Personality and Individual Differences 149 (2019) 214–219

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Dark personality traits and problematic smartphone use: The mediating role of fearful attachment

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ARTICLE INFO

Keywords:
Problematic smartphone use
Attachment
Machiavellianism
Psychopathy
Narcissism
Sadism
Spitefulness

ABSTRACT

Recently, empirical research has shown dark personality traits (i.e., Machiavellianism, psychopathy, narcissism, sadism, spitefulness) to be associated with problematic and addictive online behaviors. However, their direct relationships with problematic smartphone use (PSU) have yet to be examined. The present study investigated the direct and indirect associations of dark personality traits with PSU via fearful and dismissing attachment styles among 546 participants. Results indicated that men had higher scores on measures assessing dark personality traits and women had higher PSU. Narcissism and spitefulness were directly associated with PSU in the total sample, men, and women. Machiavellianism was indirectly associated with PSU via fearful attachment among men and sadism was directly and indirectly associated with PSU via fearful attachment among women. Findings suggest that dark personality traits may play a contributory role in higher PSU (with different traits having different effects among men and women), and that attachment styles partially explain the relationship between dark traits and PSU.

1. Introduction

Despite its facilitating uses, smartphone use can be problematic and harmful for a minority of individuals (Billieux, 2012; Billieux, Maurage, Lopez-Fernandez, Kuss, & Griffiths, 2015). Problematic smartphone use (PSU) has been defined as the excessive and increasingly uncontrolled use of smartphones that cause daily-life disturbance (Kwon, Kim, Cho, & Yang, 2013). Empirical research has indicated that PSU can lead to serious psychological and physical impairments for individuals, including elevated depression, anxiety, stress, lower sleep quality, and decreased physical activity (Demirci, Akgönül, & Akpinar, 2015; Haug et al., 2015; Xie, Dong, & Wang, 2018). It is therefore of critical importance that the predictors of PSU should be investigated in helping develop intervention and prevention strategies. According to the pathway model of problematic mobile phone use (Billieux et al., 2015), personality traits and adult attachment are among the core psychological elements that can help explain individuals' problematic and addictive use of mobile phones. Recent studies suggest that dark personality traits are positively associated with problematic use of specific and nonspecific online activities (e.g., Sindermann, Sariyska, Lachmann, Brand, & Montag, 2018). However, the associations between such traits and PSU have yet to be empirically examined. Individuals with dark personality traits are more likely to engage in PSU because it co-occurs with the other problematic online behaviors (Salehan & Negahban, 2013). Moreover, given that individuals with dark personality traits posess different adult attachment styles (Brewer et al., 2018;Ináncsi, Láng, & Bereczkei, 2015) and adult attachment styles are associated with PSU (Chiara D'Arienzo, Boursier, & Griffiths, 2019; Kim & Koh, 2018; Monacis, De Palo, Griffiths, & Sinatra, 2017a; Yuchang, Cuicui, Junxiu, & Junyi, 2017), investigating the mediating role of attachment style on the association between dark personality traits and PSU is likely provide further understanding of this

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https://doi.org/10.1016/j.paid.2019.06.005
Received 19 April 2019; Received in revised form 31 May 2019; Accepted 4 June 2019

relationship. Consequently, the present study examined the role of antisocial personality traits (i.e., narcissism, Machiavellianism, psychopathy, sadism, and spitefulness) as distal predictors of PSU and avoidant attachment styles (i.e., fearful, dismissing) as proximal predictors of PSU.

1.1. Dark personality traits and problematic smartphone use

According to pathway model of PSU (Billieux et al., 2015), antisocial personality is among the *impulsive pathway* characteristics that may lead to addictive, antisocial, and/or risky use of smartphones. Recently, increasing attention has been given to the role of dark personality traits in the problematic use of online technologies. For example, problematic internet use and problematic online gaming are associated with Machiavellianism, spitefulness, and psychopathy (Kircaburun & Griffiths, 2018; Sindermann et al., 2018), problematic online gambling is associated with psychopathy (Sindermann et al., 2018), problematic online communication is associated with Machiavelianism and narcissism (Kircaburun, Jonason, & Griffiths, 2018a), and problematic online pornography use is associated with all Dark Triad traits (Sindermann et al., 2018). Other studies have reported that Machiavellianism is both directly and indirectly associated with problematic internet use via online gambling and online gaming, spitefulness is directly and indirectly related to it via online gambling and online shopping, and narcissism is indirectly associated with problematic internet use via online social networking (Kircaburun & Griffiths, 2018). Despite the empirical evidence associating dark personality traits with problematic technology use, their potential role in smartphone use specifically has yet to be investigated. Consequently, the association between dark personality traits and PSU warrants further investigation.

There are both common and unique features that individuals with dark traits possess that may result in PSU. For instance, narcissists may be more prone to PSU given their desire for approval and admiration, which manifests in biased online self-presentations (Casale & Fioravanti, 2018). Machiavellianism is associated with interpersonal manipulation and deceptive self-promotion, which can lead to cyberbullying, cybertrolling, and cyberstalking (Kircaburun et al., 2018a; Ladanyi & Doyle-Portillo, 2017) which can make individuals susceptible to smartphone preoccupation. Psychopathy is associated with impulsivity, recklessness, and emotion dysregulation (Jonason, Lyons, Bethell, & Ross, 2013; Zeigler-Hill & Vonk, 2015), making psychopaths struggle to control their urges to spend long hours on their smartphones for pleasure and/or sensation seeking purposes (Lin & Tsai, 2002). Sadistic individuals have a tendency to enjoy humiliating others, cruelty, and malevolent behaviors (O'Meara, Davies, & Hammond, 2011). Spiteful individuals struggle to regulate their emotions (Zeigler-Hill & Vonk, 2015) and are more detached from real-life social surroundings (Zeigler-Hill & Noser, 2018). Spiteful individuals may not be able to fulfill the need for social interaction in real life, and may therefore attempt to compensate in virtual contexts via their smartphones (Kardefelt-Winther, 2014). However, consistently using smartphones for mediated social interaction may lead to the development and maintenance of PSU (Kircaburun, Jonason, & Griffiths, 2018b). As aforementioned, an additional factor that may help explain the development and maintenance of PSU is an individuals' attachment style.

1.2. The mediating role of adult attachment

According to pathway model of PSU (Billieux et al., 2015), adult attachment is among the *reassurance pathway* characteristics, and poor self-models of adult attachment can be a risk factor for PSU. Attachment refers to “the lasting psychological connectedness between human beings” (Bowlby, 1969, p. 194). Attachment theory posits that individuals develop an attachment style via their interactions with caregivers in early childhood and that such patterns of attachment remain stable into adulthood (McNally, Palfai, Levine, & Moore, 2003). Ainsworth, Blehar, Water, and Wall (1978) characterized attachment in terms of secure, anxious/ambivalent, and avoidant styles. However, other researchers have further expanded these categories to better understand how mental models of attachment develop into adolescence and adulthood and influence adult romantic attachments. For instance, Bartholomew and Horowitz (1991) specified four attachment styles based on individuals' mental models of self (representing dependence or anxiety) and other (representing avoidance). These styles are *secure* (positive model of self and other), *preoccupied* (positive model of other, but negative model of self), *fearful* (negative model of self and other), and *dismissing* (positive model of self, but negative model of other).

The present study specifically focused on individuals with negative models of others (i.e., high avoidance) because the extent to which individuals report possessing such mental models was predicted to mediate the association between dark personality traits and PSU. As noted above, Bartholomew and Horowitz (1991) suggest that individuals with negative views of others can be either dismissing or fearful, depending upon their model of self. Both fearfully and dismissively attached individuals are avoidant and distrustful of others, but fearful individuals have a poor self-image, whereas dismissively attached individuals have a positive self-image (Bartholomew & Horowitz, 1991). Individuals with a negative model of others (as indicated by higher scores on measures of avoidant attachment) engage in fewer real-life social interactions and feel less belongingness because of their social reluctance (Hart, Nailling, Bizer, & Collins, 2015). Avoidant attachment is associated with maladaptive emotional regulation strategies and problematic technology use (Beyderman & Young, 2016; Kim & Koh, 2018), which may be a compensatory behavior to deal with their limited social interaction (McNally et al., 2003). Indeed, avoidant attachment is associated with PSU (Blackwell, Leaman, Tramposch, Osborne, & Liss, 2017; Kim & Koh, 2018), which may indicate that individuals higher in avoidant attachment are compensating for a lack of social connection by interacting in controlled and safe contexts (Monacis, De Palo, Griffiths, & Sinatra, 2017b).

Given that dark personality traits are related to attachment dysfunctions (Jonason, Lyons, & Bethell, 2014), the present study hypothesized that avoidant attachment (i.e., fearful, dismissing) would mediate the association between dark personality traits and PSU. Avoidant attachment is correlated with higher Machiavellianism and psychopathy and fewer social skills (Jonason, Baughman, Carter, & Parker, 2015), which may mean that individuals high in these traits may try to avoid intimate interactions and close relationships via forming avoidant attachment systems (Rauthmann, 2011; Schimmenti et al., 2014). In contrast, narcissism is associated with less avoidant attachment and more social skills (Jonason et al., 2014, 2015), implying that not all dark personality traits promote adverse social relationships. Consequently, whether the goal is to avoid intimate social relations or to have controlled interactions with others, individuals with dark personality traits may engage in problematic use of virtual communication via their smartphones, which may be explained by avoidant attachment because individuals characterized with dark traits may engage in greater avoidance of emotions and intimacy and have an elevated inability to form strong attachment bonds in adulthood (Schimmenti et al., 2014).

1.3. Gender and problematic technology use

Empirical literature suggests different patterns of gender differences in PSU, different online activities, and dark personality traits. Studies report that dark personality traits are found more among males than females in relation to problematic technology use (e.g., Kircaburun & Griffiths, 2018). Studies have also found higher PSU and use of online activities that can be engaged via smartphones (e.g., social media, shopping) in women (Billieux, 2012; Emirtekin et al., 2019; Kircaburun & Griffiths, 2018). Even though no consistent gender differences have

Table 1
Pearson's correlations of the study variables among the total sample (N = 546).

	1	2	3	4	5	6	7	8
1. Problematic smartphone use	–							
2. Fearful attachment	0.21***	–						
3. Dismissing attachment	0.06	0.48***	–					
4. Machiavellianism	0.21***	0.21***	0.20***	–				
5. Psychopathy	0.10*	0.15**	0.27***	0.64***	–			
6. Narcissism	0.25***	0.07	0.15***	0.49***	0.39***	–		
7. Sadism	0.26***	0.17***	0.18***	0.42***	0.38***	0.27***	–	
8. Spitefulness	0.29***	0.13**	0.19***	0.52***	0.46***	0.35***	0.50***	–
M	2.46	4.04	4.67	2.52	2.70	3.73	1.15	1.47
SD	1.05	1.11	1.02	1.65	1.68	2.25	0.14	0.64

* $p < .05$.
** $p < .01$.
*** $p < .001$.

been reported, men may be described as being more avoidant and women as being more anxiously attached (Van IJzendoorn & Bakermans-Kranenburg, 2010). Consequently, based on the aforementioned rationale and the predictions of the pathway model of PSU (Billieux et al., 2015), the mediating role of avoidant attachment styles (i.e., fearful, dismissing) in the relationship between dark personality traits (i.e., narcissism, Machiavellianism, psychopathy, sadism, and spitefulness) and PSU was examined. Also, gender differences in the aforementioned variables and relationships were further examined in the present study.

2. Method

2.1. Participants and procedure

The sample comprised 251 men and 295 women who completed an online survey that was promoted in Yaşar University's distance learning center in Turkey. Participation in the study was voluntary and participants were not compensated or rewarded for their participation. Sample sizes for each sex were above the recommended thresholds (N = 250) for obtaining stable correlation estimates (Schönbrodt & Perugini, 2013). Prior to completing the survey, participants had to give their informed consent that they were aware that participation in the study was voluntary and anonymous and that their data would only be used for scientific purposes. If they consented, they proceeded through a series of self-report questions and upon completion they were thanked and debriefed.

2.2. Measures

The Turkish form (Demirci, Orhan, Demirdas, Akpinar, & Sert, 2014) of the 10-item Smartphone Addiction Scale Short Version (Kwon et al., 2013) was used to assess PSU (e.g., "*I miss planned work due to smartphone use*"). Items (1 = *strongly disagree*, 6 = *strongly agree*) were averaged together to create a score for PSU (Composite Reliability Score [CRS] = 0.91).

The Turkish form (Sümer & Güngör, 1999) of the Relationship Questionnaire (Bartholomew & Horowitz, 1991) was used to assess adult attachment styles. This questionnaire has four sub-scales (i.e. secure, preoccupied, fearful, dismissing attachment). In line with the aim of this study, only the four-item fearful (e.g., "*I am uncomfortable getting close to others*") and five-item dismissing (e.g., "*I am comfortable without close relationships*") attachment scales were used in the present study. Items (1 = *absolutely not true*, 7 = *absolutely true*) were averaged to create scores for fearful (CRS = 0.75) and dismissing attachment (CRS = 0.75).

The Turkish form (Özsoy, Rauthmann, Jonason, & Ardıç, 2017) of the 12-item Dark Triad Dirty Dozen Scale (Jonason & Webster, 2010) was used to assess Machiavellianism (e.g., "*I tend to exploit others towards my own end*"), psychopathy (e.g., "*I tend to be callous or insensitive*"), and narcissism (e.g., "*I tend to seek prestige or status*"). Items (1 = *strongly disagree*, 9 = *strongly agree*) for each scale were averaged together to create scores for Machiavellianism (CRS = 0.90), psychopathy (CRS = 0.85), and narcissism (CRS = 0.92).

The Turkish form (Kircaburun et al., 2018b) of the Short Sadistic Impulse Scale (O'Meara et al., 2011) was used to assess sadistic impulses (e.g., "*Hurting people would be exciting*"). This scale comprises 10 dichotomous items, where participants indicate whether the items are "*like me*" or "*unlike me*." Items were averaged together to create scores for sadism (CRS = 0.86).

The Turkish form (Kircaburun & Griffiths, 2018) of the 17-item Spitefulness Scale (Marcus, Zeigler-Hill, Mercer, & Norris, 2014) was used to assess spiteful dispositions (e.g., "*It might be worth risking my reputation in order to spread gossip about someone I did not like*"). The Turkish form comprises 11 items that are compatible with Turkish university students (Kircaburun & Griffiths, 2018). Items (1 = *never*, 5 = *always*) were averaged together to create scores for spitefulness (CRS = 0.90).

3. Results

Analysis indicated PSU was positively correlated with fearful attachment and dark personality traits for the total sample, as well as for men and women separately (with the exception that psychopathy was not associated with PSU for women) with very small (r = 0.10) to almost moderate (r = 0.29) effect sizes (see Table 1). A series of t-tests (see Table 2) demonstrated that women reported significantly higher PSU scores than men, whereas men reported significantly higher scores for all dark personality traits. Saturated mediation models were tested with the total sample, as well as separately for men and women, to examine the mediating role of fearful and dismissing attachment styles

Table 2
Comparison of the scores of study variables between men and women.

	Men (n = 251)	Women (n = 295)	t-Test	Cohen's d
Problematic smartphone use	2.31 (1.01)	2.59 (1.07)	−3.11**	0.27
Fearful attachment	3.98 (1.11)	4.08 (1.11)	−1.03	0.09
Dismissing attachment	4.72 (1.07)	4.62 (0.99)	1.24	0.10
Machiavellianism	2.93 (1.91)	2.16 (1.29)	5.65***	0.47
Psychopathy	3.01 (1.89)	2.44 (1.42)	3.96***	0.34
Narcissism	3.96 (2.28)	3.54 (2.20)	2.18*	0.19
Sadism	1.17 (0.17)	1.13 (0.11)	2.79**	0.28
Spitefulness	1.62 (0.74)	1.35 (0.52)	4.93***	0.42

Note: M (SD).
* $p < .05$.
** $p < .01$.
*** $p < .001$.

Table 3
Standardized estimates of total, direct, and indirect effects among total sample, men, and women.

	Effect (S.E.)		
	All	Men	Women
Machiavellianism			
➔ PSU (total effect)	0.06 (0.06)	0.19* (0.10)	0.03 (0.07)
➔ PSU (direct effect)	0.02 (0.06)	0.14 (0.10)	−0.00 (0.07)
➔ PSU (indirect effect)	0.04** (0.02)	0.05** (0.02)	0.03* (0.02)
Narcissism			
➔ PSU (total effect)	0.17** (0.05)	0.20** (0.06)	0.13* (0.07)
➔ PSU (direct effect)	0.18** (0.04)	0.20** (0.06)	0.16* (0.07)
➔ PSU (indirect effect)	−0.01 (0.01)	0.00 (0.01)	−0.03* (0.01)
Sadism			
➔ PSU (total effect)	0.15** (0.05)	0.08 (0.08)	0.21** (0.06)
➔ PSU (direct effect)	0.14** (0.05)	0.08 (0.08)	0.18** (0.06)
➔ PSU (indirect effect)	0.01 (0.01)	−0.00 (0.01)	0.02* (0.01)
Spitefulness			
➔ PSU (total effect)	0.20** (0.06)	0.30*** (0.08)	0.17* (0.08)
➔ PSU (direct effect)	0.20** (0.05)	0.30*** (0.07)	0.17* (0.08)
➔ PSU (indirect effect)	−0.00 (0.01)	0.00 (0.02)	−0.00 (0.01)
Psychopathy			
➔ PSU (total effect)	−0.16** (0.06)	−0.21* (0.09)	−0.14* (0.07)
➔ PSU (direct effect)	−0.14** (0.06)	−0.18 (0.09)	−0.13 (0.07)
➔ PSU (indirect effect)	−0.02 (0.01)	−0.03 (0.02)	−0.01 (0.01)

Note: PSU = Problematic smartphone use. Only significant pathways are shown in the table. Indirect effects of Machiavellianism, narcissism, sadism, and spitefulness on PSU are through fearful attachment, and psychopathy through dismissing attachment.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

on the association between dark traits and PSU. These analyses were carried out using the bootstrapping method with 95% bias-corrected confidence intervals and 5000 bootstrapped samples in AMOS 23.0 software.

Table 3 contains the full results of the indirect effects testing. Among the total sample, narcissism, sadism, and spitefulness were directly (positively) associated with PSU, and psychopathy was directly (negatively) associated with PSU. Among men, narcissism and spitefulness were directly (positively) associated with PSU, and Machiavellianism was indirectly (positively) associated with PSU via fearful attachment. Among women, narcissism and spitefulness were directly (positively) associated with PSU, and sadism was both directly and indirectly (positively) related to PSU via fearful attachment. A categorical moderation was tested using sex as a moderator in the model. There were no statistically significant moderation or moderated mediations observed. Psychopathy was not associated with fearful attachment; dismissing attachment was not associated with any of the personality constructs, except for its association with psychopathy and PSU among the total sample. The total tested mediation model explained 22% of the PSU variance among the total sample (Fig. 1).

Even though psychopathy and dismissing attachment did not correlate with PSU negatively in the correlation test, they were negatively related to PSU in the path analysis. This may indicate that a *suppressor variable* (i.e., a variable correlated with PSU that could have influenced the relationships between PSU, psychopathy, and dismissing attachment) impacted the analysis conducted such that the direction of the relationship observed changed in the path analysis (Ludlow & Klein, 2014). Because the possibility that the significant relationship observed in the path analysis is a statistical artifact cannot be excluded, these findings are not interpreted or discussed. Finally, to examine the additional contribution of sadism and spitefulness to the Dark Triad, hierarchical multiple regression analyses predicting PSU were conducted, while controlling for fearful and dismissing attachment, Machiavellianism, psychopathy, and narcissism. Sadism accounted for an additional 3% of PSU and spitefulness for an additional 2%.

4. Discussion

The present study, based on the theoretical assumptions of the pathway model of PSU (Billieux et al., 2015) and extant empirical evidence, examined the direct and indirect associations of the dark personality traits of narcissism, Machiavellianism, psychopathy, sadism, and spitefulness with PSU via avoidant adult attachment styles of fearful and dismissing attachments. The findings demonstrate empirical support for the pathway model of PSU that the interaction of individuals' core characteristics of personality and adult attachment may directly and/or indirectly result in PSU. Partially parallel to the study's expectations, fearful attachment had a mediating role on the relationships of Machiavellianism (fully), sadism (partially), and narcissism (negatively partially) with PSU. Machiavellianism and sadism were positively associated with fearful attachment, whereas narcissism was negatively related to it, and in turn, fearful attachment was positively associated with PSU. Furthermore, sadism, narcissism, and spitefulness were positively directly associated with PSU.

The direct relationship between narcissism and PSU is consistent with the existing literature, which found that narcissistic individuals had higher PSU (e.g., Pearson & Hussain, 2015), but the finding also contradicts other reported non-significant associations (e.g., Hussain, Griffiths, & Sheffield, 2017). Individuals with narcissistic traits may use smartphones for self-promotion and self-presentation in virtual platforms (such as social networking platforms) given their proneness to these behaviors (Andreassen, Pallesen, & Griffiths, 2017), and positive mood modification by obtaining desired gratifications may develop into problematic use (Kircaburun et al., 2018a). Sadism was directly associated with PSU among women. Women with more sadistic impulses may become problematic smartphone users in attempts to stalk others in online contexts, which has been associated with problematic social media use (Kircaburun et al., 2018a). Sadistic individuals engage in cyberbullying and cyberstalking (Smoker & March, 2017; van Geel, Goemans, Toprak, & Vedder, 2017). These obsessive behaviors may promote preoccupation and fear of missing out that can lead to excessive engagement and PSU (Balta, Emirtekin, Kircaburun, & Griffiths, 2018). Even though the present study is the first to provide empirical evidence for the association between spitefulness and PSU, this result was expected. Spiteful individuals are low in self-esteem and high in impulsivity, aggressiveness, and emotion dysregulation (Marcus et al., 2014; Zeigler-Hill & Vonk, 2015), which may result in higher vulnerability for developing problematic use of technology and online activities (Andreassen, 2015; Billieux, 2012). Furthermore, spitefulness is associated with problematic internet use via the use of different applications such as online gambling and online shopping (Kircaburun & Griffiths, 2018), which may also promote PSU.

Fearful attachment mediated the relationships of Machiavellianism, sadism, and narcissism with PSU. There may be bidirectional relationships between attachment styles and dark personality traits. An individual's adult attachment style is typically shaped by the parental care received in childhood (Bartholomew & Horowitz, 1991). Given that being raised with a dysfunctional parent may alter an individual's approach to life and their personality (Parker et al., 1999), dark personality traits may be a mediational factor in the transition of an individual's early parental attachment experiences to their development of adult attachment. Individuals may develop antisocial and callous/unemotional personality traits as an adaptation to insecure and avoidant parenting, and in turn, those with dark personality traits adopt an avoidant approach in social and romantic relationships to protect themselves from getting hurt (Jonason, Zeigler-Hill, & Baldacchino, 2017). Consequently, and consistent with the existing evidence (Jonason et al., 2014), fearful attachment was found among Machiavellians and sadists, and lower fearful attachment among narcissistics.

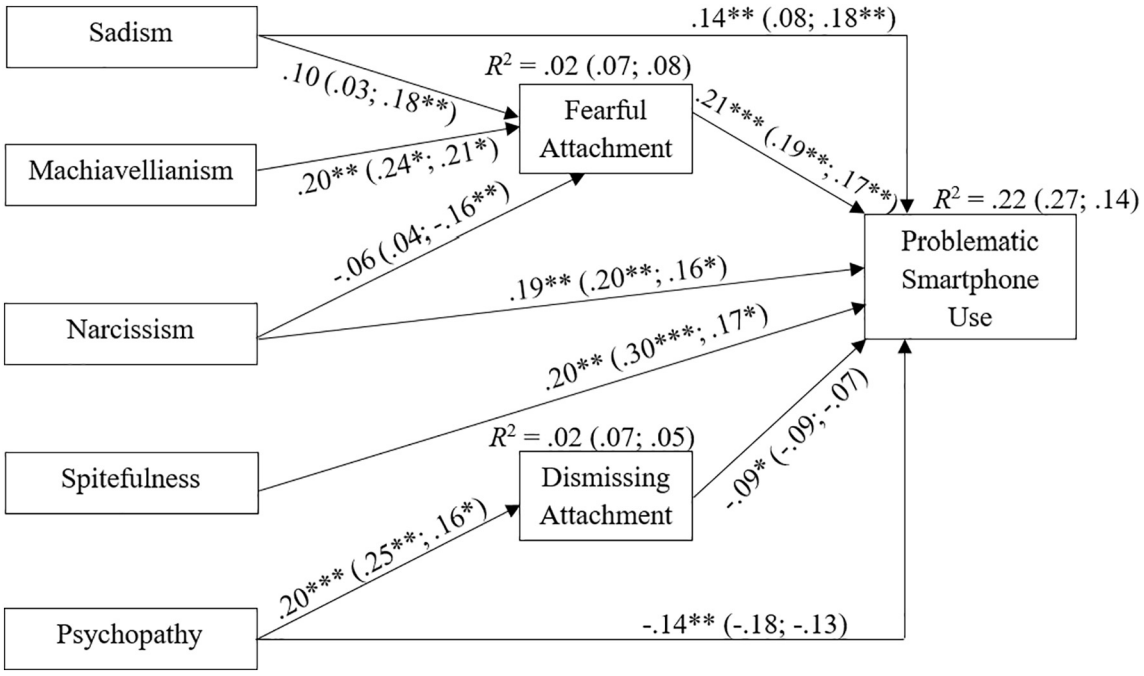

Fig. 1. Final model of the significant path coefficients among the total sample, men, and women.
For clarity, covariates among independent and mediator variables are not depicted in the figure. The standardized path coefficients outside the brackets belong to the total sample, whereas values on the left side in the brackets belong to men and the ones on the right belong to women. *$p < .05$, **$p < .01$, ***$p < .001$.

Partially in line with the hypotheses, fearful attachment, but not dismissing attachment, was related to greater PSU. Fearfully attached individuals regard themselves as unlovable and believe that others will not be able to meet their needs, indicating that they have both self-esteem and self-worth problems (Bartholomew & Horowitz, 1991). Consequently, they may prefer avoiding social and romantic encounters and interactions to avoid rejection, which may cause them to spend more time in virtual mediums of communication. Furthermore, individuals with fearful attachment tend to have adverse psychological health outcomes including depression, rumination, loneliness, and social anxiety (Beyderman & Young, 2016; Bifulco et al., 2006), and PSU is a known maladaptive coping strategy for reducing depressive and lonely feelings, ruminative thoughts, and social anxiety (Elhai, Dvorak, Levine, & Hall, 2017; Elhai, Tiamiyu, & Weeks, 2018). The non-significant relationship between dismissing attachment and PSU may be explained by the fact that fearful attachment has been negatively associated with self-esteem, whereas individuals with dismissing attachment had higher self-esteem (Bylsma, Cozzarelli, & Sumer, 1997). Contrary to fearfully attached individuals, those with dismissing attachment have a positive opinion about themselves and their competence in life (Bartholomew & Horowitz, 1991), which may lead them to spend more time in proving themselves to be successful and attractive in different life domains such as sports and/or physical attractiveness (Bylsma et al., 1997) and less time in online contexts.

5. Limitations and conclusions

The present study is not without its limitations. The main concern is that there were consistently small effects of dark personality traits and adult attachment on PSU. There were significant results that related PSU to individual difference variables, but these results were weak. There may be other variables that were not considered that might be moderately or largely associated with PSU. Therefore, future studies could investigate different individual difference predictors of PSU to identify other potential variables. Second, the cross-sectional design means that no causal conclusions for the found relationship can be made. Consequently, future studies should adopt longitudinal and qualitative approaches to better understand the aforementioned relationships. Third, data were collected from a single university in Turkey, prevents generalizability of the present findings. Therefore, future replication studies should utilize samples from other age groups and cultures. Finally, collecting data using self-report surveys has specific limitations, including response biases such as memory recall and social desirability.

Despite these limitations, there are several important contributions offered by the findings presented here. The present study is the first to consider the predictive role of dark personality traits upon PSU, and to demonstrate direct and indirect relationships of dark personality traits with PSU via avoidant (i.e., fearful) attachment. Furthermore, the study provides further understanding for sex differences in the relationship between personality traits and PSU. The study further presents empirical evidence for the theoretical assumptions of the pathway model of PSU (Billieux et al., 2015). The present authors suggest that dark personality-related adult attachment styles may lead individuals to higher problematic dependence on their smartphones and experience potential psychosocial harms from such excessive use. The findings of this study have important implications for scholars investigating PSU and its risk factors, although these preliminary results should be replicated more widely before developing possible prevention strategies. It appears that those with dark personality traits are prone to developing and maintaining PSU and their romantic attachment style has a partial explanatory and contributory role in this behavior.

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