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## SOCIAL PSYCHOLOGY | RESEARCH ARTICLE

# Investigating the mediating effects of phubbing on self-presentation and FoMO within the context of excessive Instagram use

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**Abstract:** Social media platforms can deliver benefits for their users. They help people to stay in touch with each other and to have control over how they present themselves to their contacts on these platforms. In some cases, these benefits lead to excessive usage, which can diminish individual wellbeing, and compromise relationships with significant others. We surveyed 275 respondents to investigate the influence of and interactions between (1) *self-presentation* (specifically false self-presentation), (2) *FoMO* (fear of missing out), and (3) *phubbing* (ignoring someone by diverting attention to a mobile phone) in the context of excessive Instagram use. We found that *phubbing* mediates the relationship between *false self-presentation* and excessive Instagram use but did not find evidence that phubbing mediates the relationship between FoMO and excessive Instagram use. We also found a positive relationship between excessive Instagram use and educational level. We conclude with a discussion on the theoretical and practical implications of the results.

**Subjects:** Multidisciplinary Psychology; Quantitative Methods; Factor Analysis, SEM, Multilevel & Longitudinal Modeling; Psychology of New Media; Self & Social Identity; Behaviour

**Keywords:** Instagram; phubbing; FoMO; self-presentation; problematic use; excessive use; PLS-SEM

### 1. Introduction

It has become common for individuals to have one or more social media accounts. Such accounts are used not only to stay in touch with friends and family, but also to consume and produce content—a pleasurable pastime for millions of individuals (Chen et al., 2021). However, there is the potential for usage to become excessive, consuming increasing amounts of time. This is referred to as “excessive Instagram use.” This is defined as either the use of the platform for prolonged (i.e., extended) periods or very frequent use for shorter periods (e.g., 20 times per day for 15 minutes).

### ABOUT THE AUTHORS

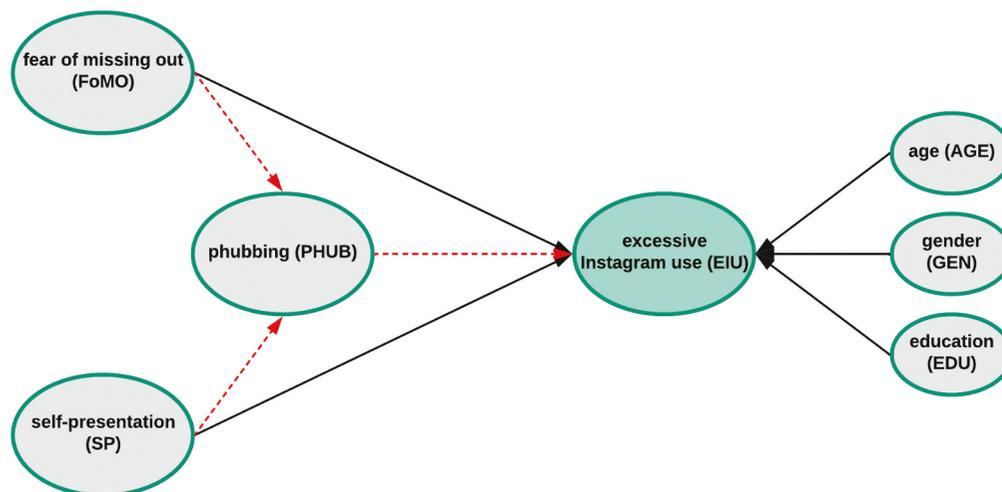
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Figure 1. Proposed research model.



Such usage can lead to negative outcomes such as depression, anxiety, insomnia, anorexia nervosa or self-harm (Chancellor et al., 2016; D’Souza & Negahban, 2019).

We investigated the influence of three different factors on such excessive Instagram usage. The first was false self-presentation, which refers to how individuals behave or present themselves to others so as to create a certain impression (Michikyan et al., 2015). The second influence was FoMO, which is defined as individuals’ concern that they are missing out on chances of interpersonal contact with their peers (Roberts & David, 2020). The third factor was phubbing, which is the impolite (and antisocial) use of a mobile phone during an in-person conversation (“**tele**phone” and “**snub**bing”; Karadağ et al., 2015). This is considered undesirable and negative (Chotpitayasunondh & Douglas, 2018; Ivanova et al., 2020; McDaniel & Wesselmann, 2021).

These factors have been investigated in other studies in the context of other kinds of usage. For example, recent studies have focused on self-presentation, investigating its direct influence within different contexts (Chen et al., 2019; González-Nuevo et al., 2021). Other studies have explored the mediating effects of FoMO—specifically in relation to smartphone addiction (Li et al., 2020; Servidio, 2019), problematic social media use (Fang et al., 2020; Oberst, 2016), and social media engagement (Reer et al., 2019). Studies that have focused on phubbing have investigated only its *direct* influence on smartphone addiction (Fu et al., 2020), specific psychological issues, such as negative emotions (Fellesson & Salomonson, 2020), well-being (Kadylak, 2020), work relationships (Roberts & David, 2020; Yasin et al., 2020), and parental care (Bai et al., 2020; Niu et al., 2020; Wang et al., 2020).

The interplay between the three factors, as proposed in our research model, is under-researched in the Instagram context, hence this investigation. We depict these interactions in figure 1, our proposed research model. Notably, we indicate the mediatory paths in dotted lines below.

To our knowledge, the only recent study that closely resembles ours is that of Çikrikci et al. (2019). Given that phubbing is usually modeled as an outcome of excessive (or even problematic) social media use, the rationale for this study is to understand the extent to which phubbing may influence excessive use. We wanted to explore how phubbing and excessive Instagram usage are related. Our thinking in this regard is mirrored by that of Brailovskaia et al. (2018) who found evidence to suggest

that excessive Facebook use should not only be viewed as an outcome, but also as a potential moderator or mediator. We take a similar view, focusing specifically on the excessive use of Instagram. Given the lack of significant overlap with other studies, this paper makes a significant contribution to the field of cyberpsychology in general and excessive use of Instagram in particular.

We commence by developing the study hypotheses. Next, we provide a complete outline of our methodological approach, followed by the results of our statistical analysis. Following this, we briefly discuss some results and conclude with an outline of the theoretical and practical implications of this study.

## 2. Hypothesis development

### 2.1. Phubbing

Phubbing first appeared in 2007 in Australia (Nazir & Piskin, 2016) and has become a phenomenon of worldwide interest to laypersons and academia alike. The increase in the incidence of phubbing is likely due to the widespread availability and use of smartphones, as well as the pervasive co-present interactions found in society (Capilla Garrido et al., 2021). While there are numerous benefits that can be derived from the use of smartphones, there has been an increased focus on their negative consequences for the mental and physical health of users. Phubbing as a form of behavior detrimentally affects the quality of social interactions between people, as it is generally perceived to be disrespectful (Anshari et al., 2016; Dwyer et al., 2018). Importantly, phubbing takes place at any time and at any location, from family meals to formal work meetings and conferences, as well as social gatherings with family and friends. Phubbing involves one (or more) conversation partners being snubbed, with the mobile phone taking center stage instead of the focus being on physically co-present partners (Yasin et al., 2020). This may negatively affect relationships, increase feelings of jealousy (Balta, Emirtekin, Kircaburun, & Griffiths, 2018) and, in extreme cases, lead to mobile phone addiction (Ivanova et al., 2020). In some instances, even those who experience being phubbed are further drawn into the use of social media in an effort to escape feelings of social exclusion (Ivanova et al., 2020).

As a result of phubbing, both parties may increase the excessiveness with which they use social media platforms such as Instagram. As such, and not surprisingly, phubbing has attracted attention from the research community. For example, phubbing has been found to exert a direct (and significant) influence on internet use disorders, abnormal smartphone use, depression, the communicative ability of users offline, as well as the intimacy of said communication (Bai et al., 2020; Balta et al., 2018; Ivanova et al., 2020). In this study, we evaluate the mediating effects of phubbing on excessive Instagram use. Understanding its influence is crucial in helping to explain the extent to which certain variables influence our phenomenon of interest (Nitzl et al., 2016). Within the context of this study, the phenomenon of interest is the excessive use of Instagram. The more excessive, the more likely it becomes that such usage will negatively impact these individuals (e.g., development of social media dependencies and an overall reduction in well-being). Mediation analysis enables us to understand the development of this phenomenon as a result of the influence of the mediating variable (Carrión et al., 2017). In other words, what insights do the mediating nature of phubbing offer us when studying excessive Instagram use? Although phubbing has received much attention within the Information Science (IS) discipline, few studies have explored the role of mediation within the context of excessive Instagram use. Even fewer studies have made use of partial least squares (PLS).

### 2.2. FOMO: Fear of Missing Out

Although we concede that individuals predominantly use Instagram via their smartphones, this study focuses on excessive use without focusing on the devices used. In other words, we want to

determine the extent to which phubbing further explains excessive Instagram use as a function of individuals' level of FoMO and self-presentation, regardless of the source device. Individuals experiencing high levels of FoMO desire to be constantly connected with other people by staying abreast of what they are doing (Roberts & David, 2020). Not surprisingly, platforms like Instagram are particularly well suited to engendering such connectedness. For example, individuals can "follow" the Instagram updates of just about anybody of interest. FoMO also causes individuals to ruminate on that which they might be missing out on, which makes them feel that they are unable to compete or keep up with their Instagram peers (Fuster et al., 2017). As a result, individuals may spend excessive amounts of time on social media to find content (and other individuals) with which they associate, to the point that such excessive use has a negative impact on the wellbeing of the individual in question. We argue that phubbing provides an additional explanation of such excessive use as a function of an individual's level of FoMO. In other words, when an individual uses Instagram because they feel they are missing out, they may choose to phub real-life conversation partners. Because mediation modeling requires us to theorize (and test) the relationship between phubbing and excessive Instagram use, it is important to note that we are not arguing in favor of the enjoyable nature of phubbing. Instead, together with FoMO, phubbing becomes habitual, which then (and over time) influences excessive Instagram use and perhaps the prevalence of phubbing as well. For example, FoMO has been found to significantly influence phubbing within the context of smartphone use (Al-Saggaf, 2020). Given the predominant use of smartphones to access Instagram (which is, first and foremost, a mobile app), it stands to reason that this also applies here. Similar findings are reported for the influence of phubbing on excessive social media use, with recent studies reporting significant relationships between phubbing and social media addiction and problematic use (Bai et al., 2020; Guazzini et al., 2019), but these studies have not focused on Instagram.

### **2.3. Self-presentation**

We also evaluated the extent to which phubbing mediates self-presentation. Self-presentation is regarded as an important social media activity (Subrahmanyam & Smahel, 2011). Arguably, such activities often center on users' needs to share personal content on social media for reasons related to impression management and self-expression (Krämer & Winter, 2008). The immediacy of the feedback mechanisms (e.g., likes and comments) on various social networking site platforms (such as Instagram) provides individuals with clues about the social desirability of the information they are providing on these platforms. This feedback can then be used to adjust their future posts to bring them more in line with the self-presentation they would like to project to others. Individuals may also compare themselves to their peers, and then decide how to present themselves on social media to these peers (Chua & Chang, 2016). Additionally, online self-presentation helps individuals gain peer acceptance and feedback (Djafarova & Trofimenko, 2019). Therefore, the more individuals depend on such feedback, the more likely the excessive use of Instagram becomes. Importantly, and to increase followers, individuals also tend to present themselves positively on Instagram (Salim et al., 2017); in other words, more positively than is authentically true of themselves (Layder & Manning, 1994). However, as an individual's followers increase, the more excessive their use of Instagram becomes in order to refine the way they portray themselves. The more positive the feedback, the more followers are gained. This perpetuates the cycle of excessive use as a function of their need to gain increasing amounts of positive feedback from followers. Ultimately, the ever-increasing excessive use of Instagram (for self-presentation purposes) may become problematic. For example, social media self-presentation (as enacted on Instagram) has been linked to reduced mental health and well-being. A study focusing on teenagers found that a high focus on social media self-presentation was linked to more mental health problems and a reduced quality of life. Specifically, there were strong associations with signs of depression and anxiety (Skogen et al., 2021). Research has revealed similar findings amongst adults where false self-presentation behaviors were associated with negative mental health, as

seen by higher reported levels of anxiety, depression, and stress (Wright et al., 2018). The effects of social media-based false self-presentation are particularly problematic. For example, extant research has revealed significant associations between false self-presentation, high levels of social anxiety and low self-esteem (Twomey & O'Reilly, 2017). We argue that when individuals experience negative side effects of social media use (e.g., social anxiety, social exclusion, and low esteem) they are more likely to seek social approval by presenting themselves in an overly positive or even false manner. FoMO may further drive this process of false self-presentation, as any relevant social media activity may be viewed as a chance to enhance how they present themselves online. For some, engaging in these behaviors may be so vital to their psychological needs that they will use any available opportunity to engage in such behavior. In such instances phubbing may further strengthen (or even enable) the excessive use of Instagram. We hypothesize that:

*H1: Phubbing mediates the relationship between FoMO and excessive Instagram use.*

*H2: Phubbing mediates the relationship between self-presentation and excessive Instagram use.*

### 3. Methodological approach

#### 3.1. Respondents and procedure

After receiving ethical clearance from the Rhodes University Ethical Standards Committee (RUESC; ref 2020-1448-3533), we collected data from 285 respondents recruited via a survey platform called Prolific (Chandler et al., 2019). Once recruited, potential respondents had to first provide informed consent before being allowed to continue with the associated survey questionnaire. In addition to providing informed consent, respondents had to be at least 18 years old, active Instagram users, and citizens of the United States of America. After applying the aforementioned criteria, we improved the data quality by disqualifying those respondents who did not complete the questionnaire or showed signs of inattentiveness (evaluated via attention check questions; Abbey & Meloy, 2017). Subsequently, 275 responses ( $n = 275$ ) remained, of which 133 (48.4%) were male and 142 (51.6%) female. From an educational perspective, 94 (34.2%) respondents had no degree or were educated up to high school level, 128 (46.5%) were in possession of a bachelor's degree and 53 (19.3%) were in possession of a master's degree or above. Respondents' ages varied with 90 (32.7%) aged 18–24, 114 (41.5%) aged 25–34, 41 (15%) aged 35–44, 21 (7.6%) aged 45–54, and nine (3.2%) aged 55–64.

#### 3.2. Measures used

**FoMO.** Respondents' levels of FoMO were evaluated by making use of a 10-item scale developed by Przybylski et al. (2013). The scale makes use of five-point Likert scale response anchors (1 = *Not at all true of me* and 5 = *Extremely true of me*) and has been used extensively in similar, and recent, cyberpsychology contexts (Elhai et al., 2020; Fabris et al., 2020; Laato et al., 2020). After eliminating items with outer loadings below 0.7, we obtained a reliability score (i.e., Cronbach's alpha) of 0.80.

**Phubbing.** To evaluate respondents' propensity to phub conversation partners, we adapted a 10-item phubbing scale developed by Karadağ et al. (2015). Like the scales described above, the phubbing scale uses a five-point Likert scale but makes use of different response anchors (1 = *Never* and 5 = *Always*). It should be noted that this scale has also been widely used within similar contexts (Busch & McCarthy, 2021; Harris et al., 2020; Ivanova et al., 2020). After eliminating items which exhibited factor loadings below 0.7, we obtained a reliability score of 0.81.

**Self-presentation (based on SPFBQ).** To evaluate Instagram-based self-presentation we adapted the Self-Presentation on Facebook Questionnaire (SPFBQ), which consists of 17 items (Michikyan et al., 2015, 2014). This scale assessed online self-presentation on a five-point Likert scale

(1 = *Strongly disagree* and 5 = *Strongly agree*) and is widely used in cyberpsychology, specifically to evaluate to what extent a respondent expresses aspects of the real, ideal, and false on Facebook. Within this context the scale was adapted for Instagram, and we only used the false self-presentation subscale. A reliability score of 0.83 was obtained.

**Excessive Instagram Use (based on the SMUQ).** To evaluate the excessiveness with which respondents use Instagram, we adapted the nine-item Social Media Use Questionnaire (SMUQ) developed by Xanidis and Brignell (2016). We felt this to be an apt choice given its focus on addiction or dependency formation which are often modeled as negative or problematic consequences of excessive social media use (Van der Schyff et al., 2020). These nine items were evaluated using a five-point Likert scale (1 = *Never* and 5 = *Always*) and achieved a reliability score of 0.85 after eliminating items with factor loadings below 0.7.

#### 4. Statistical analysis and results

A cross-sectional survey was used to collect primary data, which was first analyzed to describe the correlations between all the variables in our research model (see, Table 1 for these correlations). Following this we analyzed our data using the PLS algorithm to develop a path model in SmartPLS v3 (Ringle et al., 2015).

##### 4.1. Measurement model evaluation

We first evaluated the validity of our measurement model—specifically convergent and discriminant validity. To assess convergent validity, we used three criteria. First, we checked that all the items within our research model loaded significantly ( $t$ -values of more than 1.96) onto their desired latent variables. Second, we checked that the items exhibited outer loadings in excess of the accept threshold of 0.7 (J. Hair et al., 2017). Third, the average variance extracted (AVE) value of each latent variable was checked to ensure that it was more than 0.5 (see, Table 1). All the above criteria were satisfied. To assess discriminant validity, we made use of three criteria. First, we used the Fornell-Larcker criterion which required us to calculate the square root of the AVE value of each latent variable (on the diagonal in Table 1). These values were all in excess of 0.5 and higher than the correlations of the related latent variables (Fornell & Larcker, 1981). Second, we checked the cross-loadings of the items in our questionnaire (see Table A.2 in the Appendix). These items all loaded highest on their intended latent variables. Third, we assessed the heterotrait-monotrait (HTMT) ratios (see Table A.3 in the Appendix), which were all below the threshold of 0.85 (Henseler et al., 2014). From the above, we concluded that our measurement model was valid.

When developing path models using PLS, it is important to also assess the questionnaire for any signs of multicollinearity (Hair et al., 2019). To eliminate multicollinearity, a researcher has to inspect the variance inflation factor (VIF) values of the items to ensure that they are below 3.0 (Hair et al., 2010). All the VIF values were below 3.0, enabling us to eliminate multicollinearity (see Table A.1 in the Appendix). Given that all the latent variables exhibited reliability scores in excess of 0.7 for both the Cronbach's alpha (CA) and composite reliability (CR) criteria, we declared the questionnaire to be reliable (Tavakol & Dennick, 2011). See, Table 1 (below) and Table A.1 (in the Appendix) for a complete outline of our measurement model statistics and questionnaire descriptive statistics, respectively.

##### 4.2. Structural model evaluation

As part of the structural evaluation of our model, we calculated the predictive power ( $R^2$ ) of the dependent variables in our model. The dependent variable *excessive Instagram use (EIU)* achieved an  $R^2$  value of 0.263, whereas *phubbing (PHUB)* achieved an  $R^2$  value of 0.082. This indicates that 26.3% of the variance in EIU occurred because of an individual's level of FoMO and phubbing. Additionally, 8.2% of the variance in PHUB occurred because of an individual's level of FoMO and *self-presentation (SP)*. We also calculated the relative impact of our independent variables on the dependent variables (i.e.,

**Table 1. Measurement model statistics including demographic correlates (\*\* p < 0.05, \*\*\* p < 0.01)**

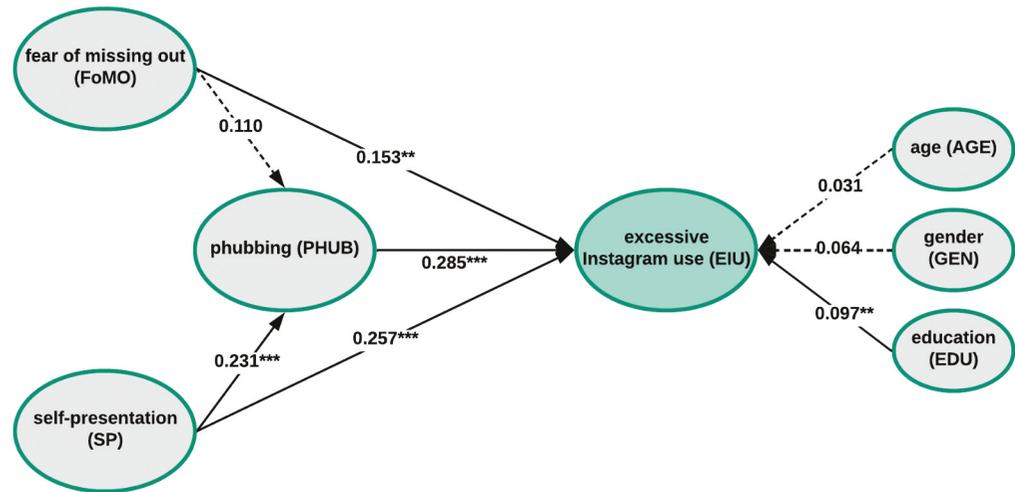
	M	SD	CA	CR	AVE	FoMO	EIU	PHUB	SP	AGE	GEN	EDU
FoMO	2.23	0.87	0.806	0.870	0.626	<b>0.791</b>						
EIU	1.54	0.62	0.852	0.894	0.629	0.284***	<b>0.793</b>					
PHUB	2.06	0.63	0.816	0.877	0.642	0.183***	0.391***	<b>0.802</b>				
SP	4.01	0.81	0.831	0.886	0.661	0.319***	0.368***	0.266***	<b>0.813</b>			
AGE	2.07	1.03				-0.217***	-0.082	-0.097	-0.260***			
GEN	1.48	0.50				0.031	0.082	0.064	-0.004	-0.054		
EDU	1.85	0.71				0.014	0.113	0.078	-0.052	0.186***	-0.022	

*phubbing*, and excessive Instagram use) by inspecting their effect sizes derived from Pearson correlations. These correlations were interpreted in terms of Cohen's guidelines for *r*, as presented in Table 1 above. *FoMO* exhibited a small-to-medium positive effect (0.183) on *phubbing* and a medium positive effect (0.284) on excessive Instagram use. *Self-presentation* exhibited a small-to-medium positive effect (0.266) on *phubbing* and a medium positive effect (0.368) on excessive Instagram use, while *phubbing* exhibited a medium positive effect (0.391) on excessive Instagram use. In addition to the effect sizes and predictive power, the predictive relevance ( $Q^2$ ) of our model was also calculated (Geisser & Eddy, 1979; Stone, 1974). Stone-Geisser's  $Q^2$  equaled 0.156 for excessive Instagram use and 0.047 for *phubbing*. Based on these analyses we declared our model to exhibit reasonable predictive relevance (J. Hair et al., 2017; Vinzi et al., 2010). Finally, we also evaluated the influence of several demographic variables including gender, education, and age. Only education exhibited a significant (albeit weak) relationship with excessive Instagram use ( $\beta = 0.097, p < 0.05$ ). Given that education is positively correlated to excessive Instagram use, there is some indication that excessive use is prevalent in more educated individuals, the implications of which we explore in the discussion. From the above it is clear that the model is structurally sound, enabling us to test for mediating effects.

#### 4.3. Testing for mediating effects

Following the evaluation of our measurement and structural models, we proceeded to test for mediating effects. Mediation revolves around the idea that a third latent variable significantly alters the relationship between an independent and a dependent variable (excessive Instagram use). Within this context, *phubbing* acts as this third mediating variable, with *FoMO* and *self-presentation* acting as the independent variables. Unlike many mediation analyses which make use of the PROCESS macro, we opted to use PLS. We argue such an approach to be preferable given that composite structural equation modeling (SEM) methods address the issues experienced with regression and factor-based SEM models (Sarstedt et al., 2020). As a first step towards evaluating the mediating effects of *phubbing*, PLS literature instructs researchers to assess the significance of the indirect and direct effects. The indirect effect associated with the path *FoMO* → *PHUB* → *EIU* was not significant ( $\beta = 0.031, p > 0.05$ ), with only the direct effect (*FoMO* → *EIU*) being significant ( $\beta = 0.153, p < 0.05$ ). According to Nitzl et al. (2016), this type of finding indicates the absence of any form of mediation. As such, and within our sample, *phubbing* does not mediate the relationship between *FoMO* and excessive Instagram use. We, therefore, reject our first hypothesis (H1). However, for the path *SP* → *PHUB* → *EIU* we found evidence of a significant indirect effect ( $\beta = 0.066, p < 0.05$ ) and a significant direct effect ( $\beta = 0.257, p < 0.01$ ) for the path *SP* → *EIU*. Given that the sign of the path *SP* → *PHUB* → *EIU* is positive (i.e., complementary), we conclude that *phubbing* does mediate the relationship between *self-presentation* and excessive Instagram use. Therefore, H2 is supported. In addition to the above, we also used the bias corrected confidence intervals (CI) to further substantiate the significance of the paths used to test for mediatory effects. This enabled us to provide further evidence as to the

Figure 2. Research model (\*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ ).



significance of the indirect effects associated with the hypotheses we developed. If the CI of a path associated with an indirect effect is found to be non-zero (i.e., does not contain a zero and is thus significant), then an assessment of the significance of the direct effect is also required to determine the mediation type (Zhao et al., 2010). See, figure 2 and Table 2 for a complete summary of the path estimates our research models and the hypothesis testing results, respectively.

## 5. Discussion

Instagram has become a popular choice among social media users. Despite its popularity, extant research on its use (not to mention excessive use) remains limited. To address this, the objective of the current study was to investigate the mediating effects of *phubbing*; specifically, as a mediator between *FoMO* and *excessive Instagram use*, as well as between *self-presentation* and *excessive Instagram use*. Our results indicate that *phubbing* does partially mediate the relationship between *self-presentation* and *excessive Instagram use*. This means that we have found evidence to suggest that *self-presentation* (specifically *false self-presentation*) increases the likelihood of excessive Instagram usage, mainly through its influence on *phubbing*. Although our literature searches were unable to uncover similar findings on the mediatory role of *phubbing* (within a similar context), we were able to find studies that confirmed the direct influence of *self-presentation* on outcomes related to excessive Instagram use. This study, therefore, confirms the findings of previous studies (Balci & Karaman, 2020) that *self-presentation* is a positively significant predictor of excessive Instagram use. Novita Kalalo (2018) also found *self-presentation* to significantly influence Instagram addiction—a problem caused by excessive use. This is corroborated by Chen and Kim (2013), who found *self-presentation* to be positively related to the problematic use of social networking sites. Casale et al. (2015) also found *self-presentation* to significantly influence addictive behavior—albeit within the context of internet addiction. Furthermore, most studies have investigated the various subscales of *self-presentation*, rather than pursuing the nature of false *self-presentation*. This makes our finding of the mediating influence of *phubbing* on the relationship between false *self-presentation* and excessive Instagram usage very interesting. Authenticity (i.e., not participating in false *self-presentation*) is essential to an individual's psychological well-being, something that is negatively influenced when excessively using Instagram (Bailey et al., 2020; Jerrentrup, 2021; Wirtz et al., 2021). Based on our results, we conclude that false *self-presentation* may indeed be a major contributor to the excessive use of Instagram; more so than the other subscales that comprise *self-presentation* as a whole. Given

**Table 2. Summary of hypothesis (thus mediation) testing**

Direct effects	Coefficient	Bias-corrected CI		Non-zero		
		2.5 %	97.5 %			
<b>FoMO → EIU</b>	<b>0.153</b>	<b>0.024</b>	<b>0.272</b>	<b>Yes</b>		
<b>PHUB → EIU</b>	<b>0.285</b>	<b>0.170</b>	<b>0.390</b>	<b>Yes</b>		
<b>SP → EIU</b>	<b>0.257</b>	<b>0.125</b>	<b>0.382</b>	<b>Yes</b>		
<b>Total effects</b>						
FoMO → EIU	0.185	0.039	0.309	Yes		
PHUB → EIU	0.285	0.170	0.390	Yes		
SP → EIU	0.323	0.195	0.439	Yes		
<b>Indirect effects</b>					<b>Mediation type</b>	<b>Supported as argued</b>
<b>H1: FoMO → PHUB → EIU</b>	0.031	-0.004	0.071	No	No mediation	No
<b>H2: SP → PHUB → EIU</b>	0.066	0.026	0.120	Yes	Complementary	Yes

that recent research has found most Instagram users to selectively present overinflated content (Jiang & Ngien, 2020), excessive use is likely to remain an issue of concern. We therefore recommend that Instagram investigate ways to encourage platform authenticity. A promising approach is proposed by a recent study into how social norms and nudging could be used to dissuade the posting of false news (Andi & Akesson, 2020). For example, Instagram may wish to revise the way in which filters are used on its platform as these may act as enablers of false self-presentation. Although these filters are somewhat limited in their ability to address such authenticity-related problems, we advise Instagram to reduce the number of filters. This does not, however, address the source and type of content posted, which may be altered before posting content. Such problems plague not only Instagram (Mun & Kim, 2021), but also other social media platforms (Turel & Gil-Or, 2019).

Similar to previous studies (e.g., Balta et al., 2020; Błachnio & Przepiorka, 2018; Karadağ et al., 2015), our study also found a positive relationship between problematic Instagram use and phubbing. However, other studies have confirmed that FoMO has a positive association with phubbing (Tandon et al., 2022). Research has even documented that FoMO is one of the most important predictors and an antecedent of phubbing behavior (Balta et al., 2018; Davey et al., 2018; Lai et al., 2016; Van Rooij et al., 2018). However, our results did not indicate that *phubbing* mediates the relationship between *FoMO* and *excessive Instagram use*. We did, however, find that both *FoMO* and *phubbing* significantly influence *excessive Instagram use*, with a plethora of studies that confirm the significant relationship between FoMO and a variety of outcomes related to the excessive use of Instagram (e.g., addiction to and problematic use of social media and the internet; Alt & Boniel-Nissim, 2018; Rozgonjuk et al., 2020; Savci et al., 2020; Shen et al., 2020; Van Rooij et al., 2018). The same applies to phubbing, with recent studies reporting significant relationships with problematic (and addictive) forms of social media use (Chi et al., 2022; Davey et al., 2018).

Most social media studies do not focus or report on the results of the educational levels of participants as we have done in this study. Rather, most studies looking at education and social media usage focus on the use of the social platform as an educational tool (Carpenter et al., 2020; Coman et al., 2021). Or, these studies investigate the effect of social media use on students' academic performance (Al-Rahmi et al., 2018; Lambić, 2016; Whelan et al., 2020). We found evidence to suggest that an individual's education is significantly related to excessive Instagram use.

Specifically, we found that excessive use is prevalent in more educated individuals. Other studies have revealed mixed findings on this relationship. For example, Henzel and Håkansson's (2021) results confirm ours, that is, that individuals leaving high school were found to be more addicted to social media. The more educated the person, the more they tend to use social media. Adults with a postgraduate degree or more use social media more frequently than those with a high-school education (Perifanou et al., 2021). Conversely, Koçak et al. (2021) found no significant relationship between social media addiction and education. Van Deursen et al. (2015) found that participants with low levels of education were using the internet for more hours daily in their spare time than more educated and employed people. Correa (2015) also found that less educated young people tended to use social media more frequently. We conclude that the mixed results could be attributed to the use of many social media platforms as an empirical case as opposed to only one, such as Instagram. The educational-level difference in Instagram usage could also be explained by the fact that more educated participants have greater knowledge and practical experience in technology and, hence, express greater interest in social media platforms. However, these mixed results do confirm that more research in this area needs to be done with generic populations.

## 6. Limitations and future research

Although our study is limited in terms of sample size (and source), cross-sectional approach, and Instagram-only focus, it does highlight interesting areas for future research. First, we advise future research to use probability sampling, which would allow for certain generalizations to be made. Second, unlike our study, we advise that future research should include smartphone use, possibly as a moderator of the relationships we explored in this study. Third, we advise future research to approach excessive social media use by way of focused experiments. For example, researchers could develop monitoring apps that record not only the frequency and duration of use but also the use of specific features (e.g., engagement metrics such as likes, emoticons, and hashtags). Fourth, and as opposed to our cross-sectional approach, it is advised that future research be conducted longitudinally, an approach that would enable researchers to investigate causal relationships. Even more interesting would be a longitudinal country-based analysis. For example, citizens of collectivistic countries may favour inclusive (and in-person) discussions, as opposed to citizens of individualistic countries (Jiang & Ngien, 2020). It is likely that this may directly influence phubbing behavior. Fifth, we also advise future research to investigate the influence of social anxiety as an antecedent of excessive use. As stated previously, the active use of Instagram includes engaging with your followers or friends by liking and commenting. Conversely, the passive use of Instagram focuses on the observation of other users without any engagement (Trifiro & Gerson, 2019). Research suggests that such passive use leads to a plethora of problems as alluded to in the introduction. Therefore, future research should use our results to understand how socially anxious individuals communicate in order to better understand the impact of phubbing on socially anxious individuals' use of social media platforms, specifically the extent to which phubbing prevents such individuals from seeking real-life connections (Al-Saggaf & O'Donnell, 2019). We argue this to be an apt approach given that phubbing negatively influences a phubbed conversation partner's need to belong, self-esteem, meaningful existence, and social control (Chotpitayasunondh & Douglas, 2018). These all amplify the negative consequences of phubbing behavior and the excessive use of Instagram (Chotpitayasunondh & Douglas, 2018). Sixth, future research could investigate interaction effects. Although we tested for these effects (and found none), the inclusion of additional antecedents (such as social anxiety) may yield interesting interaction effects. For example, it is possible that such research may find that as an individual's social anxiety increases so does their propensity to phub conversation partners. Having said this, it is possible that our model could be evaluated in its current form with the proviso that different scales (i.e., items) are used for phubbing and self-presentation. In addition, then, our seventh and final recommendation is that further research be conducted on the association between educational level and social media usage. As suggested by Perifanou

et al. (2021), usage may be influenced by study field and prior experience on certain social media platforms, but this is still far too unclear.

### **6.1. Theoretical implications**

Despite the limitations, our study provides some significant theoretical implications. First, we advise future research to adopt other theoretical frameworks. For example, selected latent variables from *uses and gratification theory* could be modeled as moderators within the context of the research model in this study. We argue this to be particularly compelling given that extant research suggests social media to enhance individuals' desire for instant gratification (Wilmer et al., 2017). Second, it would be very interesting to combine the latter latent variables with those from *the belongingness hypothesis*. We argue this to be an appropriate choice given that the premise of the belongingness hypothesis is that individuals have an innate drive to form significant and long-lasting relationships, one of the fundamental factors that drive social media use (Roberts & David, 2020).

### **6.2. Practical implications**

Our study also provides several practical implications. First, social media users should be mindful of the way in which they communicate with others (i.e., not phub conversation partners). This applies specifically to those individuals who knowingly present themselves in an overly positive or false manner. Such behavior (i.e., phubbing) leads conversation partners to feel excluded and ignored. According to the temporal need-threat model of ostracism, such exclusion immediately impairs those being phubbed. Using this model, Nuñez et al. (2020) explain that such impairments are experienced in three consecutive stages: first, a fundamental human need (reflexive) is threatened, then there is a delay in coping (reflective), and ultimately long-term health-related issues result (resignation). Together, these consequences pose a serious threat to the establishment (and maintenance) of healthy relationships. Those victimized by phubbing should therefore point out such behavior and, if not resolved, avoid these conversation partners as part of a long-term coping strategy.

Second, our results inform possible treatment of not only excessive Instagram use, but also those psychological factors and behavior that exacerbate it. For example, and as stated before, if therapists were to evaluate an individual's levels of false self-presentation, it is likely that such an individual also phubs conversation partners. Effective treatment may not only improve the well-being of the individual who suffers from excessive use, but also those around them as they are subject to less phubbing. In such instances, treatment may, for example, lead to reduced feelings of social exclusion and ostracism, which will improve relationships. This is particularly important within family environments, where phubbing has been found to resemble parental rejection—specifically by those teens who are anxious and absorbed (Liu et al., 2021).

## **7. Conclusion**

In this study, we investigated the influence and interactions between three factors with regard to *excessive Instagram usage*: (1) *self-presentation (specifically false self-presentation)*, (2) *FoMO*, and (3) *Phubbing*. Together, these factors and behavioral tendencies provide insights into the excessive use of Instagram. Our results indicate that phubbing acts as a mediator between *self-presentation* and *excessive Instagram use*—albeit in a complementary manner. Based on this, we argue that those individuals who display high levels of self-presentation (specifically false self-presentation) are more likely to use Instagram excessively. Moreover, for these individuals, phubbing enables the excessive use of Instagram. Counter to our first hypothesis, we did not find any evidence to suggest that *phubbing* mediates the relationship between *FoMO* and *excessive Instagram use*. We also found a positive relationship between Instagram use and educational level, with excessive use being more prevalent in more educated individuals.

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No potential conflict of interest was reported by the author(s).

### Data availability statement

This study made use of survey data that is not publicly available for ethical reasons.

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**Appendix**

**Table A.1. Questionnaire descriptive statistics**

	<b>Item</b>	<b>M</b>	<b>SD</b>	<b>Outer loading</b>	<b>t-value</b>	<b>VIF</b>
FOMO1	I get worried when I find out my friends are having fun without me.	2.24	1.13	0.834	23.632	1.675
FOMO2	I get anxious when I don't know what my friends are up to.	1.63	0.92	0.787	18.801	1.477
FOMO3	It bothers me when I miss an opportunity to meet up with friends.	2.48	1.18	0.792	14.583	2.032
FOMO4	When I miss out on a planned get-together it bothers me.	2.57	1.14	0.749	11.667	1.923
SP1	I sometimes try to be someone other than my true self on Instagram.	2.26	1.11	0.797	20.039	1.857
SP2	I am a completely different person online than I am offline.	2.02	0.99	0.795	21.280	1.782
SP3	I post information about myself on my Instagram profile that is not true.	1.53	0.72	0.803	28.336	1.587
SP4	Sometimes I feel like I keep up a front on Instagram.	2.13	1.14	0.855	41.361	1.942
PHUB1	My eyes start wandering on my phone when I'm together with others.	2.61	0.80	0.729	12.993	1.724
PHUB2	I am always busy with my mobile phone when I'm with my friends.	2.09	0.77	0.861	31.262	2.559
PHUB3	People complain about me dealing with my mobile phone.	1.63	0.83	0.754	20.482	1.351

(Continued)

	<b>Item</b>	<b>M</b>	<b>SD</b>	<b>Outer loading</b>	<b>t-value</b>	<b>VIF</b>
PHUB4	I'm busy with my mobile phone when I'm with friends.	1.90	0.75	0.854	38.185	2.338
EIU1	I struggle to stay in places, where I won't be able to access Instagram.	1.49	0.71	0.765	17.313	1.711
EIU2	I feel angry, when I am not able to access my Instagram account.	1.52	0.83	0.839	31.368	2.173
EIU3	My relatives and friends complain that I spend too much time using Instagram.	1.30	0.64	0.798	26.301	1.793
EIU4	I feel anxious, when I am not able to check my Instagram account.	1.51	0.83	0.842	37.996	2.127
EIU5	I spend a large proportion of my day using Instagram.	1.88	0.93	0.713	16.739	1.556

**Table A.2. Crossloading values**

	<b>FOMO</b>	<b>EIU</b>	<b>PHUB</b>	<b>SP</b>
FOMO1	0.834	0.237	0.211	0.415
FOMO2	0.787	0.261	0.158	0.234
FOMO3	0.792	0.206	0.105	0.144
FOMO4	0.749	0.175	0.067	0.148
SP1	0.264	0.254	0.156	0.797
SP2	0.286	0.224	0.226	0.795
SP3	0.185	0.323	0.252	0.803
SP4	0.309	0.367	0.219	0.855
PHUB1	0.181	0.173	0.729	0.249
PHUB2	0.137	0.279	0.861	0.244
PHUB3	0.171	0.410	0.754	0.216
PHUB4	0.096	0.333	0.854	0.146
EIU1	0.173	0.765	0.258	0.322
EIU2	0.254	0.839	0.371	0.259
EIU3	0.227	0.798	0.357	0.280
EIU4	0.281	0.842	0.294	0.358
EIU5	0.173	0.713	0.253	0.237

**Table A.3. Heterotrait-monotrait (HTMT) ratio values**

	<b>FOMO</b>	<b>EIU</b>	<b>PHUB</b>	<b>SP</b>
FOMO				
EIU	0.328			
PHUB	0.208	0.443		
SP	0.365	0.425	0.319	



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