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1 **Parental attachment security and Problematic Internet Use in children: The mediating role of**  
2 **maladaptive Cognitive Emotion Regulation strategies.**

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4 **Running head: attachment security, problematic internet use and emotion regulation**

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28           **Abstract**

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30           Problematic Internet Use (PIU) is a growing problem among children. Insecure attachment has  
31 been associated with PIU and emotion dysregulation. Furthermore, there is evidence suggesting that  
32 maladaptive Cognitive Emotion Regulation Strategies (CERS) lead to PIU, nevertheless, the mediating  
33 role of CERS between attachment and PIU has not been explored. A sample of 641 children ( $M = 10.15$ ;  
34  $SD = .89$ ) participated in the study. The findings showed that there were significant differences between  
35 problematic and non-problematic users in terms of secure attachment and emotion dysregulation.  
36 Results show a negative association between attachment security and PIU and a negative association  
37 between attachment and maladaptive CERS, whilst CERS were positively related with PIU. Finally,  
38 Rumination, Catastrophizing, Self-blame and Other-blame were found to mediate the relationship  
39 between attachment security and PIU. These findings were the same for maternal and paternal  
40 attachment. Limitations and implications are discussed, motivating the promotion of prevention and  
41 intervention programs.

42

43           **Key words:** Parent-child attachment, Problematic Internet Use, Rumination, Catastrophizing,  
44 Other-blame, Self-blame.

45           **Introduction**

46           Problematic Internet Use (PIU) is characterized by the incapacity to control Internet use to the  
47 extent to which it begins to cause harm to daily life and is becoming an issue of great concern in our  
48 society, especially in adolescents (Spada & Marino, 2017). Prevalence rates of PIU among  
49 adolescents vary between different studies. In United States, 9.7% of adolescent females and 7.3% of  
50 adolescent males showed evidence of PIU (e.g., Sun et al., 2012). In the case of European  
51 adolescents, the prevalence varied widely among countries, from 7.9% in Iceland to 22.8% in Spain  
52 (Tsitsika et al., 2014).

53           Problematic Internet Use can have negative consequences for adolescents, in terms of  
54 psychophysiological, educational, emotional, affective and deterioration of personal relationships  
55 (Hawi et al., 2018; Sánchez-Carbonell et al., 2008; Seo et al., 2016). Due to these harmful  
56 consequences, it is important to understand how Internet use may become problematic.  
57 Unfortunately, there have been few studies that have explored the factors accounting for PIU in  
58 preadolescence. Research has found that attachment (e.g., Monacis et al., 2017; Schimmenti et al.,  
59 2014) and emotion regulation (e.g., Gioia et al. 2021; Pettorruso et al., 2020) may play a key role in  
60 the development and maintenance of PIU. However, whether maladaptive emotional regulation  
61 strategies may mediate the relationship between attachment and PIU has yet to be explored.

62           *Attachment and Problematic Internet Use*

63           Attachment is considered a significant and lasting affective bond with parents, or a close  
64 partner, characterized by good communication, emotional closeness, and trust (Armsden &  
65 Greenberg, 1987). Ainsworth et al. (2015) show that depending on the child's characteristics and the  
66 responses obtained from his or her caregivers, different types of attachment will develop: secure  
67 attachment or insecure attachment (avoidant attachment and ambivalent attachment). Previous  
68 studies show that secure attachment negatively and significantly predicts PIU, whilst insecure  
69 attachment is positively related to problematic or addictive Internet users (e.g., Chang et al., 2015;

70 Eichenberg et al. 2017; Monacis et al. 2017). Wang et al. (2011) found that participants with insecure  
71 attachment were more prone to addictive internet use compared to those with secure attachment.  
72 Adolescents who feel emotionally distanced in the relationship with their caregivers, have higher  
73 PIU (Musetti et al., 2020). However, existing research has found contradictory findings concerning  
74 whether insecure attachment may be a risk factor contributing to PIU. Some studies showed that only  
75 attachment anxiety is significantly related to PIU (Schimmenti et al., 2014; Senormanci et al., 2014),  
76 other findings suggest that avoidance is the only significant factor for PIU (Khosroshahi & Nosrat-  
77 Abad, 2012), while other research showed that both factors were important (Shin, et al., 2011).

78 With regard to attachment figures, paternal attachment has been studied less than maternal  
79 attachment. Some studies have found that maternal attachment has a greater association with PIU,  
80 compared to paternal attachment (e.g., Xu et al., 2014). Nevertheless, the quality of paternal  
81 attachment is important to investigate because both attachment figures could influence the  
82 development of PIU. Furthermore, attachment security to both, mother, and father, had a negative  
83 correlation with PIU (Estévez et al., 2017) and a significant effect on Internet use (Ballarotto et al. 2018).

#### 84 *Attachment and Emotion Regulation*

85 Attachment theory has been postulated as one of the most important frameworks for  
86 understanding emotion regulation (Mikulincer et al., 2003), since the parent-child relationship play  
87 an important role in emotion regulation (Sroufe, 2005). Attachment is fundamental for developing  
88 emotion regulation to cope with daily adversities (Bowlby, 1986; Malik, Wells, & Wittkowski,  
89 2015). In fact, research has reported that difficulties in emotion regulation were negatively related to  
90 secure attachment and positively associated with insecure attachment (Ozeren, 2021). In children,  
91 attachment has been significantly linked to the use of emotion regulation strategies (Brenning et al.,  
92 2012; Zimmermann et al., 2009). Therefore, the quality of attachment is related to different emotion  
93 regulation strategies (Cassidy, 1994; Prosen & Smrtnik, 2016). Thus, children with secure  
94 attachments with their parents tend to use more adaptive regulatory strategies (Karreman &

95 Vingerhoets, 2012; Zimmer-Gembeck et al., 2015), while those with insecure attachment tend to use  
96 maladaptive emotional regulation strategies (Frias, Shaver, & Díaz-Loving, 2014; Garrison et al.,  
97 2014), like Rumination or Catastrophizing (Mikulincer & Shaver, 2007).

98         Current research focuses on Cognitive Emotion Regulation (CER), defined as the “conscious,  
99 mental strategies individuals use to cope with the intake of emotionally arousing information”  
100 (Garnefski et al., 2009). Those strategies are categorized as adaptive or maladaptive. In the present  
101 study, only maladaptive Cognitive Emotion Regulation Strategies (CERS) will be evaluated, due to  
102 their relationship with certain pathologies and specifically with PIU and problematic devices use (an  
103 aspect that we will delve into later). Considering the studies of Garnefski’s team, maladaptive CERS  
104 are: 1) *Self-blame*: occurs when you blame yourself for what happened; 2) *Rumination*: refers to  
105 thinking all the time about the feelings and thoughts related to a negative event; 3) *Catastrophizing*:  
106 refers to thoughts emphasizing how horrible an event was; and 4) *Other-blame*: occurs when you  
107 blame others for what happened.

108         Cognitive emotion regulation is related to another crucial construct in developmental  
109 psychology, i.e., self-regulation. Self-regulation contains multiple dimensions, including cognitive,  
110 motivational, affective, social and physiological processes (Calkins & Howse, 2004). Many authors  
111 put forward those cognitive strategies, along with behavioral and emotional control, as significant  
112 components in the self-regulation process (Bell et al. 2019; Langner et al., 2018; Raffaelli, 2005).  
113 Self-regulation implies the capacity to observe and control own internal thoughts, emotions,  
114 attention, actions and cognitive strategies in order to achieve personally meaningful goals  
115 (Baumeister & Vohs, 2004; Lengua, 2003). Therefore, for satisfactory self-regulation of emotion, the  
116 use of complex cognitive domains like CERS are necessary (Silvers et al. 2012). In their recent  
117 research, Khawar et al. (2023) delved into the relationship between self-regulation and cognitive  
118 emotion regulation in adolescents. The findings from their study showed that self-regulation abilities

119 are a significant negative predictor of other-blame (maladaptive CERS). Furthermore, the results  
120 revealed a significant association between self-regulation and various adaptive CERS.

### 121 *Emotion regulation and Problematic Internet Use*

122 Previous research has reported a strong association between emotion dysregulation and  
123 Problematic Internet Use, Internet Addiction or Problematic Smartphone Use in adolescents (e.g.,  
124 Karaer & Akdemir, 2019; Spada & Marino, 2017). A longitudinal study showed a direct statistical  
125 association between emotion regulation strategies in infancy and Internet Addiction (IA) in  
126 adolescence (Cimino & Cerniglia, 2018). Moreover, results of recent studies confirm the role of  
127 emotional dysregulation in the development of PIU (Gioia et al., 2021; Pettorruso, et al., 2020).  
128 Online activities might represent a strategy to manage unpleasant emotions and difficult situations  
129 (Aldao et al., 2010; Schimmenti et al., 2018; Yu et al., 2013). This approach agrees with the Theory  
130 of Emotion Regulation (Weiss, Sullivan, & Matthew, 2015), with the Interaction of Person-Affect-  
131 Cognition-Execution model (I-PACE; Brand et al., 2016) and with the Theory of Internet  
132 gratification (Deng et al. 2012). Hence, PIU could be understood as an ‘escape behavior’ (Blasi et  
133 al., 2019), so that problematic users use the Internet like a maladaptive regulatory strategy to deal  
134 with personal and emotional difficulties instead of using adaptive strategies (Spada & Marino, 2017).

135 Focusing on maladaptive CERS, particularly, Rumination has been related to Problematic  
136 Smartphone Use (Elhai et al., 2018) and Internet Addiction (Nosrat-Abad et al., 2020; Liu et al.,  
137 2019; McNicol & Thorsteinsson, 2017) in adolescence and preadolescence. According to the  
138 cognitive-behavioral model (Davis, 2001), maladaptive cognitions are a influencing factor in Internet  
139 Addiction, suggesting that high levels of Rumination might lead to more severe and durable Internet  
140 Addiction. Regarding the rest of CERS, some current results showed that all the maladaptive strategies  
141 (Self-blame, Other-blame, Catastrophizing, and Rumination) were positively related to problematic  
142 gaming on Internet (Kököneyi et al., 2019), to IA behaviors (Nosrat-Abad et al., 2020) or to Problematic

143 Smartphone Use (Extremera et al., 2019). These findings suggest the importance of maladaptive  
144 CERS in the development and maintenance of problematic use of technology.

145 *The mediating role of maladaptive emotional regulation strategies*

146 Previous research focused on the relationship among attachment styles, emotion dysregulation,  
147 and Internet Addiction or Problematic Internet use in adolescents (Estévez et al. 2019; Yu et al., 2013;  
148 Wang et al., 2018). Nevertheless, to our knowledge, no published research has investigated whether  
149 maladaptive CERS (Rumination, Catastrophizing, Self-blame and Other-blame) mediate the  
150 relationship between Mother and Father Attachment and PIU, even less in preadolescence. Brenning  
151 et al. (2012) found that emotion regulation mediated the relationships between attachment and  
152 psychopathology in childhood and early adolescence. Furthermore, it has been found that  
153 maladaptive emotion regulation strategies, such as Rumination, Catastrophizing, Self-blame and  
154 Other-blame, mediated the relationship between anxiety symptoms or social anxiety and Problematic  
155 use of technology (Elhai et al., 2017; Zsido et al., 2021). In this regard, findings in recent research  
156 show that negative beliefs about worry (Marci et al., 2021) and coping strategies (Estévez et al.,  
157 2019) may play a mediating role in the association between attachment and PIU. It seems fruitful to  
158 investigate whether maladaptive CERS may be linked to greater engagement in PIU and how  
159 parental attachment influences the development of these strategies.

160 Thus, in accordance with the literature review, the following hypotheses were formulated: (a)  
161 Problematic Internet users would have higher scores on maladaptive CERS and lower scores on  
162 Father and Mother Attachment than non-problematic users; (b) Maternal and Paternal attachment  
163 security would be negatively related with the maladaptive CERS (Rumination, Catastrophizing, Self-  
164 blame and Other-blame); (c) Maladaptive CER strategies would mediate the relationship between  
165 parental attachment and PIU, even controlling for the Mother versus Father attachment.



166           **Methods**

167           *Participants and Procedure*

168           A sample of 641 Spanish students (49.8% boys and 50.2% girls), with a mean age of 10.15  
169 years (SD = .89), participated in the study. Children completed the different questionnaires and  
170 provided sociodemographic information. All participants and their parents gave their written consent  
171 for their research participation. The questionnaires were administered collectively in school classes  
172 and took about 25 minutes. All the questionnaires were administered in compliance with data  
173 protection regulation. This research was approved by the Clinical Research Ethics Committee. Also,  
174 the study faithfully complied with the latest version of the Declaration of Helsinki (World Medical  
175 Association, 2013), on ethical principles in research Measures.

176           **Measures**

177           *The Problematic Internet Use Scale in adolescents* (EUPI-a; Rial et al., 2015). EUPI-a is a  
178 one-dimensional self-report instrument. EUPI-a consists of 11 items that assess the main  
179 characteristics of Problematic Internet Use, according to the diagnostic criteria collected in the DSM-  
180 V for gambling disorder based on the Internet (American Psychiatric Association [APA], 2013). The  
181 items are evaluated with a Likert-type response format of 5 options (0= “Totally disagree”; 4=  
182 “Totally agree”). This scale provides a global score between 0 and 44 points, establishing its cut-off  
183 point at 16 points. So that participants with a score equal to or greater than 16 are classified as  
184 problematic users. The scale has already been used previously in primary school students (e.g.,  
185 Fernández-Montalvo, et al., 2017). In the current study EUPI-a yielded a good Cronbach alpha  
186 reliability (.84).

187           *Inventory of Parent and Peer Attachment-Revised for Children* (IPPA-R; Gullone & Robinson,  
188 2005). 30 items of the IPPA-R were used in this study. These items correspond with the items of a short  
189 version for adolescents (the Inventory of Parent and Peer Attachment-45, IPPA-45, Wilkinson & Goh,  
190 2014). Therefore, 15 items have been used to assess the quality of maternal attachment and 15 items to

191 assess the quality of paternal attachment. Items are evaluated on a 3-point Likert-type scale, with the  
192 following response options: “never true”, “sometimes true” and “always true”. The items measure a  
193 global score of security attachment considering three aspects: 1) Trust, that measures the degree of  
194 mutual understanding and respect in the attachment relationship; 2) Communication, which refers to  
195 the quality of spoken communication; and 3) Alienation, that assesses the degree of anger and  
196 isolation in attachment relationships. A total score for Mother and Father Attachment was calculated by  
197 obtaining a sum of the Trust and Communication subscales and then subtracting the Alienation subscale  
198 score. Cronbach’s alpha was .84. for Mother Attachment and .87 for Father Attachment.

199 *The Cognitive Emotion Regulation Questionnaire for children (CERQ-Sk; Orgilés et al., 2019),*  
200 used in children from 7 to 12 years. The scale is based on the short version of 18-item available for adults  
201 (Garnefski & Kraaij, 2006). The 18 items evaluating nine different subscales about what children think  
202 following the experience of threatening or stressful life events. Items are evaluated with a Likert-type  
203 response format of 5 options (1= “Almost never”; 5= “Almost always”). In the present study, we used  
204 the subscales that measure maladaptive strategies, (Rumination, Catastrophizing, Self-blame, and Other-  
205 blame), being the Cronbach’s alphas .73, .80, .70, and .76, respectively.

#### 206 *Data Analysis*

207  
208 Spearman’s correlation was computed to evaluate the correlations between the variables. Mann-  
209 Whitney U tests were used to examine whether problematic Internet users and non-problematic Internet  
210 users scored significantly different in the levels of maladaptive Cognitive Emotion Regulation Strategies  
211 and Mother/Father Attachment, because the data did not follow a normal distribution. Finally, PROCESS  
212 macro (v4.0, model 4, 10,000 bootstrapped re-samples, Hayes, 2017) was used to test the mediation  
213 model involving maladaptive CERS in the relationship between parental attachment and PIU. In both  
214 models, PIU was included as dependent variable and maladaptive Cognitive Emotion Regulation  
215 Strategies were the mediators. In the first model, Mother Attachment was the predictor variable and  
216 Father Attachment was added as covariate. However, in the second model, Father Attachment was

217 introduced as predictor variable and Mother Attachment was entered as covariable. Significant  
 218 mediated effects were indicated by the absence of zero within the confidence intervals. Those  
 219 participants with one or more missing values were excluded from the analyses ( $n = 22$ ).

220 **Results**

221 *Preliminary analyses*

222

223 **Table 1.** Differences in maladaptive Cognitive Emotion Regulation Strategies (CERS) and in  
 224 attachment between children with and without Problematic Internet Use

Variables	Problematic Internet users ( $N=220, 34.3\%$ )		Non-problematic Internet users ( $N=421, 65.7\%$ )		U de Mann-Whitney
	M	SD	M	SD	
Rumination	6.30	2.07	4.85	2.08	28136.0***
Catastrophizing	6.01	2.35	4.32	2.12	27247.5***
Other-blame	4.13	2.30	3.14	1.53	35145.0***
Self-blame	5.26	2.28	4.47	2.05	36688.5***
Mother Attachment	17.93	4.98	21.26	3.92	25515.5***
Father Attachment	16.06	5.85	19.82	5.13	26579.5***

225

226

227 The percentage of participants that reported problematic internet use was 34.4% ( $n = 220$ ).  
 228 Regarding the first hypothesis, Mann-Whitney U tests (see Table 1) showed significant differences  
 229 between problematic and non-problematic Internet users in relation to Rumination ( $p < 0.001$ )  
 230 Catastrophizing ( $p < 0.001$ ), Other-blame ( $p < 0.001$ ) and Self-blame ( $p < 0.001$ ). Problematic  
 231 Internet users reported higher scores for these maladaptive CERS than non-problematic ones. There  
 232 are also statistically significant differences between problematic and non-problematic Internet users  
 233 in relation to Mother Attachment ( $p < 0.001$ ) and Father Attachment ( $p < 0.001$ ). Non-problematic  
 234 Internet users reported higher scores for secure attachment than problematic users.

235 Descriptive statistics and Spearman correlations are presented in Table 2. PIU was negatively  
 236 associated with Mother Attachment and with Father Attachment, and was positively correlated with all  
 237 CERS: Catastrophizing, Other-blame, and Self-blame. Mother and Father Attachment was strongly and

238 positively associated. Besides, Mother Attachment was negatively correlated with Rumination  
 239 Catastrophizing and Other-blame. Similarly, Father Attachment was negatively associated with  
 240 Rumination, Catastrophizing and Other-blame.

241 **Table 2.** Means (M), standard deviations (SD), and bivariate correlations of study variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Problematic Internet Use	12.93	8.47							
2. Mother Attachment	20.12	4.59	-.46**						
3. Father Attachment	18.53	5.67	-.42**	.64**					
4. Rumination	5.35	2.18	.44**	-.27**	-.23**				
5. Catastrophizing	4.90	2.34	.40**	-.26**	-.21**	.60**			
6. Other-blame	3.48	1.89	.23**	-.14**	-.11**	.15**	.17**		
7. Self-blame	4.74	2.16	.16**	-.07	-.06	.33**	.38**	-.02	

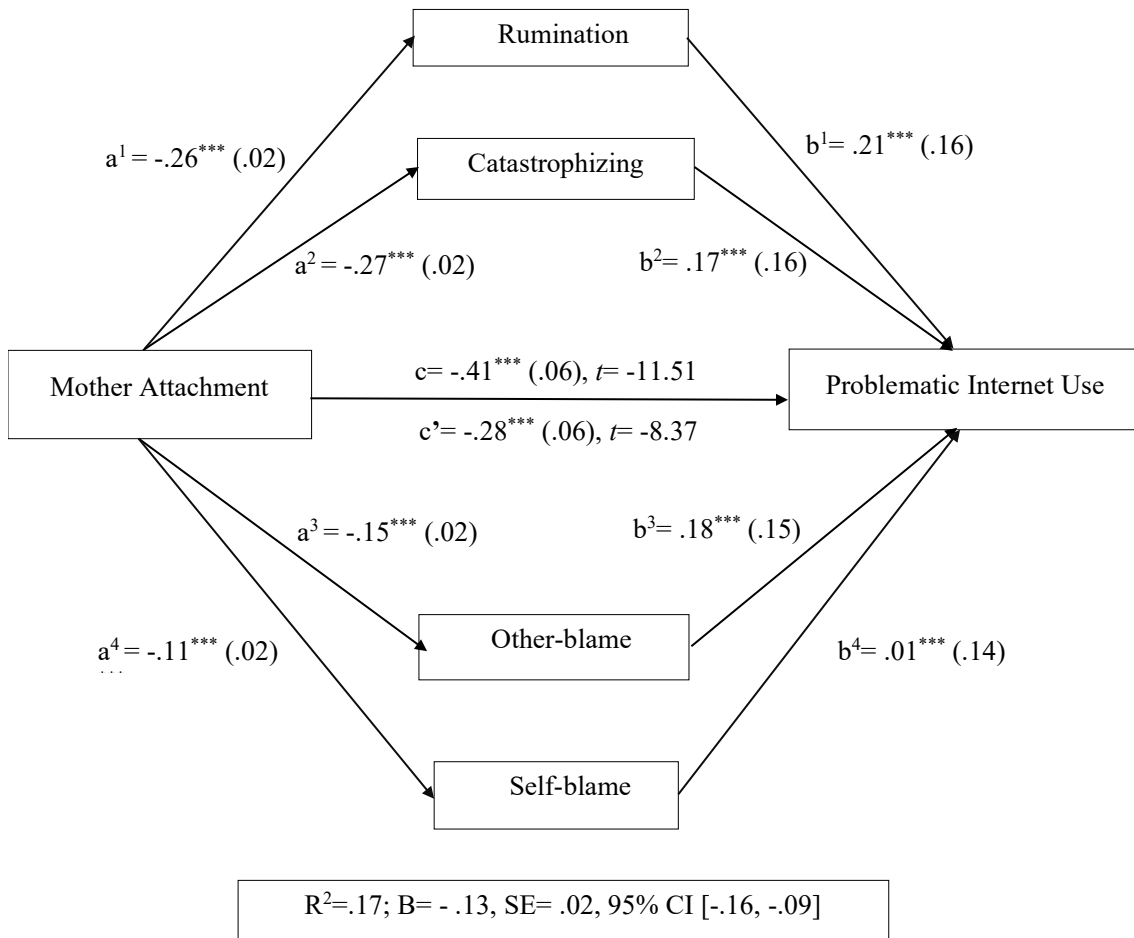
242 *Note.* *N* = 641.

243 \*\**p* < 0.01

244

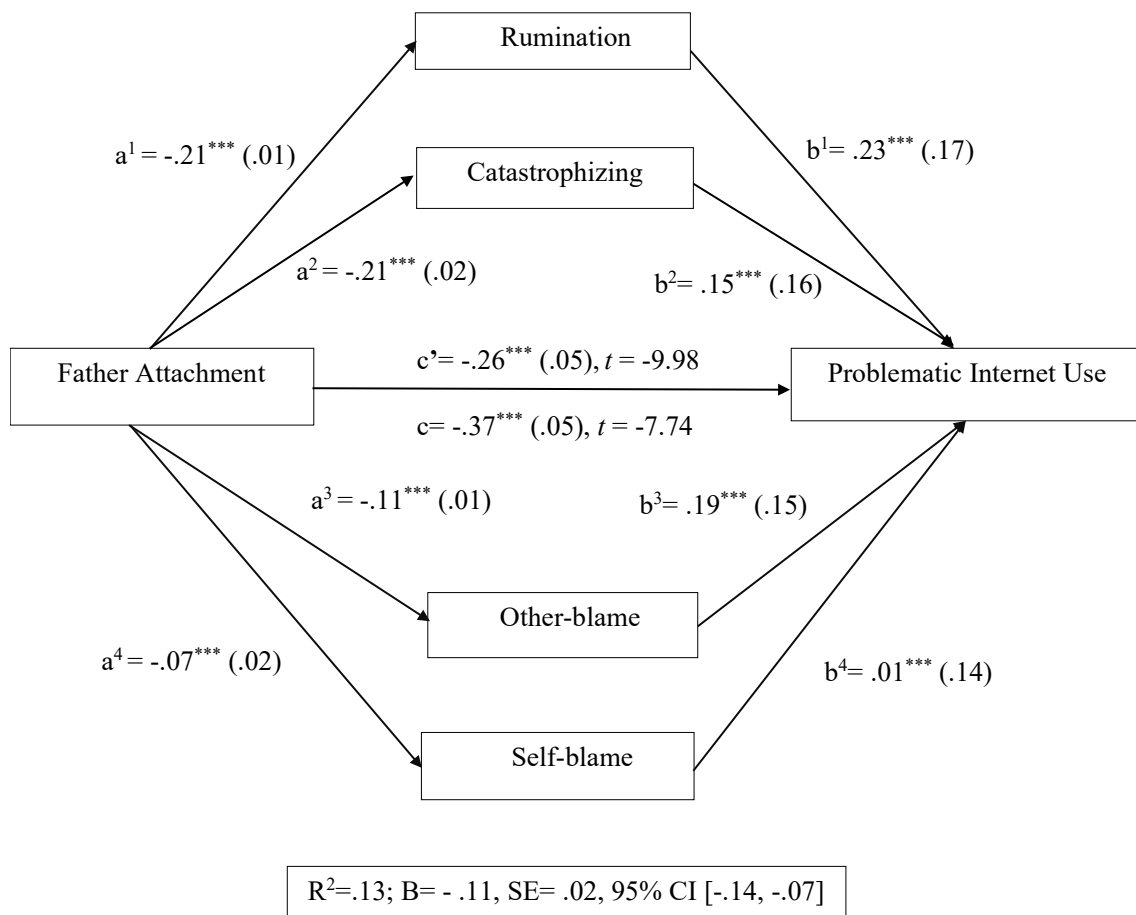
245 *The mediating role of Cognitive Emotion Regulation Strategies.*

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**Figure 1.** Mediating role of maladaptive Cognitive Emotion Regulation Strategies among Mother Attachment and Problematic Internet Use. Confidence intervals are included in Table 3.  $^{***} p < 0.001$



252

253 **Figure 2.** Mediating role of maladaptive Cognitive Emotion Regulation Strategies among Father  
 254 Attachment and Problematic Internet Use. Confidence intervals are included in Table 3.  $^{***} p < 0.001$   
 255

256 To evaluate the third hypothesis, two parallel mediation models were conducted. In the first model,  
 257 Mother Attachment was included as independent variable (Figure 1), and Father Attachment was  
 258 included as independent variable in the second model (Figure 2). In both models, PIU was entered as  
 259 dependent variable, and maladaptive Cognitive Emotion Regulation Strategies were imputed as the  
 260 mediating variables. The following has been explored: the significant direct effect of attachment on  
 261 CER strategies (*path a*), the direct effect of these CERS strategies on the PIU (*path b*), the direct  
 262 effect of attachment on PIU (*path c'*) and the total effect of attachment on PIU together with the  
 263 mediating variables (*path c*). In both models, maladaptive CERS were found to be mediating the  
 264 relationship between attachment and PIU. A full mediation is considered to exist when *path c* is  
 265 significant and *path c'* is not significant. Therefore, partial mediations were found, because both *path*

266 *c* and *path c'* are statistically significant to both Father Attachment (Figure 1) and Mother  
 267 Attachment (Figure 2) as predictor variables.

268 To explore mediation analyses, parallel mediation models were evaluated to obtain 95%  
 269 bootstrapped confidence intervals of the indirect effect, with 5.000 bootstrap resamples (Hayes,  
 270 2017). In Table 3, the indirect effects are shown. In both models, the relationship between  
 271 attachment and PIU is negative, controlling for the mother/father attachment. In the first model, in  
 272 which Mother Attachment was the predictor variable, PIU the dependent variable, and Father  
 273 attachment was included as covariate, the indirect effects for Rumination, Catastrophizing and Other-  
 274 blame are significant because the upper and lower confidences intervals do not include the value 0  
 275 (see table 3). However, the indirect effect of Self-blame is not significant, confidence interval  
 276 includes the value 0 to both Father and Mother Attachment (see table 3). Nevertheless, in Father). -  
 277 PIU attachment, controlling for Mother Attachment, the final model (Figure 2) show that only  
 278 Rumination, but not Catastrophizing, Other-blame, and Self-blame (as maladaptive CERS), partially  
 279 mediated the relationship between Attachment and PIU.

280 **Table 3.** Results of mediation analyses, including Mother Attachment (MA) and  
 281 Father Attachment (FA) as predictors, Problematic Internet Use (PIU) as  
 282 outcomes, and CERS as mediating variables.

	Indirect effect (SE)	95% CI (Bootstrap estimates)	
		Lower	Upper
<b>Model 1(Figure 1)</b>			
MA→ Rumination →PIU	-.06 (.01)	-.08	-.03
MA→ Catastrophizing →PIU	-.05 (.01)	-.07	-.02
MA→ Other-blame →PIU	-.03 (.01)	-.05	-.01
MA → Self-blame →PIU	-.00 (.01)	-.01	.01
Total indirect effect	-.13 (.02)	-.16	-.09
<b>Model 2(Figure 2)</b>			
FA→ Rumination →UPI	-.05 (.01)	-.07	-.02
FA→ Catastrophizing →UPI	-.04 (.01)	-.06	-.02
FA→ Other-blame →UPI	-.02 (.01)	-.04	-.01
FA → Self-blame →UPI	-.00 (.01)	-.01	.01
Total indirect effect	-.11 (.02)	-.14	-.06

283

284 **Discussion**

285 The main objective of the present research was to examine whether maladaptive Cognitive  
286 Emotion Regulation Strategies mediate the relationship between Mother and Father Attachment and PIU  
287 among children. Firstly, our study found that, as hypothesized, problematic Internet users had  
288 significantly higher scores on maladaptive CER strategies and lower secure attachment scores on  
289 Father and Mother Attachment than non-problematic users. Regarding the CERS, these results align  
290 well with previous literature which reported that problematic users, tend to report more difficulties in  
291 emotion regulation than non-problematic users (e.g., Estévez et al., 2017; Gioia et al., 2021;  
292 Pettorruso et al., 2020). Specifically, in the research of Extremera et al. (2019) problematic users  
293 showing significantly higher scores for maladaptive CER strategies (Rumination, Catastrophizing, Self-  
294 blame, and Other-blame). Other studies have shown that maladaptive CERS were positively associated to  
295 PIU, IA, or problematic device use (Kökönyei et al., 2019; Nosrat-Abad et al. 2020), which is consistent  
296 with the significant positive correlations we found between all maladaptive CERS and PIU. These  
297 findings suggest that problematic Internet use can be understood as a maladaptive strategy, which is used  
298 for escape from everyday problems and that partly arises because of the difficulty of using other adaptive  
299 emotional regulation strategies (e.g., Blasi et al., 2019; Brand et al., 2016; Gioia et al., 2021). Therefore,  
300 it seems plausible that preadolescents who frequently use maladaptive regulation strategies may be more  
301 prone to use the Internet problematically.

302 With respect to attachment, the results reported in the current study support the evidence that  
303 the presence of a problematic or addictive use of Internet tends to be associated with less secure  
304 attachment (e.g., Monacis et al., 2017; Musetti et al., 2020). Both maternal and paternal attachment  
305 showed significant negative correlation with PIU. These results are consistent with other studies that  
306 have shown that secure attachment negatively predicts PIU, while insecure attachment is positively  
307 associated with problematic Internet use (e.g., Chang et al., 2015; Eichenberg et al. 2017;  
308 Schimmenti et al. 2014). Moreover, both Mother and Father Attachment were significantly and



309 negatively correlated with three of the maladaptive CERS (Rumination, Catastrophizing, and Other-  
310 blame). These results support earlier work in children and preadolescent, that suggested that insecure  
311 attachment was positively correlated with negative emotion regulation strategies (e.g., Brenning et  
312 al., 2012; Zimmermann et al., 2009). Thus, children and adolescents with insecure attachment have  
313 more difficulties with adaptive emotion regulation, whilst those with secure attachment employ more  
314 adaptive emotion regulation strategies (e.g., Brenning & Braet, 2013; Zimmer-Gembeck et al., 2015).

315         Lastly, it was found that rumination as maladaptive Cognitive Emotion Regulation Strategies,  
316 partially mediated the relationship between both mother and father Attachment and PIU. However,  
317 other-blame and catastrophizing emerged as partially mediators in the Mother Attachment model, but  
318 not in the Father Attachment model. Previous evidence found that coping strategies (e.g., emotional  
319 expression, cognitive restructuring...) may play a mediating role in the association between attachment  
320 and PIU (Estévez et al. 2019). Similarly, Yu et al. (2013) found that difficulties in emotion regulation  
321 (e.g., limited access to emotion regulation strategies) mediated the association between parenting styles  
322 and PIU. Other results showed that emotion regulation ability partially mediated the relation between the  
323 parent-adolescent relationship and adolescent Internet Addiction. However, these studies did not include  
324 maladaptive CERS as mediating variables. Therefore, the present research extends previous research by  
325 suggesting that insecure attachment may lead to the activation of maladaptive emotion regulation  
326 strategies (such as Rumination, Catastrophizing, Other-blame, and Self-blame) which increases the  
327 probability of using Internet in a problematic way. In addition, the importance of this study lies in the  
328 fact that the focus is on children (younger population than in previous studies). Regarding the relationship  
329 found in the mediation model between attachment and CER strategies, this finding supports previous  
330 research which has shown that securely attached children and early adolescents tend to seek help from  
331 their attachment figures and, as a result, they may use more adaptive ER strategies and fewer maladaptive  
332 ER strategies (Brumariu, 2015). In reference to the relationship found in the mediation model between  
333 the maladaptive CERS and PIU, equivalent results were reported in previous research concerning

334 smartphone use. This research reported that Catastrophizing, Blaming others, and particularly  
335 Rumination, are essential factors in predicting problematic use (Extremera et al., 2019). Moreover, the  
336 relationship between maladaptive CERS and PIU is consistent with the argument of several researchers,  
337 who maintain that problematic internet users could be using the Internet as a means of emotional  
338 regulation to deal with unwanted feelings as consequence of presenting difficulties in using other  
339 adaptive regulation strategies (e.g., Gioia et al., 2021; Yu et al., 2013).

340

#### 341 *Limitations and Future Research*

342 The current study should be interpreted cautiously due to a number of limitations. First, the  
343 cross-sectional nature of the data does not permit the assignment of causality. In future research,  
344 longitudinal or experimental designs could be used for exploring the associations between variables.  
345 Second, this study used self-reported questionnaires, so there may be social desirability biases.  
346 Thirdly, generalizability of research results is limited. Future studies could expand our findings  
347 considering other cultural contexts, other nationalities, and other age groups. Fourthly, only families  
348 with a mother and a father were included. In future research, other types of families could be  
349 investigated. Finally, for comorbidity reasons, it would be relevant to check whether these findings can  
350 be extrapolated, not only to PIU, but also to other related variables, such as problematic videogames use,  
351 digital addiction, and so on.

#### 352 **Conclusions**

353 The current study has extended our knowledge about which variables are associated with  
354 Problematic Internet Use and to understand the underlying mechanisms between attachment and  
355 PIU. We found that children with lower secure attachment scores are more likely to use maladaptive  
356 CERS (Rumination, Catastrophizing, Self-blame, and Other-blame), which in turn can increase the  
357 risk of developing PIU. These findings have important implications for PIU prevention and

358 intervention, for children as well as their families. To this end, it could be useful to carry out family  
359 therapy interventions that promote secure attachment patterns and improve the parent-child  
360 relationship. Child-parent relationship therapy (CPRT; Bratton et al., 2006) has proven effective in  
361 children and preadolescents (Ceballos et al., 2019). Similarly, Parent-child interaction therapy  
362 (PCIT; Eyberg et al., 1995) is an attachment-based intervention, which has been shown to improve  
363 not only the parent-child bond, but also behavioral problems in children. In line with the present  
364 study, recent research has tested PCIT in preadolescents (aged 9-12 years), proving to promote  
365 secure attachment and reduce Internet dependency (Danesh et al., 2023). Nonetheless, attachment  
366 styles are often resistant to change (Fletcher et al., 2015), but the findings of this study suggest that  
367 maladaptive CER strategies, particularly rumination, may play a relevant role in the development of  
368 PIU. Therefore, prevention and intervention plans should include not only strengthening family  
369 bonds, but also the understanding of the negative repercussions of using maladaptive emotion  
370 regulation strategies. So that the use of adaptive CER strategies could be promoted to deal with  
371 negative events on a daily basis. To achieve this goal, it would be useful to conduct intervention  
372 programs such as Emotion- Based Prevention Program (EBP; Izard et al., 2008). The main objective  
373 of the EBP is to increase the emotional competence of children, so that the use of maladaptive  
374 emotion regulation strategies is decreased, diverting the focus towards adaptive strategies. Other  
375 interventions that could be effective in this regard are mindfulness programs. De Bruin et al. (2014)  
376 found that mindfulness in children and adolescents was inversely related to maladaptive CER  
377 strategies such as Self-blame, Rumination and Catastrophizing. Likewise, Mindfulness was  
378 positively linked to less Rumination and Catastrophizing (Tomlinson et al., 2018). Novel findings  
379 (Ilanloo et al., 2022) show that mindfulness is an effective intervention in reducing both maladaptive  
380 CERS and Internet Addiction in adolescents.

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