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Research Article

Insecure Attachment Styles and Phubbing: The Mediating Role of Problematic Smartphone Use

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Lately, increasing concern has focused on the incessant and intrusive use of smartphones across a wide range of interpersonal and relational contexts. Of concern is that many people appear to snub someone during face-to-face interactions by focusing more on their smartphone than on their relational partner, namely, phubbing. Individuals with insecure attachment styles may phub their intimate others more often. However, such relationships have not been examined. This study used a cross-sectional design to examine key relationships between insecure attachment styles on phubbing. An online survey was conducted to examine the relationships between the variables of this study ($N = 444$, 72% female: mean age 20). The analyses revealed both anxious-preoccupied and dismissive-avoidant attachment styles to be positively associated with phubbing. Moreover, both insecure attachment styles indirectly predicted phubbing through problematic smartphone use (PSU). Insecure attachment styles appear to impact how often people phub others within intimate relationships, and further, PSU may function as a mechanism linking these insecure attachment styles with phubbing.

1. Introduction

Smartphones have become prevalent in our daily lives. Today, there are more than 7.2 billion smartphones in use [1], and almost every American adult (85%) owns a smartphone [2]. For many, smartphones are becoming central to maintaining and reinforcing social relationships [3, 4]; however, they may also serve to separate people [5], causing relational strife when individuals focus more attention on their smartphones than on those with whom they are having direct, face-to-face interactions. The potential for discord is in large part of the result of a growing incidence of phone snubbing referred to as "phubbing," a portmanteau of "phone" and "snubbing".

The term was first introduced in Australia's 2012 Macquarie Dictionary [6], defined as the act of snubbing or ignoring someone in the middle of face-to-face interactions by focusing more on one's mobile phone. That is, people are physically together but do not show full attention to each other due to the use of smartphones. Nowadays, phubbing behavior may occur in almost any social, interpersonal, or relational setting. Chotpitayasunondh and Douglas [7] found roughly 70% of their study participants reported phubbing others at least once a day, and more than 78% reported themselves being phubbed at least once a day.

People may often intentionally use their smartphones to avoid unwilling or awkward situations, and for many, phubbing may become a habitual and relatively unconscious behavior. Indeed, it is estimated that 95% of Americans feel it is inappropriate to use their smartphones in real-life social interactions, such as during social meetings and mealtimes, yet roughly 90% of smartphone users surveyed report recently doing so anyway [8]. There is also the likelihood that many individuals do not realize how often they phub others and may be unaware of the detrimental effects on themselves and their relationships. When individuals become chronically preoccupied and distracted from their face-to-face exchanges, they may begin to lose many of the social skills necessary for successful interaction when in the physical presence of others [9].

In terms of negative or problematic aspects of smartphone use in interpersonal relationships, phubbing can be

explained by the other new term "technoference" by McDaniel and Coyne [10], defined as the intrusion of technology while having face-to-face interactions. Phubbing and technoference can be conceptually similar in that both suggest technology use or disturbance by technology when individuals engage in face-to-face interactions [11]. Both concepts also point out that such behavior or interference can be considered as a potential risk factor for the individual and their partners such as spurring conflicts, relationship dissatisfaction, and further relationship dissolution.

As the phubbing phenomenon has been observed easily in our interpersonal interactions and relationships, some scholars have examined various factors relevant to the predictors and consequences of phubbing. Of various predictors that have been demonstrated in previous studies, problematic smartphone use (hereafter PSU) has been found as the most influential factor leading to phubbing [6], defined as a failure to control the use, misuse of, or continuous use of a smartphone, despite significant negative outcomes [6, 7, 12]. With respect to other individual-level factors, personality traits such as neuroticism, disagreeableness, and conscientiousness are significantly associated with phubbing [12–14]. Phubbing has also been linked to psychosocial problems such that individuals with high levels of fear of missing out, social anxiety, and depression are likely to phub others more frequently [12, 14, 15].

Concerning its consequences, phubbing has been found to cause jealousy, conflict, depression, lower communication quality, diminished relational fulfillment, and decreased life satisfaction, particularly in romantic relationships [10, 16–18]. In the professional workplace, when supervisors are distracted by their smartphones while talking with employees, they are less likely to be trusted by their subordinates, who in turn are more likely to be disrupted in their job performance [18, 19]. Within parent-child relationships, children tend to suffer negative psychological consequences such as higher anxiety, depression, loneliness, lower relationship satisfaction, and more academic burnout when their parents engage in excessive phubbing [20–22].

Although scholars have examined several determinants of phubbing behavior, the provided research in this area is still in its early stages. Furthermore, as the kinds of PSU, technoference, and phubbing behaviors continue to evolve, newly developing concerns have emerged. Among potential predictors, previous studies have emphasized the role of attachment experiences developed in one's early childhood with the primary caregiver(s) in understanding problematic behaviors to use technologies (e.g., smartphone, Internet, and social media) [23–26]. Indeed, as a part of McDaniel and Drouin's [11] study, they investigated the association between anxious attachment style and technoference and demonstrated that attachment anxiety was a significant predictor of technoference in romantic relationships. In addition, this association has been demonstrated within the mother-child relationship such as a significant and negative correlation between attachment security rates and level of parental technoference [27]. However, the relevant relationships, particularly within the context of phubbing behavior, have received less scrutiny.

Thus, drawing on Bowlby's [28] attachment theory, the research presented here seeks to fill this gap in the literature by investigating how PSU may mediate the effects of insecure attachment styles on phubbing behavior. To summarize, the present study examines whether insecure attachment styles—anxious-preoccupied and dismissive-avoidant attachment styles—have significant associations with problematic smartphone use and phubbing behavior, respectively. With a hypothesized model developed based on the proposed hypotheses of this study, we further test the mediating role of PSU on the relationship between each insecure attachment pattern and phubbing behavior.

2. Theoretical Background

Attachment theory (Bowlby [28]) has been widely used to understand social and relational development, personality, and behavior within close relationships (Crowell et al., 2008). The theory focuses on relatedness, bonding, and quality of relationships with significant and supportive others [28, 29]. Bowlby [28] conceptualizes attachment as stemming from the instinctual seeking of closeness to one's caregivers. In this view, infants develop a lasting psychological connection or attachment with their primary caregivers (i.e., attachment figure) through constant interaction and physical contact, and when separated, they tend to experience intense anxiety and distress. Moreover, attachments formed in early relationships are important in that they affect one's lifespan and, more specifically, the development and maintenance of interpersonal relationship functioning during adulthood [30–33].

Four different attachment styles have been identified as an internal working model (IWM) of attachment that individuals develop within their close relations: secure, anxious (i.e., preoccupied), avoidant (i.e., dismissive), and disorganized (i.e., fearful-avoidant) [29, 30]. More specifically, interactions with constant and stable responses from attachment figures early in life tend to promote a secure attachment pattern. As a result, securely attached individuals generally enjoy greater psychological stability; feel more comfortable displaying their interest, affection, and intimacy toward others; and experience less problematic interpersonal concerns across their interpersonal relationships. On the other hand, when attachment figures are not reliably available and/or when they are less supportive and responsive early in life, a sense of attachment insecurity is likely to develop. Consequently, insecurely attached people tend to engage in more negative and/or problematic behaviors within their relationships, often characterized by ambivalence, avoidance, dismissiveness, and dissatisfaction [34].

Attachment insecurity is characterized by two fundamental dimensions, anxiety and avoidance, causing insecure individuals to feel and perceive their relationships more problematically [29, 30, 35]. In particular, attachment anxiety tends to generate a greater desire for being loved and supported by attachment figures, along with fear of abandonment and rejection. Thus, within their interactions, anxiously attached individuals tend to be hypersensitive to others' reactions, encouraging them to cling to their

relationships [33]. On the other hand, individuals with attachment avoidance tend to be more self-reliant while seeking greater independence and avoiding intimacy and emotional attachment to others. For avoidant individuals, social interactions and relationships seem less important, such that depending on others or having others depend on them becomes undesirable [33].

Moreover, people with different attachment styles show different communication patterns in their close relationships, especially in the context of face-to-face interaction. For example, compared with securely attached individuals who use more active engagement and more assertive and supportive communication styles with their significant others, those with attachment anxiety (termed "avoidants") tend to be less assertive but more psychologically aggressive in their communication styles [36]. They also tend to show deficits in interpersonal sensitivity, communication competence, and conversational regulation, while engaging in less self-disclosure [37]; Mikulincer & Nachson, 1995). As such, anxious avoidants tend to have greater difficulty engaging in face-to-face interpersonal interaction; hence, they may feel more comfortable with the more indirect medium of a smartphone, inclining them to avoid greater intimacy by engaging in PSU behaviors in general and phubbing in particular. Accordingly, this study examines how PSU may affect the relationship between anxious and avoidant attachment styles and phubbing.

2.1. Attachment Style and Problematic Smartphone Use.
Beyond interpersonal relationships, attachment theory has been applied to examine the nature of significant emotional attachments to nonhuman objects. Hazan and Shaver [38] propose that people can develop emotional attachments toward inanimate objects, which in turn may provide them with psychological support and stress relief. As technological—and particularly digital—devices have become more common in their lives, many individuals have begun to develop emotional attachments, especially toward their smartphones, regarding them as an integral aspect of their identity [39], and feeling anxious and uncomfortable when separated from them [26, 40]. Thus, it follows that, for many people, seeking proximity to their smartphones (having them closely at hand) and engaging with them excessively may provide a comforting buffer against undesired interpersonal intimacy, while offering a greater sense of security and stability.

Unfortunately, as people focus more on their smartphones and become more dependent upon them, psychological difficulties are more likely to occur leading to PSU [24, 25, 41]. Previous research has applied attachment theory to explain the development of PSU; for example, Flores [42] noted how anxious and avoidant attachment styles may cause problematic technology-related behaviors, and others have shown how a smartphone connection to the Internet can comfort people who have had problematic real-world attachment experiences [43, 44]. For those with anxious and avoidant attachment styles, the virtual world can offer a way to satisfy security needs while inducing less negative emotion and anxiety Hart et al., [45], but at the cost of

increased dependency on the virtual world, and greater PSU. Recent studies have also confirmed the relationship between insecure attachment styles and PSU, finding that people with anxious and avoidant attachment show more problematic behaviors in their use of smartphones as compared to securely attached individuals [46–48]. This evidence suggests that insecure attachment styles may be a significant predictor of PSU; thus, the following hypothesis is posited.

Hypothesis 1. Both (a) anxious-preoccupied and (b) avoidant-dismissive attachment styles are positively associated with PSU.

2.2. Problematic Smartphone Use and Phubbing.
Regarding the conceptualization of PSU, there has been some controversy as to whether excessive and compulsive smartphone use can be understood as a technological dependency or behavioral "addiction" and, further, which terminology may best describe the phenomenon. Indeed, the extant literature has used a range of terms, such as mobile phone/smartphone dependency [49], smartphone addition [7, 12, 50], excessive or compulsive smartphone use [51, 52], and PSU [53, 54]. As Panova and Carbonell [55] pointed out, "problematic" is an umbrella term embracing all the negative symptoms and consequences of smartphone use; thus, this study considers PSU to include all the above variations.

To understand phubbing, studies have examined numerous possible factors associated with such behavior, among which PSU appears to be the most reliably significant predictor of elevated phubbing. For example, primarily focusing on gaming, social media, Internet, and smartphone use, Karadağ et al. [6] examined which problematic behaviors associated with these specific online activities might be most relevant to phubbing. Their findings indicated all four to be positively related to phubbing, with PSU showing the strongest correlation. Likewise, Chotpitayasunondh and Douglas [7] found PSU to be a significant predictor of increased phubbing behavior. It seems reasonable then to assume that as people engage in more PSU, they are more likely to phub others as a direct consequence. Thus, the following hypothesis is posited.

Hypothesis 2. PSU is positively associated with phubbing.

2.3. Insecure Attachment Style and Phubbing.
Given their uncertainty about the availability, reliability, and responsiveness of attachment figures, individuals prone to insecure attachment may gain a sense of security by using alternative, compensatory strategies to fulfill their attachment needs [38]. Such attachment targets can be other human beings, pets, or material objects (e.g., dolls, games, and hobbies) [56]. As smartphones have become a prevalent and necessary device nowadays, many people develop emotional attachments toward them and feel anxiety and stress when separated [39]. This tendency has been found to be especially strong among people with higher levels of attachment anxiety [26], for whom smartphones function to fulfill attachment needs, acting as compensatory attachment

targets capable of securing and maintaining ongoing social connections. Those with attachment anxiety may show a particularly strong emotional attachment to their smartphones, seek closer proximity to them, feel more disturbed when separated, and be more prone to phubbing others with greater frequency.

This relationship between attachment anxiety and phubbing has been empirically demonstrated. For instance, Roberts and David [17] demonstrated that partner phubbing was significantly associated with attachment anxiety and thus increased conflict and reduced relationship satisfaction. In short, for anxiously attached individuals, partner phubbing in romantic relationships is more prevalent, resulting in relatively high levels of relational conflict. Recently, Roberts and David [57] explored how attachment anxiety moderated the link between relationship duration and perceived partner phubbing, finding attachment anxiety to be a significant predictor of perceived partner phubbing. They further demonstrated the mediating role of attachment style, such that less enduring relationships were related to higher attachment anxiety, resulting in increased perceptions of partner phubbing. Additionally, Shams et al. [58] explored the direct influences of attachment styles on phubbing and found securely attached people to be less likely to engage in the use of smartphones during face-to-face interactions, whereas those with a preoccupied attachment style—thus more attachment anxiety—tended to phub others more frequently and thus place greater strain on their own and their partner's relationship satisfaction.

Although anxious attachment has received much attention in the context of phubbing (e.g., [57, 59], avoidant attachment has not. However, because attachment avoidant individuals tend to devalue closeness, they are more likely to use "deactivating" strategies to help maximize independence and distance themselves from others [33]. Thus, to reduce intimacy and avoid uncomfortable face-to-face interactions, they may be relatively more inclined to phub others, and at least one study [58] has indicated that avoidant (or dismissive) attachment directly increases phubbing relative to secure attachment.

As mentioned, individuals who show higher levels of avoidance and attachment anxiety experience a range of difficulties in their interpersonal interactions with others, including interpersonal skill deficits, decreased communication competence, lower willingness to self-disclosure [37, 60], and greater relational communication difficulty [61]. In this regard, when rejection anxiety is experienced, or when relational interaction negatively violate expectations, smartphones may provide a particularly effective coping mechanism [42] leading to more obsessive smartphone involvement [62] and phubbing. In light of these findings, a direct association between insecure attachment and phubbing is hypothesized.

Hypothesis 3. Both (a) anxious-preoccupied and (b) avoidant-dismissive attachment styles are positively associated with phubbing.

2.4. The Mediating Role of Problematic Smartphone Use. Although studies have separately investigated the roles of PSU and insecure attachment styles in phubbing, the above reasoning suggests that PSU may mediate the effect of insecure attachment and phubbing. In line with this reasoning, recent research has shown how PSU can mediate the association between individual differences such as personality traits (e.g., extraversion) and psychological factors (e.g., anxiety and depression) (Hong et al., 2012). For instance, Kita and Luria [63] found PSU to be a significant mediator in the relationship between certain big 5 personality traits and smartphone use while driving. In light of these findings, it seems likely that PSU may also mediate the relationship between insecure attachment styles and phubbing; hence, the following hypothesized model is posited (see Figure 1).

Hypothesis 4. PSU mediates the relationship between both (a) anxious-preoccupied, and (b) avoidant-dismissive attachment styles and phubbing.

3. Method

3.1. Participants and Procedure. Participants over the age of 18 who possessed smartphones were recruited from a department research subject pool at a large southwestern university and given course credit for completing a Qualtrics survey. University students were considered an appropriate sample and specifically targeted for this study because it has been found that 98% of young adults aged 18-29 are likely to phub others to some extent while engaging in social interaction [8]. In total, 485 university students participated, of whom 41 cases were removed for failing to complete the survey. The final sample ($N = 444$) consisted of 318 females (71.8%), 124 males (27.9%), and 1 nonbinary (.2%), and their ages ranged between 18 and 37 years old ($M = 19.64$, $SD = 1.54$). Detailed demographic information is provided in Table 1. Following informed consent, participants were directed to an online questionnaire administered by Qualtrics, wherein they were asked to report on demographic information, smartphone usage patterns, phubbing, PSU, and attachment style. The survey took approximately 20 minutes to complete, and participants received course credits for their participation.

3.2. Measures

3.2.1. Smartphone Use. Participants were asked to indicate how often they use their smartphone on a daily basis ("Approximately how much time a day do you spend on your smartphone?) with the following five options: "less than 10 minutes," "11-60 minutes," "1-2 hours," "2-3 hours," "3-4 hours," and "more than 5 hours."

3.2.2. Insecure Attachment Style. Participants' insecure attachment patterns were measured using the Experiences in Close Relationships-Revised (ECR-R) scale developed by Fraley et al. [64]. To assess their attachment style within intimate—but not necessarily romantic—relationships, participants were asked to think about their "most close and intimate friends or partners." The scale contains
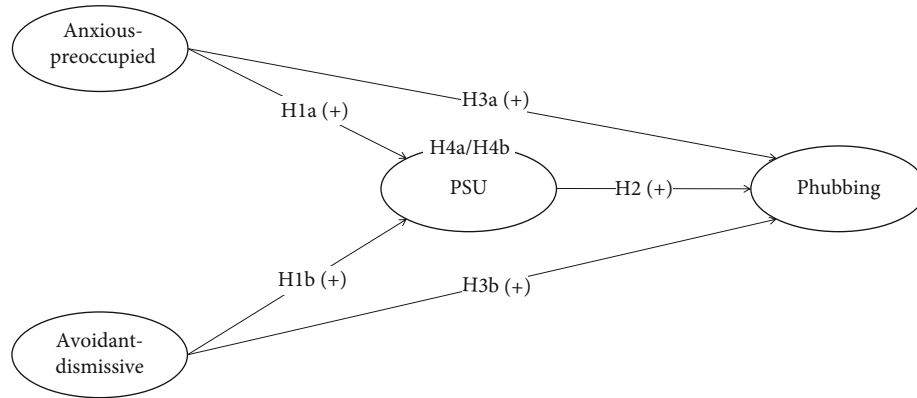
FIGURE 1: Hypothesized model.

TABLE 1: Demographic information of the participants ($N = 444$).

Variables	Frequency	Percentage (%)
Race/ethnicity		
Caucasian	332	74.8%
Asian	37	8.3%
African America	23	5.2%
Hispanic	29	6.5%
Native American	14	3.2%
Bi-/multiracial ethnicity	9	2.0%
College year		
First-year student	193	43.5%
Second-year student	126	28.4%
Junior	85	19.1%
Senior	40	9.0%
Time spent on a smartphone per day		
Less than 10 minutes	0	.0%
11-60 minutes	10	2.3%
1-2 hours	81	18.2%
2-3 hours	102	22.9%
3-4 hours	118	26.6%
More than 5 hours	133	30.0%

32 items with two dimensions: anxiety, assessing an anxious-preoccupied style showing fear of rejection and abandonment (e.g., "I often worry that my partner will not want to stay with me"), and avoidance, assessing an avoidant-dismissive style showing discomfort with intimacy while seeking independence (e.g., "I find it difficult to allow myself to depend on romantic partners"). Each dimension includes 16 items rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Reverse items were recoded, and mean scores were computed, with higher scores in each dimension indicating greater levels of preoccupied anxiety or dismissive avoidance of closeness in interpersonal relationships (anxious attachment style: $M = 3.76$, SD = 1.51, $\alpha = .89$; avoidant attachment style: $M = 3.18$, SD = 1.33, $\alpha = .80$).

3.2.3. Problematic Smartphone Use. Participants' levels of PSU were assessed with Kwon et al.'s [65] Smartphone Addiction Scale-Short Version (SAS-SV), consisting of 10 self-report items (e.g., "Missing planned work due to smartphone use" and "Using my smartphone longer than I had intended") measured on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), with higher scores indicating more problematic smartphone use ($M = 3.24$, SD = 1.38, $\alpha = .74$).

3.2.4. Phubbing. Phubbing behavior was measured using Karadağ et al.'s [6] phubbing scale, which includes 10 items comprising 2 factors: (a) communication disturbance (5 items, e.g., "I'm busy with my mobile phone when I'm with friends") and (b) phone obsession (5 items, e.g., "My phone is always within my reach") rated on a five-point Likert scale ranging from 1 (never) to 5 (always). Because items in the phone obsession factor overlapped with items assessing PSU, this study focused primarily on the 5-item communication disturbance factor, for which higher scores indicated more frequent phubbing in the presence of others ($M = 2.51$, SD = .74, $\alpha = .81$).

3.3. Covariates. Previous studies have demonstrated significant effects for gender [47] and time spent using smartphones on differences in PSU [66] and phubbing [7]; thus, gender and duration of smartphone use were measured by asking "What is your gender" and "Approximately how much time a day do you spend on your smartphone?" for use as covariates.

3.4. Data Analysis. Data were analyzed using SPSS 26.0 and AMOS 24.0. Descriptive was examined and Pearson's correlation coefficients were computed to explore the associations between all variables. Before testing the hypothesized model and hypotheses (see Figure 1), the reliability and validity of the measurements were assessed according to Fornell and Lacker's [67] criteria, that is, (1) factor loading > .50, (2) Cronbach's alpha (α) and composite reliability (CR) > .70, and (3) the average variance extracted (AVE, testing convergent validity) > .50. Items not meeting these criteria were removed from further analyses.

To examine whether the data adequately represent the hypothesized model, a confirmatory factor analysis (CFA) was conducted with the following standards [68, 69]: (1) nonsignificant χ^2, or $\chi^2/df \leq 3$, (2) comparative fit index (CFI) ≥ .90, (3) root mean square error of approximation (RMSEA) < .08, and (4) the standardized root mean residual (SRMR) < .08. Structural equation modeling (SEM) with mediation analysis was used to test the hypotheses. As Preacher and Hayes [70] suggest, all estimates were standardized, and maximum likelihood (ML) examination was used with bootstrapping (2000 bootstrap samples) and 95% bias-corrected confidence intervals (CI).

As indicated in Table 2, the reliability and validity of the measurements were tested, and factor loadings ranged from .61 (for PSU) to .88 (for anxious-preoccupied style), confirming individual item reliability. Values of Cronbach's alpha ranged from .74 to .89, indicating good internal consistency across all measurements. Convergent validity was indicated by all values of AVE and CR being above .5 and .7, respectively.

3.5. Common Method Bias. Because this study used self-reported and cross-sectional methods and included multipoint Likert-type scales, Harman's single factor test for common method bias (CMB) was conducted, and Podsakoff et al.'s [71] criterion requiring total variance extracted by the one factor not exceeding 50% was applied. The obtained result indicated that the total variance extracted was 35.97%; therefore, CMB did not appear to be a problem.

4. Results

4.1. Preliminary Analyses. Table 3 shows descriptive statistics and zero-order correlations among the variables. As expected, all four variables of interest were significantly correlated with each other. Of note, PSU was positively correlated with anxious-preoccupied ($r = .36$, $p < .01$) and avoidant-dismissive styles ($r = .21$, $p < .01$). Both insecure attachment styles—anxious-preoccupation ($r = .43$, $p < .01$) and avoidant-dismissive styles ($r = .44$, $p < .01$)—were positively correlated with phubbing behavior. Further, PSU and phubbing were positively correlated with each other ($r = .48$, $p < .01$). The variance inflation factor (VIF) was smaller than 5 [72]: anxious-preoccupied style (1.26), avoidant-dismissive style (1.15), and PSU (1.16), and there were no multicollinearity problems.

4.2. Hypothesized Model and Hypotheses. Finding the validity and reliability of measurements satisfactory, a CFA was conducted to test the hypothesized model, examining the relationships between both insecure attachment patterns (i.e., anxious-preoccupied and avoidant-dismissive styles), PSU, and phubbing. The hypothesized model had an excellent fit ($\chi^2/df = 1.75$, CFI = .97, RMSEA = .04, and SRMR = .04), confirming how anxious-preoccupied and avoidant-dismissive attachment styles both appear to be directly and indirectly related to PSU and phubbing. The percentage of variance directly explained by anxious-preoccupied and avoidant-dismissive attachment styles on PSU was 26.3%,

TABLE 2: Results of confirmatory factor analysis.

	Items	Factor loading	CR	AVE
	AS1	.854		
	AS2	.876		
Anxious-preoccupied	AS4	.782	.890	.619
	AS5	.745		
	AS17	.658		
	AS19	.732		
Avoidant-dismissive	AS21	.650	.798	.501
	AS23	.743		
	AS25	.695		
	PSU5	.610		
PSU	PSU6	.808	.752	.506
	PSU8	.702		
	PHUB1	.731		
Phubbing	PHUB2	.762	.816	.528
	PHUB3	.785		
	PHUB10	.617		

TABLE 3: Results of descriptive statistics and zero-order correlations ($N = 444$).

		1	2	3	4
1	Anxious-preoccupied	—			
2	Avoidant-dismissive	.35**	—		
3	PSU	.36**	.21**	—	
4	Phubbing	.43**	.44**	.48**	—
Skewness		.11	.35	.25	.53
Kurtosis		-.75	-.43	-.62	.11

Note. **$p < .01$.

and the percentage both directly explained by the two attachment styles and indirectly explained through PSU on phubbing was 53.6% (see Figure 2).

We predicted that both anxious-preoccupied and avoidant-dismissive attachment styles would be positively associated with PSU. As the model in Figure 2 shows, anxious-preoccupied attachment style was positively associated with PSU ($b = .31$, $p < .01$), as was avoidant-dismissive attachment style, although to a lesser extent ($b = .14$, $p < .05$). These results show the higher a participant's score for either of the insecure attachment styles, the higher the corresponding level of PSU predicted; thus, Hypothesis 1 (a and b) found support. This study also predicted that PSU would be positively associated with phubbing, and this expectation was confirmed ($b = .45$, $p < .01$), indicating that participants with higher levels of PSU showed greater phubbing behavior during their face-to-face interactions with others; thus, Hypothesis 2 also found support. Hypothesis 3 predicted that both insecure attachment styles would both be positively associated with phubbing. Again, the result of this study showed anxious-preoccupied ($b = .18$, $p < .01$) and avoidant-dismissive ($b = .35$, $p < .01$) attachment styles were
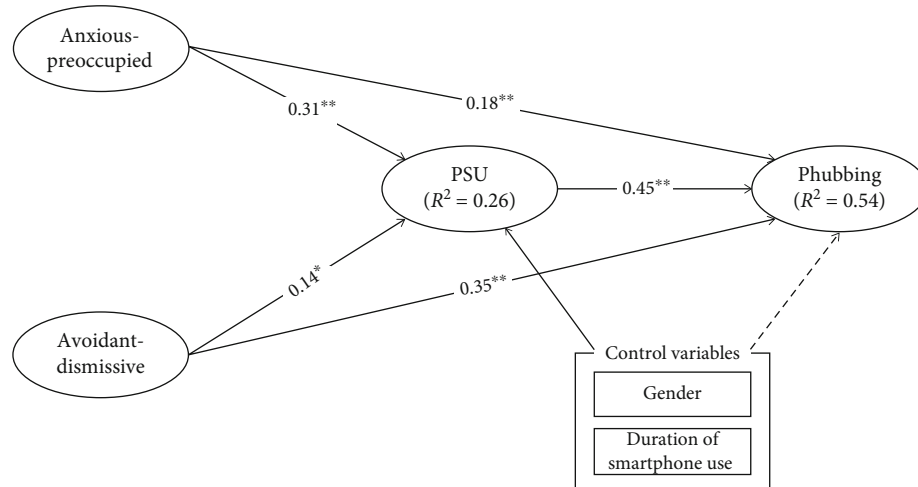
FIGURE 2: Results for the adjusted model (with modified scales). *Notes.* Standardized estimates are indicated in the figure. Bold lines indicate significant relationships, and the dashed line indicates a nonsignificant association. Circles represent latent variables. Covariates between anxious-preoccupied and avoidant-dismissive attachment styles and error terms were included in the mode but are not presented for simplicity. $^*p < .05$ and $^{**}p < .01$.

positively and significantly associated with phubbing; thus, Hypothesis 3 (a and b) was supported.

Finally, we addressed the mediating role of PSU in the relationship between attachment style and phubbing. The indirect effect of (a) anxious-preoccupied attachment on phubbing mediated by PSU was significant ($b = .14$, $p < .01$, 95% CI [.08, .22]), as was the indirect effect of (b) avoidant-dismissive attachment on phubbing ($b = .06$, $p < .01$, 95% CI [.01, .13]). In addition, our findings showed that the total effect of insecure attachment styles on phubbing was positive and significant, indicating that PSU was partially mediated the relationships between anxious-preoccupied style and phubbing ($b = .32$, $p < .01$, 95% CI [.21, .42]) and between avoidant-dismissive and phubbing ($b = .41$, $p < .01$, 95% CI [.31, .52]), respectively. Thus, Hypothesis 4 (a and b) also found support.

5. Discussion

5.1. Key Findings. In line with prior research applying attachment theory to examine the nature of phubbing, the results reported here provide empirical evidence for how insecure attachment styles are associated with PSU and phubbing within intimate interpersonal relationships. More specifically, these findings show how anxious-preoccupied and avoidant-dismissive attachment styles can be directly and indirectly related to phubbing behavior, as mediated through PSU. These results have several implications for relational communication, as discussed below.

First, consistent with previous studies demonstrating that individuals with insecure attachment styles tend to engage in greater PSU [46–48], the present study replicates those findings showing both insecure attachment styles to be significant predictors of PSU. This can be explained by the internal working model by Bowlby [28] that attachment insecurity that indicates unhealthy states of mind tends to exacerbate internalizing and externalizing behavioral addic-

tions (e.g., drug, gambling, and drinking) [73, 74]. Of many different behaviors, those with insecure attachment may show high levels of PSU because their psychological and emotional needs have not been satisfied by their close others and thus they attempt to find alternative attachment objects (e.g., smartphone) to compensate for their needs [42]. That is, for those higher in attachment anxiety or avoidance, smartphones can be perceived as attachment targets to satisfy their attachment needs [26]. Therefore, the use of smartphones may provide a sense of security, leading to a high obsession with the device which can become problematic. Another possible explanation of the result is that insecurely attached individuals show greater PSU because they have low self-control in their behaviors [75]. This tendency may lead them to have difficulty disengaging from an ever-present smartphone.

Second, this study replicates the findings of Karadağ et al. [6], and Chotpitayasunondh and Douglas [7], providing further support for the positive relationship between PSU and phubbing. We can explain this significant association by symptoms of PSU such as poor control over smartphone use, psychological dependence on the device, disregard of negative consequences, and/or anxious feeling without a smartphone [76]. Therefore, it makes sense to show more frequent phubbing behavior. That is, individuals with greater PSU may look at their smartphones more frequently and further pay more attention to using their smartphones when engaging in face-to-face conversations because they are easily distracted by external stimuli with losing control.

Third, in support of Shams et al. [58], both dimensions of insecure attachment styles examined in the present study were found to be significantly and positively associated with phubbing. Especially, individuals with attachment anxiety tend to be concerned about rejection by others, and they have a strong need for intimacy with others [33]. These tendencies can explain the findings of this study. Those with

attachment anxiety are likely to phub others more often because they may also keep closeness with others who are not physically together but have interacted through smartphones (e.g., calls, text messages, and social media). However, those with avoidant tendencies in relationships are more independent and avoid closeness with others [33]. In this sense, for them, smartphone use may be one of their strategies to avoid social interactions and keep a distance from others and thus show phubbing behavior more frequently.

5.2. The Mediating Role of Problematic Smartphone Use. The primary contribution of the present study is in demonstrating the mediating role of PSU through the indirect paths between insecure attachment styles, PSU, and phubbing. Interestingly, the total indirect effect of these two predictors on phubbing was stronger than either of their direct effects alone. That is to say, avoidant-dismissive and especially anxious-preoccupied attachment styles were shown to have a positive and significant indirect effect on phubbing behavior through PSU. When examining the pathways—direct and indirect—between the two insecure attachment styles and phubbing, there appears to be an asymmetry wherein the anxious-preoccupied style shows stronger effects through its indirect path to phubbing via PSU, than through its direct path—suggesting that the anxious-preoccupied attachment style has its greatest influence through PSU. Conversely, the avoidant-dismissive attachment style seems to have its strongest effect through its direct path to phubbing rather than its indirect pathway through PSU—suggesting that the avoidant-dismissive attachment style exerts its greatest influence on phubbing more directly as a means of avoiding opportunities for intimacy via face-to-face conversation. These differences are clearly illustrated in Figure 2.

In conclusion, the findings in support of Hypothesis 4 tie the three separate, positive, replicated relationships together (Hypotheses 1–3: i.e., between insecure attachment style and PSU; PSU and phubbing; and insecure attachment style and phubbing). Previously, little was known about the intercession of PSU in the relationships between insecure attachments and phubbing. In this respect, the present study extends previous research by demonstrating that the primary influence of an anxious-preoccupied attachment style on phubbing is mediated by PSU during face-to-face relational interaction. This is in contrast to the more direct effect of an avoidant-dismissive attachment style on phubbing.

In sum, whereas the avoidant-dismissive attachment style appears to be significantly associated with phubbing, for the anxious-preoccupied attachment style, the mediating role of PSU appears to be particularly strong.

5.3. Limitations and Future Directions. Several limitations within this study should be acknowledged. First, participants were predominately white female college students. Confidence that these findings are fully generalizable will require further research examining different populations to confirm whether similar results obtain across different age groups and ethnicities, as well as within different contexts and locations. Future studies should seek to sample more demo-

graphically diverse populations. Nevertheless, given how the sample of predominantly college-aged females examined in this study is prone to frequent smartphone use, the findings reported here provide some theoretically valid and useful recommendations for future consideration.

A second limitation concerns how the present study used a correlational, cross-section method of observation making it impossible to examine causal relationships within the proposed model. This is a common issue when using such a design; however, future research could avoid this limitation by using a longitudinal method, making observations at multiple points in time to help identify the causal relationships among insecure attachment styles, PSU, and phubbing behaviors.

Third, all measures within this study were self-reported, making it difficult to ascertain the precision of its assessments. Future approaches might use more direct observational methods to replicate these findings. Finally, this study focused solely on the two relevant insecure attachment styles influencing PSU and phubbing; thus, other variables associated with a secure attachment style were not examined. Likewise, other possible causes, determinants, and mediators of phubbing behavior were not examined. It would be worthwhile for future research to extend this model by exploring other relevant factors such as fear of missing out, self-control, self-esteem, and various personality and sociopsychological variables associated with attachment formation in human development.

Despite these limitations, the present study makes theoretical contributions to the literature by improving our understanding of the psychological mechanisms motivating people to phub others during their relational interactions. To be specific, these findings emphasize the importance of the mediating role of problematic smartphone use on the relationship between insecure attachment styles and phubbing.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflict of interests.

Acknowledgments

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