of phubbing and capture its multidimensional nature. This approach allowed us to synthesize findings from different scales and establish a more robust understanding of the relationships involved.

In summary, the univariate analysis confirmed three hypotheses regarding the relationship between phubbing (H1, H2, and H3). The first hypothesis, H1, states that there is a positive relationship between phubbing and intrinsic motivation, i.e., motivation derived from personal satisfaction and enjoyment in performing an activity. This could mean that people who are more motivated by internal factors may have more phubbing behaviors. This finding is consistent with recent scientific evidence showing that a decrease in intrinsic motivation-based features is associated with lower smartphone use [80, 81]. The second hypothesis, H2, argues that there is a positive correlation between phubbing and online vigilance, i.e., the tendency to constantly monitor other people's online activity. This could mean that people who are more attentive to the online lives of others may also phub more. This result seems to be totally alien to the recent literature showing online vigilance and phubbing as positively associated [59, 82]. The third hypothesis, H3, states that there is a positive correlation between phubbing and boredom. This suggests that people who feel more bored may also tend to do more phubbing than those who are less bored. This result is in line with studies showing an association between state boredom and phubbing [58, 85]. We can, therefore, conclude that despite the confirmation of these hypotheses, further studies should be directed toward a deeper and more thorough understanding of all motivations and behaviors related to phubbing.
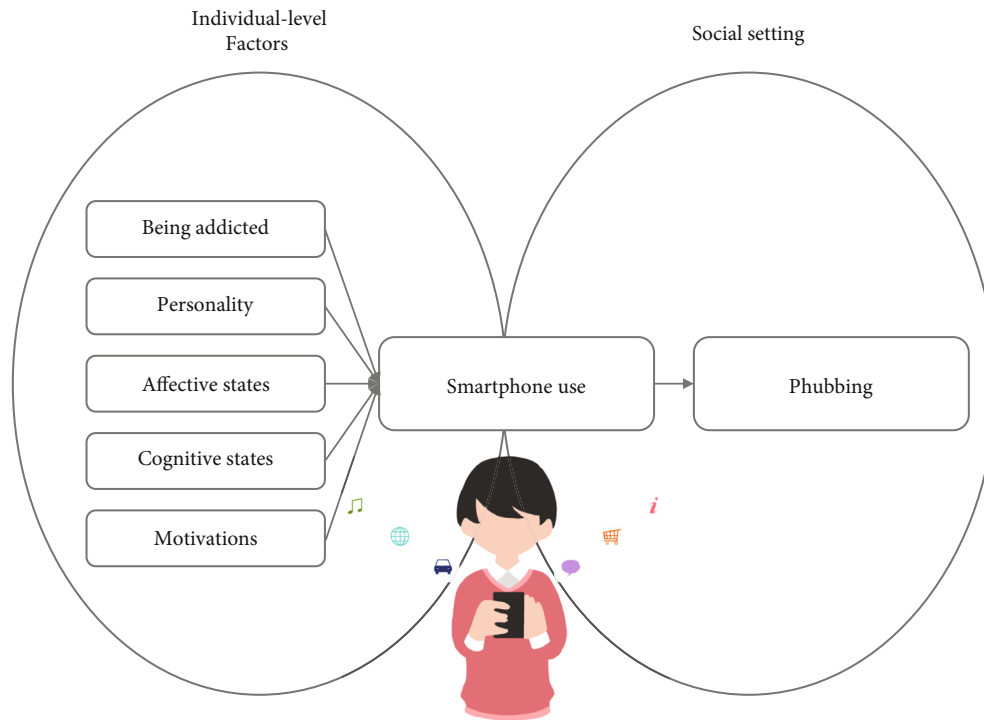
FIGURE 1: Summarizing our study contribution in increasing the understanding of phubbing phenomenon.

In view of developing the best possible predictive model, we performed a hierarchical regression providing evidence to support how online vigilance, intrinsic motivation, and boredom contributed to explaining the variance in phubbing behavior, while also considering variables associated with problematic technology use. These findings suggested that individual-level factors beyond technological addiction play a significant role in shaping individuals' tendency to engage in phubbing (Figure 1).

Overall, our study suggested that individual-level factors contributing to phubbing behavior extend beyond mere smartphone addiction or personality. Our findings revealed that motivations, cognitive factors (i.e., online vigilance), and affective states (i.e., boredom) might increase the likelihood of using the smartphone, and when this happens in a social context, phubbing occurs.

4.1. Limits and Future Prospectives.

However, it is important to acknowledge and carefully consider the limitations of this study. Firstly, it is crucial to recognize that this study adopts an exploratory, cross-sectional design, which inherently restricts our ability to establish causal relationships between the variables [96]. It is important to interpret the findings within this context and avoid making definitive conclusions about causality. Another limitation to consider is the restriction of the participant sample to Italian citizens without tracking their specific locations. This may limit the generalizability of the findings to broader populations or other cultural contexts. Additionally, the use of a nonprobability sampling technique introduces the potential for selection bias, as participants may not be representative of the larger population. It is essential to be cautious when generalizing

the results beyond the sample used in this study. Lastly, despite the authors' efforts to minimize response bias by encouraging participants to reflect on their prior participation in the data collection, we cannot completely rule out the possibility of individuals providing multiple responses in good faith. This potential response bias should be taken into account when interpreting the results and considering their validity.

One further limitation of our study pertains to the deliberate focus on individual factors associated with phubbing, as dictated by the chosen research design. As a result, we regrettably did not explore the social factors in which phubbing manifests itself. This restriction could have potentially provided a more comprehensive understanding of the phenomenon and its contextual influences.

In light of these limitations, it is important to approach the findings with caution and recognize the need for further research to address these concerns and validate the results. Future studies employing longitudinal designs and diverse, representative samples would contribute to a deeper understanding of the relationships examined in this study. Future research should also examine the predictive power of the identified set of predictors for other forms of social exclusion in technological environments, such as snubbing in video conferencing situations. Understanding how these predictors operate in different contexts would provide valuable insights into the broader phenomenon of social exclusion in the digital age. By expanding our knowledge in these areas, researchers can contribute to the development of effective strategies and interventions to mitigate social exclusion and promote inclusive digital environments. This research would not only enhance our understanding of the

phenomenon but also have practical implications for designing more socially supportive and inclusive technological platforms. In this regard, our findings could have interesting implications. For instance, they could inspire the development of smartphone notification systems that aim to reduce the likelihood of eliciting high levels of online vigilance. By understanding the factors that contribute to online vigilance, such as the need for constant social feedback or fear of missing out [61], these notification systems could be designed to promote healthier and more balanced technology use. They could provide personalized notifications that encourage users to take breaks, set boundaries, and engage in offline activities, thereby reducing the tendency to engage in phubbing behaviors. Additionally, our results highlight the importance of addressing boredom and the lack of optimal stimulation in a socially acceptable manner [97].

Recognizing that individuals may turn to phubbing as a means of alleviating boredom or seeking stimulation, interventions and learning pathways could be developed to help individuals manage these experiences effectively. For example, educational programs or digital interventions could be designed to enhance individuals' self-awareness and provide alternative strategies for coping with boredom or seeking stimulation. By promoting healthy coping mechanisms, individuals may be less likely to resort to phubbing behaviors as a means of addressing these underlying needs [98–100].

5. Conclusion

Our work presented new variables that could influence phubbing behavior. Both online vigilance, boredom, and intrinsic motivation showed considerable positive correlations with each scale and subscale used to measure phubbing. Phubbing was again shown to be positively correlated with the addiction variables (mobile phone addiction, texting addiction, social media addiction, Internet addiction, and gaming addiction). With regard to age and gender, younger persons and women appeared to be more prone to phubbing for each phubbing scale used, consistent with the literature. In addition, our work has highlighted the correlations of phubbing, measured with several scales, with the various components of the Big Five (positive correlations, mainly with neuroticism, and negative but not very considerable with the other personality traits).

Data Availability

The data presented in this study are available on request from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Supplementary Materials

Table S.1: descriptive statistics of personality measures. (Supplementary Materials)

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