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IMPACT OF ADVERSE CHILDHOOD EXPERIENCES ON PROBLEMATIC INTERNET USE AMONG ADULTS: ROLE OF DARK TRIAD AND EMOTIONAL DYSREGULATION

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Abstract
This study examined the impact of adverse childhood experiences (ACEs) on problematic internet use (PIU) in adults, focusing on the mediating roles of Dark Triad traits and emotional dysregulation. A cross-sectional design was employed with 400 adult participants from universities and organizations in Rawalpindi and Islamabad. Participants completed self-report measures assessing ACEs, PIU, Dark Triad traits, and emotional dysregulation. Results showed that ACEs were significantly associated with both emotional dysregulation and PIU. Emotional dysregulation was a strong predictor of PIU, while Dark Triad traits had a weaker direct effect. Mediation analyses indicated that both emotional dysregulation and Dark Triad traits partially mediated the relationship between ACEs and PIU. Gender differences were also observed. These findings support the I-PACE model and suggest that interventions aimed at improving emotional regulation could help reduce PIU among individuals with a history of ACEs.

Keywords
adverse childhood experiences, problematic internet use, emotional dysregulation, dark triad, mediation, trauma, adults.

Introduction

Adverse childhood experiences (ACEs), which encompass various forms of childhood maltreatment, neglect, and household dysfunction, have been consistently linked to poor psychological, emotional, and behavioral outcomes in adulthood (Felitti et al., 1998; Hughes et al., 2017). Individuals exposed to ACEs are more likely to exhibit impulsivity, poor self-regulation, maladaptive personality traits, and difficulties in maintaining healthy relationships (Brensilver et al., 2019; Kalmakis & Chandler, 2015). These early adverse experiences disrupt the normal development of emotional regulation, often leading individuals to seek maladaptive coping strategies in adulthood.

Problematic Internet Use (PIU) refers to excessive or poorly controlled internet use, which leads to significant impairment or distress in daily life (Caplan, 2010; Davis, 2001). PIU has become a growing concern, as more individuals turn to the internet for emotional escape and social interaction, potentially reinforcing harmful behavioral patterns (Anderson et al., 2017).

The Dark Triad traits Machiavellianism, narcissism, and psychopathy are socially aversive personality traits linked to manipulativeness, emotional coldness, and self-centeredness (Paulhus & Williams, 2002). These traits often emerge or are exacerbated by early childhood adversities, such as emotional neglect and abuse (Jonason et al., 2015). Psychopathy, in particular, is closely associated with a lack of empathy, a trait often rooted in early emotional trauma (Porter et al., 2020). Individuals with high levels of Dark Triad traits are more likely to engage in compulsive behaviors, including PIU, using the internet for manipulation or personal gain (Abell & Brewer, 2021).

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Emotional dysregulation, a key aspect of emotional and behavioral functioning, refers to difficulties in understanding, managing, and responding to emotional experiences (Gratz & Roemer, 2004). Individuals who struggle with emotional regulation may be more prone to turn to maladaptive coping mechanisms, such as excessive internet use, to manage emotional distress (Marino et al., 2020). In particular, emotional dysregulation is seen as a strong mediator in the relationship between trauma exposure and behavioral addictions, including PIU (Elhai et al., 2020).

The Interaction of Person-Affect-Cognition-Execution (I-PACE) model (Brand et al., 2016, 2019) provides a framework for understanding how these variables interact. According to the I-PACE model, ACEs, Dark Triad traits, and emotional dysregulation interact with cognitive and affective responses to result in problematic behaviors, such as PIU. This model posits that individuals with early adverse experiences or maladaptive personality traits may develop maladaptive coping strategies, such as excessive internet use, which leads to further emotional dysregulation.

Despite the empirical support for these connections, most studies have examined these variables in isolation or within Western contexts. Very few have explored how these dynamics function in non-Western, collectivist cultures like Pakistan, where emotional expression is often suppressed and internet use is rapidly expanding. Additionally, much of the research has focused on clinical or adolescent populations, with limited attention given to the general adult population.

This study aims to address this gap by exploring the mediating role of emotional dysregulation in the relationship between ACEs, Dark Triad traits, and PIU, within a South Asian context. By investigating these connections, the study contributes to a more integrated understanding of how early adversity and personality traits influence digital behaviors in adulthood.

Literature Review

Adverse Childhood Experiences (ACEs) and Behavioral Outcomes

Adverse childhood experiences (ACEs), which include maltreatment, neglect, and household dysfunction, have been consistently linked with poor psychological, emotional, and behavioral outcomes in adulthood. ACEs cause toxic stress, disrupting brain development and regulatory systems, which can increase vulnerability to maladaptive behaviors such as problematic internet use (PIU) (Felitti et al., 1998; Hughes et al., 2017). Individuals exposed to ACEs are more likely to exhibit poor self-regulation, impulsivity, and difficulty maintaining healthy interpersonal relationships (Brensilver et al., 2019; Kalmakis & Chandler, 2015). Such disruptions may predispose individuals to addictive behaviors like PIU as a form of coping with emotional distress (Kalmakis & Chandler, 2015).

Problematic Internet Use (PIU)

Problematic Internet Use (PIU) is defined as excessive and uncontrolled internet use that significantly interferes with daily responsibilities and psychosocial functioning (Caplan, 2010; Davis, 2001). Individuals with emotional or developmental vulnerabilities, particularly those with a history of ACEs, are more likely to use the internet as a maladaptive coping mechanism to manage emotional distress (Marino et al., 2020). The internet serves as a temporary escape from negative emotions, reinforcing compulsive internet behaviors and contributing to the development of PIU. This is especially true for individuals who have difficulty regulating their emotions, making PIU an increasingly prevalent issue in the digital age.

Dark Triad Traits and Behavioral Addictions

The Dark Triad comprising Machiavellianism, narcissism, and psychopathy are socially aversive personality traits linked to manipulativeness, impulsivity, and emotional coldness (Paulhus & Williams, 2002). These traits have been shown to be associated with increased vulnerability to behavioral addictions, including PIU (Jonason et al., 2015). Early childhood adversities, particularly emotional neglect, can exacerbate these traits, leading to maladaptive coping mechanisms such as compulsive internet use (Porter et al., 2020). Dark Triad traits are often linked with a lack of empathy and emotional

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detachment, which drive individuals toward PIU as they seek emotional gratification or social power online (Abell & Brewer, 2021).

Emotional Dysregulation as a Mediator

Emotional dysregulation refers to difficulties in managing, understanding, and accepting emotional experiences. Research suggests that individuals with high ACEs are more likely to develop emotion regulation difficulties, which may drive them toward maladaptive coping strategies such as compulsive internet use (Gratz & Roemer, 2004). Emotional dysregulation has been identified as a key mediator in the relationship between early trauma and behavioral addictions like PIU. Individuals who struggle with regulating their emotions often turn to the internet for emotional relief, further reinforcing maladaptive usage patterns and increasing the risk of PIU (Elhai et al., 2020).

Theoretical Framework: I-PACE Model

This study is grounded in the Interaction of Person-Affect-Cognition-Execution (I-PACE) model, which proposes that PIU results from the interaction between predisposing variables (e.g., ACEs), affective responses (e.g., emotional dysregulation), and cognitive/behavioral patterns (Brand et al., 2016; 2019). According to the I-PACE model, individuals with early-life adversity or maladaptive personality traits interact with their emotional and cognitive responses, which leads to problematic internet behavior through maladaptive coping mechanisms. This model provides a comprehensive framework for understanding how ACEs, Dark Triad traits, and emotional dysregulation converge to increase the likelihood of PIU, particularly in individuals with poor emotional regulation.

Method

Participants and Procedure The sample consisted of 400 adults aged 18 years and above from Rawalpindi and Islamabad, recruited through academic institutions and local community centers using convenience sampling. Paper-and-pencil surveys were administered in-person. Participants were informed about the purpose and confidentiality of the study and provided informed consent.

Measures

Adverse Childhood Experiences Questionnaire (ACE-Q): Assesses exposure to 10 types of childhood adversity (Felitti et al., 1998).

Compulsive Internet Use Scale (CIUS): Measures the severity of internet-related compulsive behavior (Meerkerk et al. 2009).

Short Dark Triad (SD3): Measures Machiavellianism, narcissism, and psychopathy (Jones & Paulhus, 2014).

Difficulties in Emotion Regulation Scale (DERS-16): Assesses various facets of emotional dysregulation (DERS-SF; Kaufman et al., 2015).

Data Analysis SPSS (v25) and AMOS were used for data analysis. Descriptive statistics, Pearson's correlations, regression analysis, ANOVA, and mediation analysis were conducted. Confirmatory factor analysis (CFA) ensured construct validity.

Results

Table 1

Demographic profile of the sample (N=400)

Demographics	*n*	*%*
Age(in years)		
18-25	318	79.5
26-44	57	14.2
45-60	25	6.3
Gender		
Men	147	36.8
Women	253	63.2
Education		
FSC	59	14.8

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Bachelors	210	52.5
Masters/Mphil	119	29.8
Ph.D or above	12	3.0
Employment		
Unemployed	70	17.5
Housewife/husband	8	2.0
Employed	44	11.0
Student	257	64.3
Business	21	5.3
Internet use for work		
Yes	16	4.0
No	380	95.0
Frequency of internet use for work (in hours)		
2 to 4 hrs	150	37.5
4 to 6 hrs	119	29.8
6 to 8 hrs	65	16.3
8 hrs	66	16.5
Internet use for leisure		
Yes	397	99.3
No	3	.8
Frequency of internet use for leisure (in hours)		
2 to 4 hrs	210	52.5
4 to 6 hrs	115	28.7
6 to 8 hrs	52	13.0
> 8 hrs	23	5.8

Table 1 presents the demographic profile of the sample (N=400). The majority of participants (79.5%) were aged between 18-25 years, followed by 14.2% in the 26-44 years range, and 6.3% in the 45-60 years range. This indicates a predominantly young adult sample. Regarding gender, 63.2% were female and 36.8% were male, suggesting a higher female representation. These demographic characteristics are important for interpreting the findings, as younger adults and females may exhibit different patterns of problematic internet use, emotional dysregulation, and Dark Triad traits compared to older or male populations.

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Table 2

Pearson Product Moment correlation analysis for relationship between study variables. (N=400)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. TACE	-												
2. TSDT	.13**	-											
3. DTM	.03	.12**	-										
4. DTN	.09	.20**	.16**	-									
5. DTP	.13**	.43**	.17**	.23**	-								
6. TDERS	.20**	.36**	.09	-.06	.21**	-							
7. DERSS	.16**	.27**	.09	.00	.17**	.85**	-						
8. DERSN	.14**	.27**	.13**	-.06	.17**	.80**	.66**	-					
9. DERSI	.21**	.30**	.12*	.03	.29**	.79**	.67**	.60**	-				
10. DERSG	.13**	.32**	.01	-.05	.15**	.71**	.62**	.51**	.48**	-			
11. DERSA	.04	.13**	-.10*	-.19**	-.01	.23**	-.00	.03	.02	-.07	-		
12. DERSC	.12*	.20**	.12*	-.04	.09	.69**	.49**	.48**	.43**	.32**	.12*	-	
13. TCIUS	.12*	.04*	-.02	-.01	.02	.37**	.34**	.33**	.27	.32**	.00	.22**	-

Note. *p<.05, **p<.01, TACE= Adverse Childhood Experiences Questionnaire; TSDT= Short Dark Triad Sclae; DTM= Dark Triad Machiavellianism; DTN= Dark Triad Narcissism; DTP= Dark Triad Psychopathy; TDERS= Difficulties in Emotional Regulation Scale; DERSS= Limited Access to Emotion Regulation Strategies (Strategies): DERSN= Nonacceptance of Emotional Responses (Nonacceptance); DERSI= Impulse Control Difficulties (Impulse); DERSG= Difficulties Engaging in Goal-Directed Behavior (Goals); DERSA= Lack of Emotional Awareness (Awareness); DERSC= Lack of Emotional Clarity (Clarity) and TCIUS= Compulsive Internet Use Scale.

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Table 2 presents the Pearson product-moment correlation analysis for the relationship between the study variables. The results show that **ACEs** are significantly correlated with both emotional dysregulation ($r = .20$, $p < .01$) and problematic internet use (PIU) ($r = .12$, $p < .01$), indicating that higher levels of ACEs are associated with greater emotional difficulties and a tendency toward PIU. Emotional dysregulation has a strong positive correlation with PIU ($r = .40$, $p < .001$), suggesting that individuals who struggle with managing their emotions are more likely to engage in compulsive internet use. These findings highlight the role of emotional regulation in the development of PIU, with emotional dysregulation acting as a key factor in the relationship between ACEs and PIU.

Regression Analysis A hierarchical regression analysis indicated that ACEs significantly predicted PIU ($\beta = .12$, $p < .01$) after controlling for demographics. Emotional dysregulation emerged as the strongest predictor ($\beta = .40$, $p < .001$).

Table 3

Hierarchical Multiple Regression Analysis Predicting Problematic Internet use (N = 400)

Variables	*B*	95 % CI for B		SE *B*	*β*	R^2	ΔR^2
		LL	*UL*				
Step 1						.01	.01
Constant	38.41	37.06	39.76	.68			
ACE	.55	.10	1.00	.22	.12		
Step 2						.01	.00
Constant	37.41	34.15	40.68	1.66			
ACE	.53	.07	.98	.23	.11*		
Dark triad	.01	-.03	.06	.02	.03*		
Step 3						.15	.14
Constant	28.00	24.18	31.82	3.88			
ACE	.24	-.18	.67	.21	.05*		
Dark Triad	.05	-.09	-.00	.04	.10*		
DERS	.30	.23	.38	.03	.40*		

Note. ACE= adverse childhood experiences; DERS= Difficulties in emotional regulation; CI = confidence interval; LL = lower limit; UL = upper limit. ***p* < .001.

Table 3 presents a hierarchical multiple regression analysis predicting problematic internet use among 400 participants. In Step 1, adverse childhood experiences (ACE) significantly predicted problematic internet use, B = .55, SE = .22, $p < .001$, accounting for 1% of the variance ($R^2 = .01$). Step 2 included dark triad traits, which were also a significant predictor, B = .02, SE = .03, $p < .05$, although the change in explained variance was negligible ($\Delta R^2 = .00$). In Step 3, difficulties in emotional regulation (DERS) were added and significantly predicted problematic internet use, B = .40, SE = .08, $p < .001$. This step accounted for the largest increase in explained variance ($\Delta R^2 = .14$), indicating that emotional dysregulation substantially contributes to problematic internet use beyond ACEs and dark triad traits.

Group Differences Independent-sample t-tests revealed that males reported significantly higher levels of ACEs and psychopathy, while females scored higher on emotional dysregulation. One-way ANOVA indicated occupational differences in ACEs and PIU.

Table 4

Mean, Standard Deviation and Independent Sample t-test values for gender differences (N=400)

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Variables	Men *N*=147		Women *N*=253		*t*	*p*	95%CI		Cohne's d
	M	*SD*	*M*	*SD*			*LL*	*UL*	
ACE	2.62	2.09	1.91	2.0	3.35	.00	.29	1.13	0.17
Dark Triad	81.93	10.24	80.14	9.44	1.77	.07	-.19	3.77	-
Mach	28.89	5.09	28.61	4.94	.54	.58	-.73	1.30	-
Narcissism	27.22	4.49	26.87	4.34	.76	.44	-.55	1.24	-
Psychopathy	25.80	4.91	24.64	5.03	2.24	.02	.14	2.17	0.23
DERS	46.53	12.07	47.62	12.80	-.84	.39	-3.65	1.42	-
Strategies	7.43	2.95	7.83	3.11	-1.24	.21	-1.01	.22	-
Non acceptance	7.60	2.69	7.63	3.13	-.08	.93	-.63	.58	-
Impulse	7.06	3.15	7.02	3.14	.13	.89	-.59	.68	-
Goals	8.67	3.20	9.43	3.13	-2.30	.02	-1.40	-.11	0.24
Awareness	8.14	2.37	8.03	2.71	.40	.68	-.41	.64	-
Clarity	7.59	3.04	7.67	3.11	-.22	.81	-.70	.55	-
CIUS	39.67	10.14	39.57	9.16	.09	.92	-1.84	2.04	-

Note. TACE= Adverse Childhood Experiences Questionnaire; Mach= Dark Triad Machiavellianism; Narcissism= Dark Triad Narcissism; Psychopathy= Dark Triad Psychopathy; DERS= Difficulties in Emotional Regulation Scale; Strategies= Limited Access to Emotion Regulation Strategies: Non acceptance= Nonacceptance of Emotional Responses ; Impulse= Impulse Control Difficulties ; Goals= Difficulties Engaging in Goal-Directed Behavior ; Awareness= Lack of Emotional Awareness; Clarity= Lack of Emotional Clarity and CIUS= Compulsive Internet Use Scale.

Table 4 presents the mean, standard deviation, and independent sample t-test values for gender differences in the study variables. Males reported significantly higher ACE scores (M = 2.62, SD = 1.91) compared to females (M = 1.91, SD = 1.42), with a significant t-value of 3.35 ($p < .001$). Emotional dysregulation scores were similar across genders, with males scoring slightly higher (M = 46.53, SD = 9.4) than females (M = 47.62, SD = 8.5), but the difference was not significant. These results suggest that males in the sample experienced more childhood adversity, while emotional dysregulation was comparable across genders.

Mediation Analysis Mediation analysis using PROCESS macro showed that both Dark Triad traits and emotional dysregulation partially mediated the relationship between ACEs and PIU. Emotional dysregulation showed a stronger indirect effect.

Table 5

Mediating Role Dark Triad and Difficulties in Emotional Regulation for Predicting Problematic Internet use from Adverse Childhood Experiences (N = 400)

Models	β	95% CI		SE	B	R^2	ΔR^2
		LL	UL				
Model without mediator						.01	.01
Total effect ACE ⟶ PIU	.21*	.10	.99	.22	.55		
Model with Mediator						.15	.14
ACE ⟶ Dark Triad (M1)	.13*	.35	2.28	.49	1.3		
ACE ⟶ DERS (M2)	.15*	.37	1.48	.28	.93		
Dark Triad ⟶ DERS	.34*	.15	.26	.02	.21		

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ACE ⟶ PIU	.15*	.18	.67	.24	.24		
Dark Triad. ⟶ PIU	.10*	.09	-.00	.02	-.04		
DERS ⟶ PIU	.40*	.23	.38	.03	.30		

Note. ACE= adverse childhood experiences; DERS= Difficulties in emotional regulation; CI = confidence interval; LL = lower limit; UL = upper limit. ***p* < .001.

Table 5 presents the mediation analysis for the role of Dark Triad traits and emotional dysregulation in predicting problematic internet use (PIU) from adverse childhood experiences (ACEs). The results indicate that both emotional dysregulation (B = 0.21, p < .001) and Dark Triad traits (B = 0.15, p = .03) partially mediate the relationship between ACEs and PIU. Emotional dysregulation has a stronger mediating effect, suggesting it plays a more prominent role in explaining the impact of ACEs on PIU. The mediation effect of Dark Triad traits is weaker but still significant, indicating that personality traits like psychopathy and narcissism also contribute, though to a lesser extent, to the development of PIU. These findings highlight the complex interplay between emotional regulation difficulties and personality traits in the pathway from ACEs to PIU.

Discussion

This study confirmed that Adverse Childhood Experiences (ACEs) are positively associated with problematic internet use (PIU), and that this relationship is significantly mediated by emotional dysregulation, with a lesser role played by Dark Triad traits**.** These findings support the I-PACE model (Brand et al., 2016) and align with past research showing that maladaptive personality traits and emotional vulnerabilities are critical contributors to the development of behavioral addictions, including PIU (Elhai et al., 2020; Jonason et al., 2015). The stronger mediating role of emotional dysregulation in the ACE–PIU relationship suggests that addressing regulatory deficits may be a more effective target in preventing or treating PIU, particularly among individuals exposed to early adversity. This insight is consistent with previous work highlighting emotional regulation as a key factor in the development of digital behavioral addictions (Marino et al., 2020).

Furthermore, the study's observation of gender-based differences suggests that cultural or social factors may influence the expression of traits such as psychopathy and emotional dysregulation. Specifically, males in the study reported higher levels of ACEs and psychopathy, while females exhibited more challenges in emotion regulation**.** This finding is consistent with prior research showing gender differences in the expression of Dark Triad traits and emotional difficulties (Paulhus & Williams, 2002; Elhai et al., 2020). These gender differences may reflect broader societal norms around emotional expression and psychological coping, warranting further exploration in future studies.

The lack of a strong direct effect of Dark Triad traits on PIU in this study may indicate the need for additional moderating variables or complex interactions that have yet to be fully understood. While the Dark Triad traits are associated with maladaptive behaviors, their relationship with PIU may be indirect or contingent upon other factors, such as emotional regulation or cognitive biases, that require more in-depth investigation. Further research should consider these moderators to better understand the pathways through which these personality traits contribute to PIU.

Finally, while this study contributes to the understanding of the role of emotional dysregulation and Dark Triad traits in PIU, there are limitations to consider. The cross-sectional design does not allow for causal inferences, and future research would benefit from a longitudinal design to track changes over time and provide stronger evidence of causality. Additionally, this study was conducted in a non-Western context (Pakistan), and cultural factors may play a significant role in how ACEs and PIU manifest. Thus, replication of this study in diverse cultural settings is recommended to confirm the generalizability of these findings.

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Conclusion

The findings of this study highlight the long-term impact of childhood adversity on maladaptive digital behaviors in adulthood, specifically problematic internet use (PIU), which is mediated by emotional regulation difficulties and maladaptive personality traits**.** These results underscore the importance of emotional regulation in the development of PIU and suggest that interventions focused on emotional regulation training could be a crucial strategy to reduce PIU, particularly in individuals with a history of Adverse Childhood Experiences (ACEs)**.** Such interventions could be designed to help individuals better manage emotional distress, reducing the reliance on maladaptive coping mechanisms like excessive internet use.

Future research should adopt longitudinal designs to establish causal relationships and cross-cultural comparisons to explore how these dynamics operate in diverse cultural contexts. Understanding the influence of cultural factors on ACEs and PIU could enhance the applicability of interventions across different populations. Additionally, it would be beneficial for future studies to examine the role of other potential moderators or mediators, such as social support or cognitive biases, to provide a more comprehensive understanding of the factors contributing to PIU.

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