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ORIGINAL ARTICLE

For the love of being liked: a moderated mediation model of attachment, likes-seeking behaviors, and problematic Facebook use

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ABSTRACT

Introduction: Some Facebook users have difficulty regulating the amount of time they spend online, and some Facebook features, such as likes, promote habitual use. Theoretically, attachment insecurities could be related to problematic Facebook use, but the findings of past studies were mixed with limited knowledge about potential moderators and mediators of the association between adult attachment and problematic use of Facebook.

Aims: The present study used adult attachment theory to explore a moderated mediation model that examined the interaction of the two attachment dimensions of attachment anxiety and avoidance as well as the mediation role of likes-seeking behaviors.

Method: A total of 2758 adolescents and young adults completed self-report questionnaires.

Results: Results showed a significant interaction between the attachment dimensions, such that attachment anxiety and avoidance were each related to problematic Facebook use when the level of the other attachment dimension was low. The relations between the attachment dimensions and problematic Facebook use were mediated by likes-seeking behaviors.

Conclusions: Our findings highlight the interplay between the attachment dimensions and the mediation of behaviors related to one specific Facebook feature as important risk factors of problematic Facebook use.

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Attachment; likes-seeking behavior; problematic Facebook use; Facebook addiction; social networking site addiction

With approximately 2.27 billion monthly users, Facebook is the largest online community and the most popular social networking site, despite mounting competition (Facebook 2018). Adolescents and young adults under 29 years are the most common age group of users; 81% of them use Facebook (Pew Research Center 2018). Facebook provides the opportunity to connect with friends and family and to form new social connections on the basis of shared interests. Thus, when used in moderation, it offers many benefits and is associated with higher self-esteem and well-being (Valkenburg et al. 2006; Nabi et al. 2013). However, some users become deeply involved and have difficulty limiting the amount of time they spend online, presenting addiction-like symptoms (Kuss and Griffiths 2011). Several labels have been used to denote problematic or excessive Facebook use, such as pathological use, compulsive use, or addiction. Due to the lack of a consensus on the definition and diagnostic criteria of Facebook addiction, an atheoretical and more conventional term, problematic Facebook use (PFU), will be used in this paper (Carbonell and Panova 2016; Marino et al. 2018).

Like any other behavioral addiction (Griffiths 1996), PFU consists of a compulsive involvement with harmful effects on real-life activities, a subjective loss of control over time spent, and emotional withdrawal symptoms (LaRose et al. 2010; Griffiths 2013; Ryan et al. 2014). PFU can lead to detrimental outcomes such as psychological difficulties, sleep disturbance, decreased academic or professional performance, and relationship conflicts (Clayton et al. 2013; Vilca and Vallejos 2015; Woods and Scott 2016). Even if this behavioral addiction has not been recognized as a legitimate disorder in the DSM-5 (American Psychiatric Association 2013), Facebook's popularity and the potentially damaging outcomes of PFU are sufficient to demonstrate the need to understand the risk factors that could trigger the development of PFU.

Despite the lack of a consistent theoretical framework to explain how PFU arises (Holmgren and Coyne 2017; Wiederhold 2017), studies have identified some intra-individual sociodemographic characteristics, well-being indicators, and psychological traits associated with PFU, such as gender, age, personality traits, self-esteem, and loneliness (Andreassen et al. 2012; Satici and Uysal 2015; Błachnio et al. 2016a; 2016b). Apart from the potential influence of these intra-individual characteristics, some interpersonal factors may also increase the odds of developing and maintaining PFU. As with all forms of addiction (Höfler and Kooyman 1996; Flores 2004), addiction to social media including Facebook has been conceptualized as arising from

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attachment disorder (D'Arienzo et al. 2019). Thus, the present study examined the links between attachment dimensions and PFU among the heaviest users of Facebook, adolescents and young adults.

Attachment and Facebook use

Attachment theory is particularly relevant to understanding the dynamics of human relationships. This theory proposes that the stability and security of early interactions with parents and other significant figures instill expectations, cognitions, and behaviors throughout adulthood, subsequently shaping the dynamics of interpersonal relationships (Bartholomew and Horowitz 1991; Mikulincer and Shaver 2007). The coordination of two dimensions, attachment anxiety and avoidance, characterizes individuals' ways of relating to others. The attachment anxiety dimension refers to hyperactivation of the attachment system. In highly anxiously attached individuals, chronic doubts about self-worth lead to fear of rejection and excessive intimacy-seeking behaviors. By contrast, the attachment avoidance dimension refers to the deactivation of the attachment system through perception of others as unavailable or untrustworthy. Avoidantly attached individuals are characterized by self-reliance and discomfort with closeness (Mikulincer and Shaver 2007).

The inferences may be drawn from attachment theory that individuals with high attachment anxiety or avoidance might turn to Facebook to acquire a secure base in a self-soothing strategy to deal with negative self or other representations, leading to excessive use and even loss of control over their behavior (Höfler and Kooyman 1996). Individuals with high attachment anxiety may use Facebook as a way of validating themselves and maintaining constant bonds with others so as to manage their abandonment anxieties. For avoidant individuals, Facebook may represent a "safe" and distant way of being in a relationship with others without the costs associated with demanding face-to-face relationships; thus, the person remains independent. These different attachment-related motivations may drive users toward excessive Facebook use, as research has shown that when Facebook is used as a coping strategy to satisfy social needs, the risk of overuse increases (Venkat 2016).

In general, empirical studies have suggested an association between attachment anxiety and a large array of behaviors on Facebook; More frequent Facebook use, more use when feeling negative emotions, more concern over how others perceive them on Facebook, a feeling of greater intimacy with Facebook friends, a lower inclination toward privacy, and Facebook jealousy and surveillance (Marshall et al. 2013; Oldmeadow et al. 2013; Hart et al. 2015). For attachment avoidance, most studies have revealed no significant association with behaviors on Facebook, including frequency of use and feedback sensitivity (Oldmeadow et al. 2013; Hart et al. 2015). However, despite the growing body of research examining the association between attachment and problematic Facebook or social media use (D'Arienzo et al. 2019), the relationship between these two constructs remains unclear. Past studies usually found a negative association between secure attachment (low attachment anxiety and avoidance) and problematic social media use, including Facebook (Rao and Madan 2013; Eroglu 2015; Monacis et al. 2017a). Attachment anxiety and avoidance are generally independently related to higher levels of PFU (Eroglu 2015; Blackwell et al. 2017; Monacis et al. 2017b), but some researchers have reported no association between attachment anxiety or attachment avoidance and problematic social media use, including Facebook (Jenkins-Guarnieri et al. 2012; 2013; Baek et al. 2014). Indeed, some studies have even reported that attachment avoidance could be related to lower levels of PFU (Monacis et al. 2017a). These mixed findings may be explained by the effects of potential moderator and mediator variables on the associations between attachment dimensions and PFU.

One potential explanation of these mixed findings is that the two attachment dimensions interact in their associations with PFU. For example, some researchers suggest that avoidant attachment may be related to social media addiction only when individuals are also high in attachment anxiety, as they can use social media to feel connected to others without engaging in real-life social interactions (Nitzburg and Farber 2013; Blackwell et al. 2017). Building on attachment theory, two assumptions can be made. On the one hand, it is possible that individuals with both high attachment anxiety and avoidance are at increased risk of developing PFU. As a means of securing connections with and validation from others in the safe, distant space of the online world, Facebook might meet the needs of individuals with both anxiety and avoidance issues particularly well. On the other hand, the incongruence between anxious and avoidant attachment needs might lead to ambivalent behaviors on Facebook, thereby leading to decreased use. Hence, as opposed to past studies that included the two attachment dimensions independently without examining their interactions, we examined the associations between the attachment dimensions as well as those of their interaction with PFU.

Attachment and longing for likes

By applying attachment theory to investigate online behaviors, a specific interpersonal motivation for using Facebook may be found to explain the assumed association between attachment anxiety and PFU: Likes-seeking behaviors. The Facebook "like" button, represented by a thumbs-up, is a Facebook feature that enables users to express that they like the status updates, comments, photos, and videos shared by friends. As with other Facebook features that promote habitual use, likes get users to return repeatedly to Facebook to check their number of likes and improve their profiles to gain more likes (Griffiths 2018). These likes-seeking behaviors encourage users to check their Facebook profile regularly, which may pave the way to their excessive use of Facebook.

The like feature may be particularly attractive for people with unmet attachment needs, as it allows them to gain recognition and approval. Hyperactivation of the attachment system may lead users to engage in a variety of likes-seeking

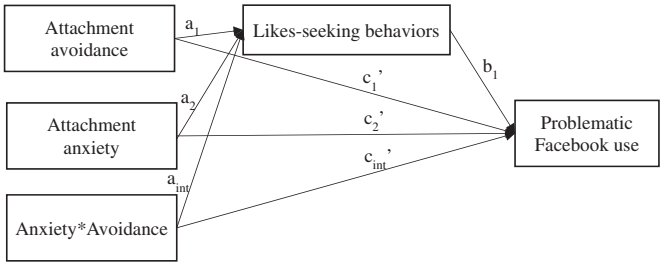

Figure 1. Moderated mediation model.
Note: The covariates are not shown for the sake of clarity.

behaviors to regulate their view of self by receiving frequent online feedback and validation. Previous empirical studies have reported that individuals with high attachment anxiety are more likely to seek feedback and show concern about how other users perceive them on Facebook (Oldmeadow et al. 2013; Hart et al. 2015). They also receive more attention via likes and comments on Facebook (Hart et al. 2015). However, few researchers have studied the psychosocial predictors of likes-seeking behaviors and their role in the development of PFU (Burrow and Rainone 2017; Hong et al. 2017). Research has shown that using Facebook for online popularity is associated with lower self-esteem (Zywica and Danowski 2008) and that the need for admiration is associated with Facebook addiction (Casale and Fioravanti 2018). However, the assumption that the link between attachment anxiety and PFU is mediated by likes-seeking behaviors has never been empirically tested.

The current study

The overall aim of this study was to examine the associations between attachment-related anxiety and avoidance and PFU via likes-seeking behaviors. We examined a moderated mediation model that included the interaction of anxiety and avoidance, as well as the mediation role of likes-seeking behaviors. Figure 1 displays all the relevant pathways. Given that previous research reported that gender, age, self-esteem, and loneliness are correlated with Facebook addiction or PFU (Andreassen et al. 2012; Błachnio et al. 2016a; Błachnio et al. 2016b), we controlled for these variables. First, we predicted direct, positive links between attachment avoidance and PFU (path c'_1) and between attachment anxiety and PFU (path c'_2). Second, we predicted that attachment anxiety would be positively associated with likes-seeking behaviors (path a_2), which in turn would be positively associated with PFU (path b_1), with a significant indirect effect (path $a_2{*}b_1$). Third, we expected a significant interaction between attachment dimensions (path c_{int}', path a_{int}), which can go two ways. On the one hand, as Facebook may meet the needs well of individuals scoring high on both attachment anxiety and attachment avoidance, all the direct and indirect effects of one attachment dimension may increase in magnitude as the level of the other dimension also increases. On the other hand, given the contradiction between hyperactivation and deactivation strategies, all the direct and indirect effects of one attachment dimension may decrease in magnitude as the level of the other dimension increases.

Method

Participants and procedure

A convenience sample of adolescents and young adults was recruited online and in local high schools to complete an online survey about social media use. To be eligible, interested participants had to be aged between 14 and 25 years, use Facebook, and own a cell phone. Eligible participants accessed a hyperlink to electronically sign a consent form and then completed an anonymous survey via the survey-hosting website *FluidSurveys*. Participants were offered a chance to enter a drawing to win one of six $50 cash prices as an incentive. The Université du Québec à Trois-Rivières Institutional Review Board approved these procedures.

Of the 3,087 volunteer French-speaking Canadians who began the survey, 2,758 (89.3%) completed questionnaires on Facebook use and were thus included in this study. Of these, 81.1% ($n = 2236$) were women and 18.9% ($n = 522$) were men. The mean age of participant was 20.15 years (SD = 2.67, ranging from 14 to 25 years). Regarding education, 22.6% ($n = 623$) reported pursuing or having completed a high school or vocational degree, 45.0% ($n = 1240$) a pre-university degree, 27.3% ($n = 753$) an undergraduate degree, and 5.1% ($n = 142$) a graduate degree. Regarding relationship status, 37.8% ($n = 1043$) were single, 34.2% ($n = 942$) were dating without cohabiting, and 27.8% ($n = 766$) were cohabiting or married.

Measures

All questionnaires were completed in French. Information about demographics and Facebook usage were collected. Participants' sociodemographic characteristics included gender, age, education, sexual orientation, and relationship status. Participants reported their three most commonly used social networking sites (e.g. Facebook, Instagram, Twitter) as well as the average time spent per day logged onto social networking sites, their number of Facebook friends, and the average number of likes their pictures received.

To assess likes-seeking behaviors on social networking sites, participants indicated on a five-point Likert scale (1 = *Not at all*, 5 = *Very much*) the extent to which they endorsed four items referring to common online behaviors to gain more likes (e.g. "If I see that one of the pictures I posted online receives few likes or comments, I will change or delete it"). These items were developed in French for the current study based on the most common behaviors to gain likes reported during individual interviews between the last author and university students who were active Facebook users. After all reported behaviors were reviewed by a coauthor, the five most common behaviors were retained and pilot tested among 1133 community-based participants aged between 14 and 25 years who had been recruited for another study (75.7% women; age $M = 20.51$, SD = 2.51). Exploratory factor analyses revealed that one item was not loading on the same factor as the others. Correlations between this item and the four others were mostly small and nonsignificant ($r = 0.02$, $p = .508$ to $r = 0.11$ $p = .001$). This behavior ("I

put online videos or comments saying that I will do something in particular if I gain a certain number of likes") was scored 1 = *Not at all* by 97.8% ($n = 1108/1133$) of the sample and thus was removed from the scale. Exploratory factor analysis with the four remaining items then revealed a one-factor solution, with the first factor having an eigenvalue of 1.77 and factor loadings varying from 0.49 to 0.77, and accounting for 44.2% of the variance with an ordinal coefficient alpha of .69. The four final items were then used in the current study and confirmatory factor analysis indicated that the one-factor solution fitted the data well, $\chi^2(2) = 6.99$, $p = .030$; RMSEA = 0.03, 90% CI[0.00 to 0.06]; CFI = 1.00; SRMR = 0.01, with factor loadings all significant and varying from 0.27 to 0.71, and an ordinal coefficient alpha of 0.68. Given that the four questions referred to different online behaviors and that alpha is affected by the limited number of items, we considered this value of alpha to be satisfactory (Cortina 1993). As the factorial structure was satisfactory, the four items were summed to create a total score that varies from 4 to 20.

PFU was assessed using an eight-item French measure developed for the current study based on items from the Problematic Facebook Use Scale (Marino et al. 2017) and the Bergen Facebook Addiction Scale (Andreassen et al. 2012). These items were rated on a six-point scale (1 = *strongly disagree*, 6 = *strongly agree*) and assessed the extent to which Facebook was ingrained into participants' daily life (e.g. "Facebook is part of my daily routine"), emotional attitude toward Facebook (e.g. "I feel out of touch when I am not logged onto Facebook"), withdrawal symptoms (e.g. "I am angry when I cannot log onto Facebook"), compulsive use (e.g. "I am unable to reduce my time spent on Facebook"), and negative outcomes (e.g. "My job or my studies are affected by my Facebook use"). Items taken from the two validated measures were translated into French using forward and backward translation. The eight best items selected by two coauthors were then pilot tested among the aforementioned pilot sample. Exploratory factor analysis yielded a one-factor solution, with the first factor having an eigenvalue of 3.27 and factor loadings varying from 0.49 to 0.74, and accounting for 40.9% of the variance with a coefficient alpha of .78. Confirmatory factor analysis of the sample of the current study indicated that the one-factor solution fitted the data well, $\chi^2(11) = 19.15$, $p = .058$; RMSEA = 0.02, 90% CI[0.00 to 0.03]; CFI = 0.99; SRMR = 0.01, with all factor loadings significant and varying from 0.45 to 0.73, and a coefficient alpha of 0.81. As the factorial structure was satisfactory, these eight items were summed to compute a total score ranging from 8 to 48.

Attachment representations were evaluated with the validated French version of the Experiences in Close Relationships Questionnaire (Brennan et al. 1998; Lafontaine et al. 2016). The attachment anxiety subscale includes six items to assess the extent to which people worry about the availability and responsiveness of their partner in general, whereas the attachment avoidance subscale includes six items to measure the extent to which people are uncomfortable being close to their partner in general. Participants reported their general feeling regarding romantic relationships on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*). Items were averaged for each subscale, with higher scores indicating greater attachment anxiety or avoidance. The French version of this measure showed good psychometric properties (Cronbach's alpha = 0.74 to 0.87) and good test-retest correlations for a one-year period ($r = 0.53$ to 0.82; Lafontaine et al. 2016). In this study, Cronbach's alphas were 0.85 for attachment anxiety and 0.90 for avoidance.

Of the control variables, self-esteem was measured with one question in French ("I have good self-esteem") rated on a 7-point scale (1 = *strongly disagree,* 7 = *strongly agree*), and loneliness was assessed with one question in French ("How often do you feel lonely or isolated") rated on a 4-point scale (0 = *never*, 3 = *always*).

Statistical analyses

Descriptive and correlation analyses were performed using the Statistical Package for the Social Sciences (SPSS 24.0), and path analyses were then performed using M*plus* version 8.0 to examine the hypothesized mediational model. The highest frequency of missing data was 19.9% for attachment avoidance, and missing values were treated using Full Information Maximum Likelihood (FIML) with maximum likelihood estimates robust to non-normality (MLR; Muthén and Muthén 1998–2017). Overall model fit was estimated by considering multiple fit indices: A statistically non-significant chi-square value; a comparative fit index (CFI) of 0.95 or higher; a root mean square error of approximation (RMSEA) <0.06; and a standardized root-mean-square residual (SRMR) <0.08 (Kline 2015). To examine the significance of indirect effects, 95% bootstrap confidence intervals with 10,000 resamples were estimated (Preacher and Hayes 2008).

To examine whether attachment anxiety and avoidance interact in predicting likes-seeking behaviors and PFU, the statistical model depicted in Figure 1 was estimated. In addition to moderation effects on individual links (paths c_{int}' and a_{int}), a moderated mediation occurs when the conditional indirect effect (paths $a_1{*}b_1$ and $a_2{*}b_1$) of one attachment dimension on PFU through likes-seeking behaviors differs across levels of the other attachment dimension. Bias-corrected bootstrapping techniques were employed to

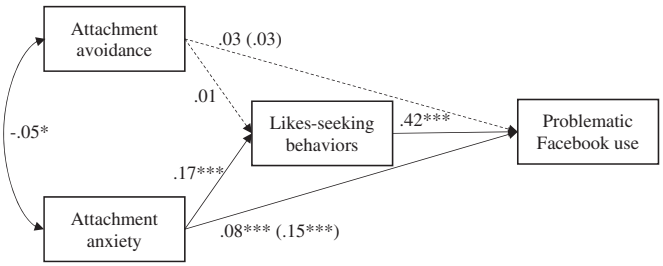

Figure 2. Mediation model of the role of likes-seeking behaviors in the associations between attachment dimensions and problematic Facebook use.
Note: Coefficients are standardized. The covariates are not shown for the sake of clarity. Coefficients in parentheses are the direct effect before the inclusion of the likes-Seeking behaviors. *$p < .05$ and ***$p < .001$.

Table 1. Means, standard deviations, and correlations for attachment dimensions, likes-seeking behaviors, and problematic Facebook use.

	M (SD)			
	$n = 2209–2758$	1.	2.	3.
1. Avoidance	3.07 (1.66)	–		
2. Anxiety	3.91 (1.53)	–0.05*	–	
3. Likes-seeking behaviors	8.29 (2.81)	0.01	0.20***	–
4. Problematic Facebook use	23.33 (7.41)	0.05*	0.21***	0.46***

*$p < .05$ and ***$p < .001$.

Table 2. Moderated mediational path analysis model of the role of likes-seeking behaviors in the associations between attachment dimensions and problematic Facebook use.

	Likes-seeking behaviors			Problematic Facebook use		
	b	*p*	β	*b*	*p*	β
Avoidance	0.01	.877	0.00	0.09	.285	0.02
Anxiety	0.32	.000	0.18	0.42	.000	0.09
Anxiety*avoidance	−0.08	.001	−0.07	−0.17	.003	−0.06
Gender (1 = women)	0.56	.000	0.08	0.52	.115	0.03
Age	0.01	.612	0.01	0.06	.206	0.02
Self-esteem	−0.02	.477	−0.02	−0.11	.188	−0.03
Loneliness	0.30	.001	0.07	1.23	.000	0.12
Likes-seeking behaviors				1.11	.000	0.42

determine if the indirect effect of one attachment dimension was significant at specific values of the other attachment dimension (Preacher et al. 2007).

Results

Descriptive analyses

Almost all participants (98.3%, $n = 2710$) reported that Facebook was one of the three social networking sites they used most frequently; for 81.4% ($n = 2245$), Facebook was the most used. A total of 10.5% ($n = 290$) reported spending less than one hour each day on Facebook, 47.6% ($n = 1313$) between 1 and 3 hours, 26.0% ($n = 718$) between 3 and 5 hours, and 15.6% ($n = 430$) more than 5 hours. Most participants (62.7%, $n = 1730$) had between 100 and 500 Facebook friends, and 80.5% ($n = 2221$) reported receiving on average between 10 and 100 likes for their pictures posted on Facebook.

Means, standard deviations, and bivariate correlations for study variables are presented in Table 1. The correlational analyses revealed preliminary associations that are mostly in line with our hypothetical models. Attachment avoidance was positively associated with PFU. Attachment anxiety was positively associated with likes-seeking behaviors and PFU. Likes-seeking behaviors were positively correlated with PFU.

The mediation model

A path analysis model was tested to assess the direct links between attachment dimensions and PFU and the indirect associations via likes-seeking behaviors. Gender, age, self-esteem, and loneliness were included as covariates. The covariance between attachment anxiety and avoidance was included as well as covariances between these attachment dimensions and covariates. This mediational model, presented in Figure 2, provided a good fit to the data: $\chi^2(2) = 2.24$, $p = .327$; RMSEA = 0.01, 90% CI[0.00 to 0.04]; CFI = 1.00; SRMR = 0.01.

The results showed a direct association between attachment anxiety and PFU before the inclusion of the mediator in the model. This direct association was still significant, although smaller, after the inclusion of likes-seeking behaviors. In addition, attachment anxiety was positively associated with likes-seeking behaviors, which were in turn positively associated with PFU. The results indicated a significant indirect effect (*indirect effect* = 0.34, 95% bootstrap CI: 0.24 to 0.44), with 47.4% of the total effect of attachment anxiety on PFU going through likes-seeking behaviors. Attachment avoidance was not significantly associated with likes-seeking behaviors and PFU. The final model explained 5.5% of the variance in online popularity seeking and 24.8% of the variance in PFU.

The moderated mediation model

To examine if the effect of one attachment dimension varies according to the level of the other attachment dimension, the interaction term between attachment dimensions to predict likes-seeking behaviors and PFU was included in the mediational model. Attachment dimensions were centered prior to computing their interaction. Gender, age, self-esteem, and loneliness were included as covariates. This mediational model yielded satisfactory fit indices: $\chi^2(3) = 3.29$, $p = .349$; RMSEA = 0.01, 90% CI[0.00 to 0.03]; CFI = 1.00; SRMR= 0.01. The results, presented in Table 2, show that the interaction between attachment anxiety and avoidance was significantly associated with likes-seeking behaviors and PFU.

Given the significant interaction, the direct associations between one attachment dimension and PFU were plotted separately for low, high, and very high levels of the other attachment dimension (respectively 1 *SD* below, 1 *SD* above, and 2 *SD* above the mean). For these simple slope tests, all continuous variables were standardized (attachment dimensions were standardized prior to computing their interaction). Simple slope tests, presented in Figure 3(a), indicated that at low levels of attachment avoidance, attachment anxiety was positively associated with PFU. However, at high and very high levels of attachment avoidance, the association was nonsignificant. As displayed in Figure 3(b), simple slope tests show that attachment avoidance was positively associated with PFU at low levels of attachment anxiety, non-significantly associated with PFU at high levels of attachment anxiety, and negatively associated with PFU at very high levels of attachment anxiety.

To examine the indirect effects, the associations between one attachment dimension and likes-seeking behaviors were then plotted separately for low, high, and very high levels of the other attachment dimension (respectively 1 *SD* below, 1 *SD* above, and 2 *SD* above the mean). As displayed in Figure 4(a), simple slope tests indicated that at low and high levels of attachment avoidance, attachment anxiety was positively associated with higher likes-seeking behaviors. At very

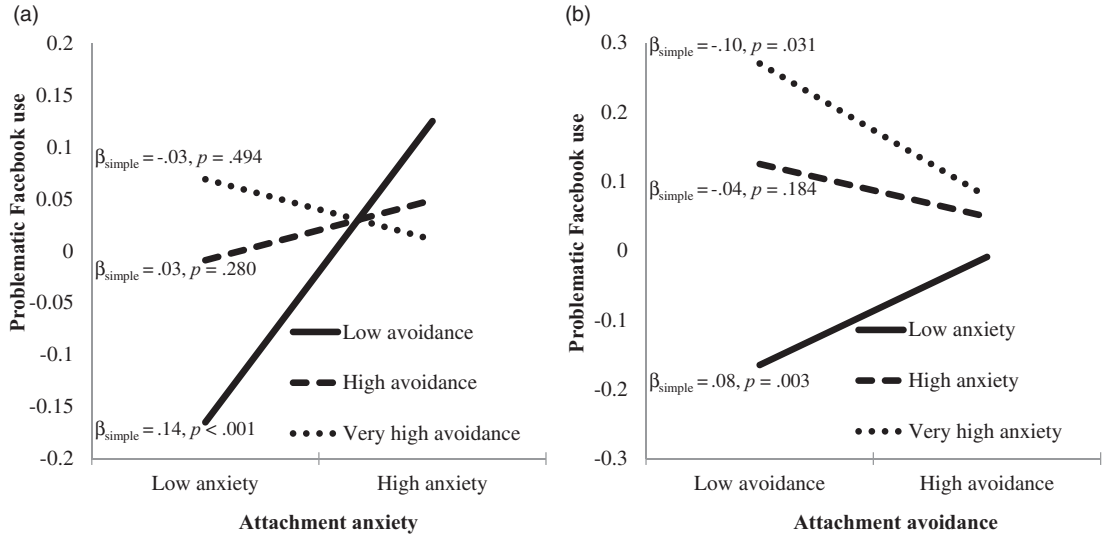

Figure 3. Interaction between attachment anxiety and avoidance within the moderated mediational model predicting problematic Facebook use.
Note: All continuous variables were standardized. Low, high, and very high represent scores at 1 SD below, 1 SD above, and 2 SD above the mean, respectively.

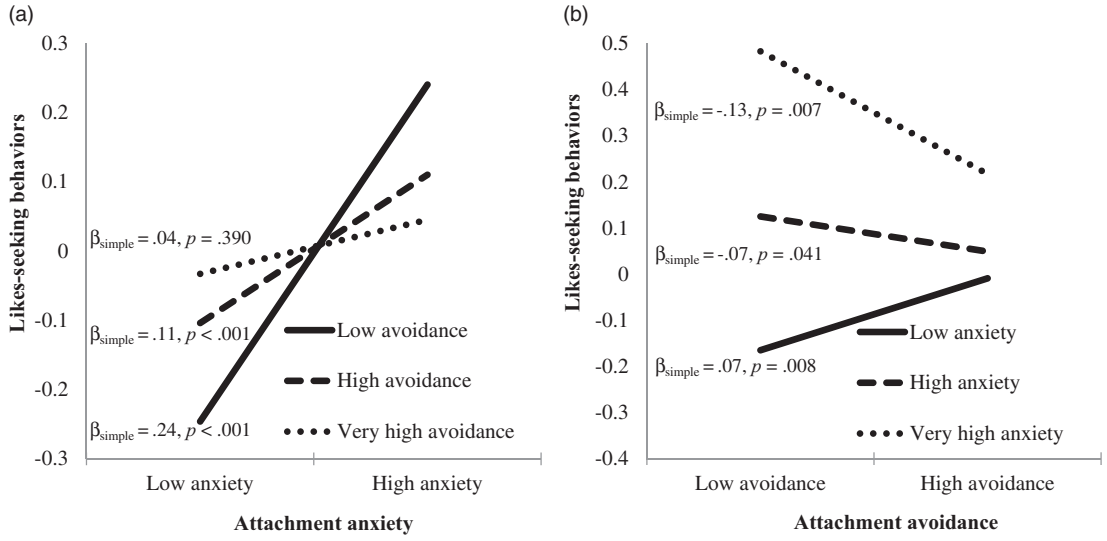

Figure 4. Interaction between attachment anxiety and avoidance within the moderated mediational model predicting likes-seeking behaviors.
Note: All continuous variables were standardized. Low, high, and very high represent scores at 1 SD below, 1 SD above, and 2 SD above the mean, respectively.

high levels of attachment avoidance, the association was nonsignificant. As displayed in Figure 4(b), simple slope tests showed that at low levels of attachment anxiety, attachment avoidance was positively associated with likes-seeking behaviors, but at high and very high levels of attachment anxiety, attachment avoidance was negatively associated with likes-seeking behaviors.

The conditional indirect effect of attachment anxiety on PFU through likes-seeking behaviors was positive and significant at low levels (1 *SD* below the mean: *indirect effect* = 0.10, 95% bootstrap CI: 0.08 to 0.13) and at high levels (1 *SD* above the mean: *indirect effect* = 0.05, 95% bootstrap CI: 0.02 to 0.07) of attachment avoidance, but was nonsignificant at very high levels of attachment avoidance (2 *SD* above the mean: *indirect effect* = 0.02, 95% bootstrap CI: −0.02 to 0.05). The conditional indirect effect of attachment avoidance on PFU through likes-seeking behaviors was positive and significant at low levels of attachment anxiety (1 *SD* below the mean: *indirect effect* = 0.03, 95% bootstrap CI: 0.01 to 0.05). At high and very high levels of attachment anxiety, this indirect effect was negative and significant (1 *SD* above the mean: *indirect effect* = −0.03, 95% bootstrap CI: −0.05 to −0.002; 2 *SD* above the mean: *indirect effect* = −0.06, 95% bootstrap CI: −0.10 to −0.02).

Discussion

Our findings support attachment theory as a valuable framework for understanding higher PFU, as has been shown for most addictions (Flores 2004). The present study provides important new insights into the interpersonal correlates of PFU in adolescents and young adults by showing that the

interplay between attachment anxiety and attachment avoidance offers an explanation of the attachment contexts in which Facebook may become problematic. In addition, our results show that likes-seeking behaviors mediated the associations between attachment and PFU.

Attachment and problematic Facebook use

We found that attachment anxiety, but not attachment avoidance, was positively related to PFU, which is in line with the results of some past studies (Andangsari et al. 2013; Oldmeadow et al. 2013). The significant association with attachment anxiety is consistent with past empirical studies that showed an association between attachment anxiety and various social-media behaviors, including more frequent Facebook use (Hart et al. 2015; Oldmeadow et al. 2013), as well as associations with social media addiction and problematic Internet use in general (Odacı and Çıkrıkçı 2014; Blackwell et al. 2017). According to attachment theory, in an attempt to manage chronic interpersonal insecurities, anxiously attached individuals may use Facebook as a self-soothing strategy, fulfilling the constant need to be validated and offering a sense of belonging through constant connection with friends (Bartholomew and Horowitz 1991; Mikulincer and Shaver 2007). These hyperactivation strategies may pave the way to the compulsive cycle of PFU, as is the case for other addictions (Flores 2004). On the other hand, Facebook users who have little need to forge close emotional bonds with others—individuals with high attachment avoidance—may be less at risk of losing control over their Facebook use, as reflected in the nonsignificant association we observed between attachment avoidance and PFU.

The significant interaction between anxiety and avoidance in predicting likes-seeking behaviors and PFU goes beyond the results of past studies and suggests a much more complex interplay between attachment needs and Facebook behaviors. Our results indicate that the association between either of the attachment dimensions and PFU is stronger when the level of the other dimension is low. This is in line with the results of Odacı and Çıkrıkçı (2014), who demonstrated that problematic Internet use is associated with the dismissive and preoccupied attachment styles, but not the secure (low anxiety and avoidance) or fearful ones (high anxiety and high avoidance).

Thus, attachment avoidance is also associated with PFU, but only when attachment anxiety is low. The inherent greater distance provided by online interactions than face-to-face ones may be attractive to the point of addiction for individuals with high levels of attachment avoidance but no abandonment fear, as it allows for interactions with others while preserving autonomy. When attachment insecurities are not conflicting, as in individuals with high attachment anxiety and low attachment avoidance or vice versa, strategies to manage these insecurities may be easily and even compulsively used on Facebook. When both attachment dimensions are high, the contradiction between hyperactivation and deactivation attachment strategies may not be easily rewarded through Facebook behaviors. The desire for closeness followed by the withdrawal response evidenced by individuals with high levels on both attachment dimensions might lead to a disorganized involvement on Facebook that is not characteristic of the stable and pervasive engagement characteristic of PFU. Our findings suggest that overlooking these interaction effects might have biased the conclusions of past studies and might explain their nonsignificant or contradictory results (Hart et al. 2015; Jenkins-Guarnieri et al. 2012; Oldmeadow et al. 2013).

Likes-Seeking behaviors as an explanatory mechanism

In line with our hypothesis, it was found that the association between attachment anxiety and PFU was mediated by likes-seeking behaviors. This result is in line with those of another study (Hart et al. 2015) that reported that anxiously attached individuals are more prone to frequent posting, commenting, and liking on Facebook, probably because they are more preoccupied with social feedback and their activities generate more attention from others. Zell and Moeller (2018) reported that the number of likes and positive comments is a strong correlate of perceiving oneself as being of interest to the Facebook community. PFU may arise in anxiously attached individuals because they are trying, via Facebook, to improve their negative view of self by gaining validation and attention from others' likes and comments.

The main effect of attachment avoidance on PFU was not mediated by likes-seeking behavior. However, likes-seeking behaviors mediated the link between avoidance and PFU when levels of attachment anxiety were low. This is surprising, as individuals with a dismissing-avoidant attachment style (high avoidance and low anxiety) usually deny their needs for other people and avoid interdependence (Mikulincer and Shaver 2007). However, for individuals with a dismissing-avoidant attachment style, likes and comments on Facebook may be a strategy to overcome interpersonal difficulties in the offline world by creating relations and gaining attention online while maintaining a safe distance regarding intimacy and emotional disclosure. Likes-seeking behaviors may thus represent a safe way to enhance self-image for insecure adolescents and young adults with this specific attachment style, making them more prone to developing PFU.

Our results also add some nuance by showing that the link between attachment anxiety and likes-seeking behaviors lacks significance when paired with very high levels of attachment avoidance (i.e. fearful avoidant style). The association between attachment avoidance and likes-seeking behaviors was in fact negative when paired with high or very high levels of attachment anxiety. For these fearful avoidant individuals with a negative view of self and others, likes and comments on Facebook may constitute a context in which they might be judged negatively by others or even rejected by being "not likes." These are specifically the types of at-risk interactions they probably prefer to avoid.

Limitations and directions for future research

Our results should be interpreted in light of certain limitations. First, although the mediating model suggests an ordering of variables based on a clinical and theoretical understanding, the correlational design makes it impossible to determine causality. Longitudinal or experimental studies should be employed to address the issue of causal directionality. Second, the use of a convenience sample with more women than men limits the representativeness of our sample. Future research should replicate our findings with a more representative sample and should examine our moderated mediation model in older adults. Third, only self-report measures were used, which have inherent biases and are dependent on individuals' self-perceptions. Future research should replicate our findings using interviewer ratings of attachment behaviors and observations of Facebook behaviors. Moreover, the internal consistency of the likes-seeking measure developed for the present study was adequate but could be improved; the small number of items could be enlarged. Finally, we specifically examined Facebook, as we were interested in a feature that was first developed for Facebook and is commonly used on this social media, namely likes. However, Facebook is only one of the many websites available for social networking, and for now our moderated mediational model is only applicable to Facebook users. Future studies should use general measures of likes-seeking behaviors (e.g. the heart symbol on Instagram) and problematic social media use to confirm that our findings can be generalized to other social networking sites. Facebook includes a vast array of activities: Playing games, posting status updates, watching videos, sending private messages, commenting, chatting, etc. The PFU measure does not differentiate between these different activities, but this should be done in future studies, as the underlying addiction process may differ according to the specific Facebook activity in which a person engages compulsively (Griffiths 2013).

Conclusions

Our findings yield a more sophisticated understanding of how and under which conditions PFU may arise. This study underscores the way in which online addictive behaviors are likely to reflect interpersonal dynamics typical of attachment anxiety and avoidance. We also suggest that attachment strategies used on Facebook to regulate one's view of self – likes-seeking behaviors – partly explain why the interplay between attachment dynamics may be associated with PFU. Attachment strategies and likes-seeking behaviors should both be assessed as possible predictors of current PFU. We suggest the use of attachment theory as a framework that may inform avenues for intervention and strategies aimed at reducing the compulsive use of Facebook as well as the associated consequences (Flores 2001; Mikulincer et al. 2013).

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