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# Problematic Internet Use in early adolescence: The role of attachment and negative beliefs about worry

TATIANA MARCI<sup>1†</sup>, CLAUDIA MARINO<sup>1,2†\*</sup> ,  
CHIARA SACCHI<sup>1</sup>, XIAOYU LAN<sup>1</sup> and  
MARCANTONIO M. SPADA<sup>2</sup>

<sup>1</sup> Department of Developmental and Social Psychology, University of Padova, Padova, Italy

<sup>2</sup> Division of Psychology, School of Applied Sciences, London South Bank University, London, UK

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## BRIEF REPORT



### ABSTRACT

*Background and aims:* Problematic Internet Use (PIU) might be a potential mental health problem. Few studies have investigated the relative contribution of individual and family factors in the development of PIU in early adolescence. The aim of the current study was to model the relationship between attachment styles, negative beliefs about worry, and PIU in early adolescence. *Methods:* Five hundred and thirty-eight Italian early adolescents (51% females,  $M_{age} = 12.7$  years,  $SD = 0.87$ ) were included in this study. The pattern of relationships specified by the theoretical model was examined through path analysis. *Results:* Results showed that avoidance (mother) and anxiety (father) were directly associated with PIU. Anxiety (mother) and avoidance (father) were indirectly associated with PIU via negative beliefs about worry. *Discussion and conclusions:* Overall, our findings show that attachment toward mother and father are differently linked to PIU and that negative beliefs about worry may play a mediating role in the association between attachment and PIU. Findings are discussed within clinical and preventive implications.

### KEYWORDS

problematic internet use, early adolescence, attachment, metacognitions

## INTRODUCTION

Problematic Internet use (PIU) might be a potential mental health problem and, despite not having yet been categorized as a mental disorder, it can lead to a number of negative consequences for daily functioning, including psychological distress, emotional imbalance, social problems, and neurological difficulties (e.g., Malinauskas & Malinauskiene, 2019). Although a lack of consensus about terminology and definition of PIU still exists, PIU has been defined as the inability to control Internet use to the degree to which it begins to cause harm to daily life (Spada, 2014), for example in terms of loss of sleep, jeopardizing homework and relations, and family conflict among young Internet users (Siciliano et al., 2015). A relatively large body of research on PIU has focused on adolescents and early adulthood, whereas few studies have investigated interpersonal and individual variables potentially accounting for PIU onset in early adolescence (e.g., Lim & Nam, 2018). Early adolescence, ranging approximately from 11 to 14 years (Eccle, 1999), represents a critical developmental period in which prominent changes occur in biological, social, and cognitive domains. It is characterized by a substantial increase in abstract thinking, cognitive flexibility, metacognitive and emotion regulation skills, as well as a progressive independence from parents. A higher risk of engaging in problematic behaviors, such as PIU and particularly problematic social media use and Internet gaming disorder, is also present (Cerniglia et al., 2019; Eccles, 1999; Lim & Nam, 2018). Therefore, the

<sup>†</sup>TM and CM contributed equally to this work.

\*Corresponding author.  
E-mail: [claudia.marino@unipd.it](mailto:claudia.marino@unipd.it)

current study aims to investigate the joint contribution of mother and father attachment representations and negative beliefs about worry in explaining PIU in early adolescence.

The robustness of socio-emotional development is rooted in the quality of the attachment relationship (Groh, Fearon, van IJzendoorn, Bakermans-Kranenburg, & Roisman, 2017), which refers to a long-lasting bond between children and their primary caregivers (Bowlby, 1973). Secure attachment nurtures a positive and worthy representation of oneself and others, boosting a sense of trust in social interactions, and perhaps supporting the establishment of positive relationships both offline and online, thus decreasing the likelihood to develop PIU (Savcı & Aysan, 2016). Conversely, insecurity in attachment might lead to anxious feelings in real-life social interactions paving the way for Internet-mediated communications, as avoidance and compensatory strategies (D'Arienzo, Boursier, & Griffiths, 2019; Monacis, de Palo, Griffiths, & Sinatra, 2017; Şenormancı, Şenormancı, Güçlü, & Konkan, 2014), as well as an increase in social networking sites use (Jenkins-Guarnieri, Wright, & Hudiburgh, 2012; Kalaitzaki & Birtchnell, 2014).

It has also been suggested that Internet use may become problematic if it takes the form of a dysfunctional cognitive and affective self-regulatory strategy (Spada, Langston, Nikčević, & Moneta, 2008). Metacognitions are defined as knowledge and beliefs held about one's own cognitive-affective experiences, and about coping strategies aimed at controlling such experiences (Wells, 2013). In the metacognitive model of psychological distress, the Self-Regulatory Executive Function model (Wells, 2002), positive metacognitions (e.g., "If I worry I will be prepared") are believed to drive the activation of coping strategies, such as rumination, worry and thought suppression, aimed managing cognitive-affective experiences (e.g., unwanted thoughts, memories, urges). Negative metacognitions (e.g., "I cannot control my thoughts"), on the other hand, are thought to exacerbate psychological distress and lock in the individual in self-referent thinking and perseverative behaviors. Research has shown that three types of negative metacognitions, beliefs about the need to control thoughts, lack of cognitive confidence, and negative beliefs about the uncontrollability and danger of worry are markers of psychological distress in addictive behaviors (Akbari, 2017; Hamonniere & Varescon, 2018; Spada, Caselli, & Wells, 2013; Wells, 2013) and may be, at least partially, responsible for the perpetuation of Internet use as a means of self-regulation (Spada & Marino, 2017). The role of these beliefs in heightened levels of problematic online behaviors (i.e., internet, social media and gaming) has been identified in adult samples (see for example, Marino et al., 2016; Monacis, Griffiths, Limone, Sinatra, & Servidio, 2020; Spada & Caselli, 2017; Spada et al., 2008). However, to our knowledge, no study has ascertained the role of such beliefs in PIU among early adolescents.

Children's emotion regulation and mentalizing capacities, such as the ability to recognize and think about one's own thought, emerge from the intimate early experiences with the caregiver (Sharp & Fonagy, 2008). The roles of both attachment representation and metacognitions in the emergence of

adolescents' problematic use of social networking sites has been recognized (Marino et al., 2019). Namely, both anxiety and avoidance in attachment (for an elaboration of attachment styles see: Brennan, Clark, & Shaver, 1998) have been found to be positively associated with the activation of maladaptive metacognitions and in turn with Problematic Facebook Use in adolescence. From a developmental perspective, it is worthy to explore how the quality of attachment towards mother and father is linked to adolescents' PIU both directly and indirectly via the development of negative beliefs about worry (Caselli, Ruggiero, & Sassaroli, 2017). Therefore, the aim of this study was to model the associations between attachment representations toward both mother and father and negative beliefs about worry in explaining PIU in early adolescence (Fig. 1). We decided to focus on negative beliefs about worry as these are the only beliefs that map clearly from the adult version of the Metacognitions Questionnaire (Quattropiani, Lenzo, Mucciardi, & Toffle, 2014) onto the adolescent version, the Meta-Cognitions Questionnaire for Children (Bacow, Pincus, Ehrenreich, & Brody, 2009; Benedetto, Di Blasi, & Pacicca, 2014).

## METHODS

### Participants and procedure

A convenience sample of 538 early adolescents aged between 10.7 and 14.2 years (51% females,  $M_{age} = 12.7$  years,  $SD = 0.87$ ) was recruited from three public middle schools in Northeast Italy. The majority of participants came from middle (22.3%) to upper-income families (77.3%), whereas 0.4% came from low-income families. About 3% of participants reported a PIU score 2 SD above the sample mean. Approval from school principals, parental written consent, and verbal consent from each participant were required before data collection. Students took part in the study during a regular class hour under the supervision of a researcher.

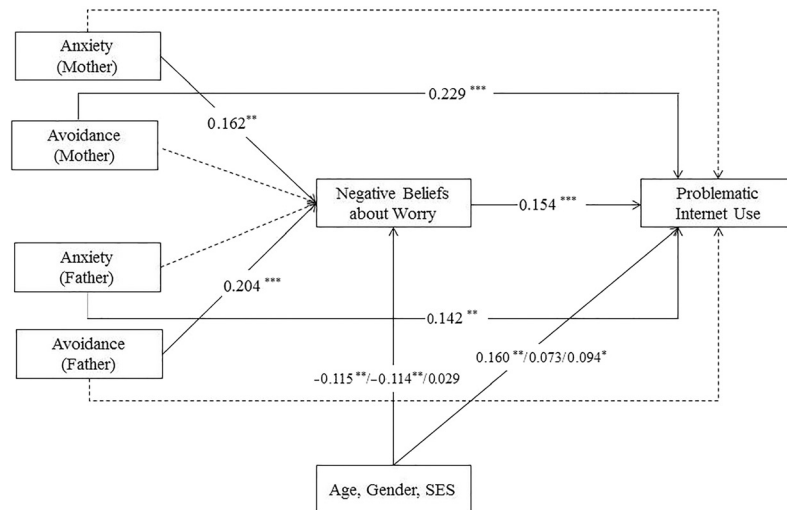
### Measures

Demographic information was collected, including age, gender, and socioeconomic status (assessed with the Family Affluence Scale (FAS; Boyce, Torsheim, Currie, & Zambon, 2006), which is a widely used 4-item measure of family wealth. All these items were summed to obtain an overall score, with values from 0 to 2 indicating low affluence, from 3 to 5 medium affluence, and from 6 to 9 high affluence.

PIU was assessed via the Short Problematic Internet Use Test (SPIUT, Siciliano et al., 2015). The SPIUT consists of 6 items rated on a 5-point Likert scale. Scores across items were averaged to provide a total score, with higher values suggesting more severe PIU. Polychoric Cronbach's  $\alpha$  was 0.78 [95% CI = 0.75–0.81].

Attachment representations were assessed using the short form of the Experiences in Close Relationships Scale–Revised child version (ECR–RC, Brenning, Van Petegem, Vanhalst, & Soenens, 2014; Marci, Moscardino, & Altoè, 2019). The ECR–RC consists of 12-item (the same for mother and father)





Notes: N=538; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ; Gender was coded as 1 = female, 2 = male. SES = socioeconomic status.

Fig. 1. Results of the path analytical model

evaluating attachment anxiety (6 items) and avoidance (6 items) in children and adolescents. Each item was rated on a 5-point Likert scale and scores across anxiety and avoidance-related items were averaged to yield four different scores, with higher scores indicating greater levels of the corresponding attachment dimension. Polychoric Cronbach's  $\alpha$ s were 0.93 [95% CI = 0.92–0.94] and 0.95 [95% CI = 0.95–0.96] for the subscales of mother and father anxiety respectively; and 0.91 [95% CI = 0.90–0.92] and 0.93 [95% CI = 0.92–0.94] for the subscales of mother and father avoidance respectively.

Negative beliefs about worry were assessed through the subscale of the Meta-Cognitions Questionnaire for Children (Bacow et al., 2009; Benedetto et al., 2014). The subscale consists of 6 items rated on a 4-point Likert scale. Scores across items were averaged to obtain a single score, with higher scores indicating higher levels of negative beliefs about worry. Polychoric Cronbach's  $\alpha$  was 0.78 [95% CI = 0.76–0.81].

### Statistical analyses

Descriptive statistics were computed for all the variables of the study, and bivariate Pearson's correlations were performed. To test the association among study variables, a path analysis approach was applied using R (R Development Core, 2020) and single observed score for each construct was used. The dimensions of anxious and avoidant attachment toward mother and father were included as exogenous variables (independent variables; IVs), and negative beliefs about worry (mediator) and PIU (dependent variable; DV) as endogenous variables. Relevant socio-demographic variables (age, gender, and SES) were included in the models as covariates of negative beliefs about worry and PIU. Specifically, starting from the full model, we removed step-by-step path coefficients not significant at the 5% level to obtain a more parsimonious model. All models were estimated using the robust maximum likelihood methods (MLR; Satorra &

Bentler, 1994) suitable for non-normally distributed variables. In the final model, indirect paths from IVs to DV via negative beliefs about worry were tested using the Sobel tests for mediation (Baron & Kenny, 1986; Hayes, 2013). Demographic variables were maintained as fixed covariates. To evaluate the model fit, several goodness-of-fit indices were computed (i.e.,  $\chi^2/df$ , CFI, TLI, RMSEA, and SRMR; Hu & Bentler, 1999), and the explained variance of each endogenous variable ( $R^2$ ) and the total coefficient of determination (TCD; Joreskog & Sorbom, 1996) were calculated.

### Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. The Institutional Review Board of the University of Padova approved the study. This study did not involve human and/or animal experimentation.

## RESULTS

Descriptive statistics and bivariate correlations are reported in Table 1 and in Appendix A for males and females separately. Some variables showed a non-normal distribution, further supporting the use of the MLR estimator for the subsequent path analyses. Overall, the association between variables was significant at .01 level, despite of modest magnitude, according to Cohen (1988) guidelines.

The final model (see Fig. 1) showed a good fit ( $\chi^2/df = 1.187$ , CFI = 0.995, TLI = 0.980, RMSEA = 0.019 [0.000–0.068], SRMR = 0.009) and supported the direct effects of avoidance (mother) and anxiety (father) on PIU. Results of the Sobel tests supported the mediating role of negative beliefs about worry in the association between anxiety toward mother ( $\beta = 0.025$ ,  $SE = 0.013$ ,  $z = 2.460$ ,  $P = 0.014$ ) and avoidant toward father ( $\beta = 0.031$ ,  $SE = 0.009$ ,

Table 1. Descriptive statistics and Pearson's correlations of study variables

	Mean	SD	Range	Skew	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Gender	–	–	–	–	–								
(2) Age	12.66	0.87	10.67–14.17	0.03	0.02	–							
(3) SES	6.63	1.59	1.00–9.00	–0.44	0.03	–0.04	–						
(4) Problematic Internet Use	2.38	0.85	1.00–5.00	0.48	0.03	0.19	0.08	–					
(5) Anxiety (Mother)	1.45	0.68	1.00–4.50	2.09	–0.05	0.14	–0.03	0.20	–				
(6) Avoidance (Mother)	2.46	0.98	1.00–5.00	0.53	–0.05	0.17	0.00	0.31	0.32	–			
(7) Anxiety (Father)	1.48	0.77	1.00–5.00	1.91	–0.09	0.05	–0.09	0.21	0.62	0.20	–		
(8) Avoidance (Father)	2.68	1.02	1.00–5.00	0.25	–0.20	0.13	–0.14	0.28	0.29	0.59	0.47	–	
(9) Negative Beliefs about Worry	2.28	0.61	1.00–4.00	0.22	–0.16	–0.07	–0.00	0.20	0.21	0.19	0.22	0.25	–

Notes:  $N = 538$ ; Gender was coded as 1 = female, 2 = male. SES = socioeconomic status. Correlations higher than  $r = 0.08$  were significant at the 0.05 level; correlations higher than  $r = 0.11$  were significant at the 0.01 level; correlations higher than  $r = 0.14$  were significant at the 0.001 level.

$z = 2.951$ ,  $P = 0.003$ ) and PIU. The model accounted for 17% of the variance for PIU, and 11.2% of the variance for the mediator (negative beliefs about worry), and a total amount variance explained by the model exhibited a satisfactory fit to the observed data ( $TCD = 23$ ).

## DISCUSSION

To date, the role of maternal and paternal attachment representations and negative beliefs about worry in the early onset of PIU has not been investigated. This study adds to the previous findings in the field by highlighting: (i) the direct associations between avoidance toward mother and anxiety toward father with PIU; (ii) the indirect associations between anxiety toward mother and avoidance toward father with PIU via negative metacognitive beliefs about worry. These results confirm that the robustness of socio-cognitive-emotional development is profoundly rooted in the quality of primary attachment relationship (Groh et al., 2017), with attachment styles toward mother and father both directly and indirectly associated with PIU.

Overall, the direct links align to previous studies that have identified the role of attachment styles in predicting PIU: insecure attachment may expose to problematic use of technologies such as the Internet and social network sites in order to fulfill the need for social support perceived as missing in the relationships with parents (e.g., Savcı & Aysan, 2016; Schimmenti, Passanisi, Gervasi, Manzella, & Famà, 2014). Differently to the case of older adolescents' problematic Facebook use (Marino et al., 2019), the younger adolescents talk to their mothers about how they feel and their problems, the more likely they are to use the Internet as an escape strategy (D'Arienzo et al., 2019). Similarly, early adolescents worried about their fathers' love and closeness appear to be at risk to develop PIU. Such alternating patterns for anxiety and avoidance toward mother and father, as related to PIU, show that insecurity in mother's and father's representations might present specific facets differently contributing to PIU in this developmental stage. For instance, anxiety toward the father might provide an

interpersonal cognitive script built on expectations of inconsistent and preoccupied interactions that might support PIU as strategy to fulfill constant emotional needs. On the contrary, avoidance toward the mother might be associated with the development of a strong sense of self-reliance, and repeated failings in seeking care as a way to maintain a relationship likely to lead to PIU as a result of a self- other-exclusion from real world social interactions.

The positive link between negative beliefs about worry and PIU suggests that "negative meta-worry" (Benedetto et al., 2014) may increase the likelihood of utilizing the Internet as a means of control of negative internal states, thus incurring in PIU as in the case of older adolescents (Spada & Marino, 2017). As for the link between attachment representations and negative beliefs about worry, theoretical formulations support the interconnection between childhood attachment experiences and the development of early metacognitive capacities (Sharp & Fonagy, 2008). Specifically, early adolescents worried that their mothers do not love them or that they will leave them (anxiety toward mother), and early adolescents who prefer not to get close to their father (avoidance toward father), might develop the belief that worrying will help them to stay safe. Of course, one should take into consideration that attachment insecurity might lead to more mentalization difficulties, which might, in turn, impact on adolescents' capacity of recognizing their metacognitions. These types of positive metacognitions may lead to the activation of maladaptive coping strategies, such as worry and rumination, which foster negative internal experiences. Over time, negative beliefs about worry (e.g., "If I worry a lot, I could make myself sick") may develop and account for the perpetuation of distress, putting early adolescents at major risk to use the Internet in a maladaptive way and incurring PIU (Spada & Marino, 2017).

With regard to covariates, in congruence with previous studies (e.g., Lim & Nam, 2018; Zhang, Li, & Li, 2015), the current findings showed that adolescents of older age and from higher family SES tended to report higher PIU. Moreover, although significant gender differences concerning PIU are not observed in this study, a similar pattern can be also found in prior research using a sample of Italian adolescents (e.g., Spada & Marino, 2017).





## Limitations

Some limitations should be noted. The cross-sectional research design limits speculations on causal paths linking attachment styles to PIU. Moreover, the current sample was recruited based on a convenience sampling method. Cross-cultural replications and studies involving larger samples, as well as considering simultaneously the potential moderating effects of age and gender, are warranted in order to address the generalizability issue. Furthermore, a cut-off for the SPIUT is currently unavailable. Future studies are needed in order to recommend a cut-off value, thus allowing researchers to investigate the prevalence of PIU and practitioners to screen adolescents at risk of PIU. Beyond the generalized pattern of Internet use, it is also crucial to depict the specific types of online activities preferred by early male and female adolescents (e.g., social media and gaming) in order to build targeted interventions. Finally, relatively small associations are observed among constructs, thus suggesting that results should be taken cautiously.

## Conclusions

The present study provides a new insight into the role of maternal and paternal attachment representations and negative beliefs about worry in the early onset of PIU. Findings should be considered in clinical and educational contexts for timely preventive practices. The study suggests addressing early adolescents' negative beliefs about worry and to consider attachment relationships in supporting the developmental stage toward better trajectories of Internet use.

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*Authors' contribution:* CM and TM are responsible for the study concept and design. CM, TM and CS wrote the first draft of the manuscript. TM collected the data and performed the analyses. XL contributed to the interpretation of data. MS performed study supervision. All authors critically reviewed and approved the final version of the manuscript.

*Conflict of interest:* The authors declare no conflict of interest.

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## APPENDIX A

Table A1. Males (Descriptive statistics and Pearson's correlations of study variables)

	Mean	SD	Range	Skew	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Age	12.68	0.86	10.92–14.17	0.07	–						
(2) SES	6.69	1.57	1.00–9.00	–0.50	–0.08	–					
(3) Problematic Internet Use	2.40	0.87	1.00–5.00	0.40	0.16	0.07	–				
(4) Anxiety (Mother)	1.42	0.66	1.00–4.50	2.21	0.12	0.07	0.20	–			
(5) Avoidance (Mother)	2.41	0.92	1.00–5.00	0.51	0.16	–0.08	0.35	0.32	–		
(6) Anxiety (Father)	1.40	0.68	1.00–5.00	2.13	0.07	–0.01	0.23	0.52	0.17	–	
(7) Avoidance (Father)	2.47	1.00	1.00–5.00	0.42	0.17	–0.23	0.28	0.23	0.57	0.47	–
(8) Negative beliefs about worry	2.18	0.59	1.00–4.00	0.36	–0.24	0.06	0.16	0.18	0.11	0.16	0.11

Notes:  $n = 263$ ; SES = socioeconomic status. Correlations higher than  $r = 0.12$  were significant at the 0.05 level; correlations higher than  $r = 0.16$  were significant at the 0.01 level; correlations higher than  $r = 0.20$  were significant at the 0.001 level.



Table A2. Females (Descriptive statistics and Pearson's correlations of study variables)

	Mean	SD	Range	Skew	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Age	12.65	0.88	10.67–14.17	0.00	–						
(2) SES	6.58	1.60	2.00–9.00	–0.39	–0.01	–					
(3) Problematic Internet Use	2.35	0.84	1.00–4.60	0.55	0.22	0.08	–				
(4) Anxiety (Mother)	1.49	0.70	1.00–4.50	1.98	0.15	–0.11	0.19	–			
(5) Avoidance (Mother)	2.51	1.04	1.00–5.00	0.50	0.19	0.07	0.28	0.31	–		
(6) Anxiety (Father)	1.55	0.85	1.00–5.00	1.69	0.04	–0.14	0.21	0.69	0.21	–	
(7) Avoidance (Father)	2.88	1.00	1.00–5.00	0.10	0.12	–0.05	0.31	0.34	0.62	0.46	–
(8) Negative beliefs about worry	2.38	0.62	1.00–3.83	0.08	0.09	–0.04	0.26	0.23	0.23	0.24	0.34

Notes:  $n = 275$ ; SES = socioeconomic status. Correlations higher than  $r = 0.12$  were significant at the 0.05 level; correlations higher than  $r = 0.16$  were significant at the 0.01 level; correlations higher than  $r = 0.20$  were significant at the 0.001 level.

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