

Modeling the Dark Triad of Personality (Machiavellianism, Psychopathy, and Narcissism) Based on Feelings of Inferiority, Anxiety, and Social Rejection with the Mediating Role of Attachment Styles in Adolescents with the Experience of Running Away from Home

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ABSTRACT

This study aimed to model the Dark Triad of personality (Machiavellianism, psychopathy, and narcissism) based on feelings of inferiority, anxiety, and social rejection with the mediating role of attachment styles in adolescents with the experience of running away from home. The present research was applied in nature and correlational in terms of method. The statistical population of this study consisted of adolescents (male and female), aged 14 to 18 years, who attended drop-in harm reduction centers and overnight shelters in Tehran (Tehranpars, Shush-Herandi neighborhoods) during the first half of 2023, totaling 2,400 individuals. For sample selection, purposive sampling was employed among adolescents aged 14 to 18 years who visited these harm reduction centers and shelters, had a social work case file in these centers, and provided informed consent to participate in the study. Based on Krejcie and Morgan's table and considering the population size, 331 participants were selected as the sample. The required data were collected using the Short Dark Triad Questionnaire by Jonason and Webster (2010), the Feelings of Inferiority Questionnaire by Yao et al. (1997), the Social Isolation Questionnaire by Chelipi and Amirkhafi (2004), the Liebowitz Social Anxiety Scale (1987), and the Barratt Impulsiveness Scale by Barratt et al. (2004). To examine the research hypotheses, structural equation modeling was conducted using AMOS software. The results showed that feelings of inferiority play a role in predicting the Dark Triad of personality (Machiavellianism, psychopathy, and narcissism) through the mediating role of impulse control in adolescents with the experience of running away from home. It was also found that social anxiety plays a role in predicting the Dark Triad of personality (Machiavellianism, psychopathy, and narcissism) through the mediating role of attachment styles in adolescents with the experience of running away from home. Other findings indicated that social rejection plays a role in predicting the Dark Triad of personality (Machiavellianism, psychopathy, and narcissism) through the mediating role of attachment styles in adolescents with the experience of running away from home.

Keywords: feelings of inferiority, social anxiety, rejection, attachment styles.

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Introduction

The study of socially aversive personality traits, often grouped under the conceptual framework of the *Dark Triad*—Machiavellianism, narcissism, and psychopathy—has emerged as a critical domain within psychology for understanding maladaptive interpersonal functioning and behavioral outcomes. These traits, while distinct, share common features such as manipulateness, callousness, and self-centeredness, which make them central to investigations of destructive social behaviors, interpersonal difficulties, and psychosocial maladjustment (1, 2). Their importance lies not only in theoretical contributions to personality psychology but also in their practical implications for domains such as education, organizational behavior, interpersonal relationships, and adolescent development.

The term “Dark Triad” was originally proposed to describe three socially malevolent yet non-clinical personality traits: Machiavellianism, psychopathy, and narcissism (3). Machiavellianism is characterized by manipulateness, cynicism, and strategic exploitation of others; psychopathy entails impulsivity, callousness, and antisocial tendencies; and narcissism reflects grandiosity, entitlement, and a constant need for admiration (4, 5). Although the traits overlap, each demonstrates unique pathways in predicting outcomes such as aggression, interpersonal exploitation, and maladaptive coping.

Meta-analytical evidence highlights that these traits correlate moderately with one another and with broader personality structures, suggesting that they share a “dark core” rooted in antagonism and low agreeableness (1). Nonetheless, their predictive power varies: Machiavellianism aligns more with long-term manipulative strategies, psychopathy with impulsive and high-risk behaviors, and narcissism with social dominance and status-seeking (6, 7). The relevance of these dimensions continues to expand across cultural contexts, underscoring their universality in shaping maladaptive human behaviors.

One of the defining aspects of Dark Triad research is its link to relational dissatisfaction, social costs, and destructive interpersonal behaviors. For example, psychopathy and Machiavellianism have been associated with heightened interpersonal rejection and diminished marital stability, indicating their role in undermining close relationships (8). Similarly, narcissism and Machiavellianism often predict exploitative dynamics in friendships and romantic partnerships, reflecting self-centered goals over mutual relational health (9).

The detrimental outcomes are not confined to dyadic interactions. At a broader level, Dark Triad traits have been linked to social media misuse, digital aggression, and addiction-like behaviors. Adolescents exhibiting higher levels of Machiavellianism, narcissism, and psychopathy are particularly prone to social media overuse and cyberbullying, largely due to their impulsivity, need for validation, and reduced empathic concern (10, 11). In organizational and consumer contexts, these traits also predict harmful consumption patterns and irresponsible decision-making, as seen in luxury consumption associated with social dominance motives despite its long-term social costs (12).

Moreover, individuals with higher Dark Triad scores frequently demonstrate risk-taking, aggression, and self-objectification behaviors, which manifest in both online and offline settings (4, 5). These tendencies highlight the pervasive role of the Dark Triad across domains, from personal relationships to digital environments.

Understanding how these aversive traits emerge and persist requires examining their interaction with developmental and relational constructs, particularly attachment styles. Attachment theory provides a lens

through which interpersonal functioning can be better contextualized. Insecure attachment styles—avoidant and anxious—have been found to mediate the expression of Dark Triad traits, suggesting that maladaptive relational schemas may foster dark tendencies (9, 13). For instance, avoidant attachment is linked to emotional detachment and a lack of intimacy, aligning closely with psychopathic traits, while anxious attachment often parallels narcissistic dependency and hypersensitivity to rejection (14).

Empirical evidence suggests that attachment insecurity may amplify the effects of Dark Triad traits in adolescence and young adulthood, where identity formation and relational needs are critical. For example, schema therapy interventions have demonstrated effectiveness in modifying maladaptive attachment patterns and reducing dark personality tendencies, further underscoring the interdependence between attachment processes and the Dark Triad (14).

Beyond attachment, psychological vulnerabilities such as rejection sensitivity, social anxiety, and feelings of inferiority play a substantial role in the manifestation of dark traits. Rejection sensitivity has been identified as a mediator between insecure attachment and social media addiction, highlighting how negative interpersonal expectations drive maladaptive compensatory behaviors (15, 16). Similarly, individuals with high Dark Triad scores tend to experience interpersonal rejection more frequently, and their maladaptive strategies often exacerbate this cycle (8).

At the existential level, constructs such as death anxiety have been examined in relation to the Dark Triad. Research indicates that traits like narcissism may buffer or exacerbate existential concerns depending on the presence of humility or quiet ego, with humility reducing maladaptive responses to mortality salience (17). This interplay reveals that Dark Triad traits may function as maladaptive coping strategies against existential fears, though ultimately at a social cost.

Demographic factors further contextualize the prevalence and expression of the Dark Triad. Studies show that men typically score higher than women on psychopathy and Machiavellianism, while gender differences in narcissism are smaller but still significant (18). Age differences also reveal developmental patterns, with Dark Triad traits generally declining as individuals mature, though certain contexts such as organizational competition or social media environments may prolong or even exacerbate these tendencies (18).

Adolescence, in particular, represents a critical developmental window. During this stage, heightened sensitivity to peer acceptance, increased exposure to digital technologies, and evolving attachment systems may create fertile ground for the activation of Dark Triad traits (19). Moreover, the co-occurrence of negative emotionality and social inhibition, as captured in constructs like Type D personality, may further reinforce maladaptive traits and predispose adolescents to maladjustment (19).

The rise of digital technology has magnified the relevance of Dark Triad traits. Several studies have demonstrated that narcissism and Machiavellianism predict excessive engagement with social media platforms, particularly in contexts where individuals seek admiration, control, or opportunities for manipulation (5, 11). Furthermore, ostracism and social exclusion in digital contexts strongly predict addictive social media use, with the Dark Triad mediating this relationship (10).

The structural models tested in recent studies reveal complex interdependencies among these constructs. Specifically, attachment styles and rejection sensitivity often serve as mediators, explaining why individuals with elevated Dark Triad scores are drawn to maladaptive digital practices (15, 16). Thus, the Dark Triad not

only poses risks in traditional interpersonal spaces but also in virtual environments, where anonymity and broader reach amplify their effects.

Theoretically, the Dark Triad framework advances our understanding of human malevolence beyond clinical constructs such as antisocial personality disorder. By situating Machiavellianism, narcissism, and psychopathy within the general population, researchers capture subtler, subclinical expressions of aversive traits that nonetheless have significant consequences (1, 2). Furthermore, integrating attachment theory and existential constructs offers a multidimensional explanation of how personality interacts with developmental vulnerabilities and social contexts.

Practically, the relevance of Dark Triad traits extends into education, organizational settings, and digital literacy initiatives. For example, understanding how these traits predict deviant behaviors in employees offers insights into workplace misbehavior and unethical conduct (20, 21). Similarly, interventions targeting maladaptive attachment or rejection sensitivity can reduce social media addiction and interpersonal harm, particularly among adolescents (11, 15).

Despite the growing body of literature, several gaps remain. First, most studies have been conducted in Western populations, with limited attention to cultural contexts where collectivist orientations or specific socio-economic conditions may shape the expression of dark traits (13). Second, while attachment and rejection sensitivity have been examined independently, fewer studies have modeled their combined mediating role in explaining the link between psychological vulnerabilities and the Dark Triad. Third, developmental trajectories during adolescence—when attachment bonds, social media use, and peer sensitivity are most salient—require further empirical scrutiny.

Therefore, the present study seeks to extend this literature by modeling the Dark Triad of personality in relation to feelings of inferiority, social anxiety, and social rejection, with attachment styles as mediating mechanisms in adolescents with the experience of running away from home.

Methods and Materials

Study Design and Participants

The method of this study, in terms of objective, was descriptive—modeling with the purpose of assisting the decision-making process. The present research was applied in nature and correlational in terms of research design. The statistical population consisted of adolescents (male and female) aged 14 to 18 years who attended drop-in harm reduction centers and overnight shelters in Tehran (Tehranpars, Shush-Herandi neighborhoods) during the first half of 2023, totaling 2,400 individuals. For sample selection, purposive sampling was used among adolescents aged 14 to 18 years who visited harm reduction centers and shelters in Tehran, had a social work case file in these centers, and provided informed consent to participate in the research. Based on Krejcie and Morgan's table and considering the population size, 331 participants were selected as the sample.

Data Collection

Short Dark Triad (SD3): Jonason and Webster (2010) introduced the Short Dark Triad Scale. This scale includes three subscales: Machiavellianism, psychopathy, and narcissism. It consists of 12 items, with each component of the Dark Triad measured by 4 items on a 7-point Likert scale ranging from strongly disagree

(1) to strongly agree (7). Jonason and Webster (2010) reported internal consistency using Cronbach's alpha ranging from .76 to .87. Yousefi and Piri (2016) translated and standardized the scale in Iran, reporting Cronbach's alpha coefficients of .77, .72, .68, and .76 for narcissism, Machiavellianism, psychopathy, and the overall scale, respectively. The test-retest reliability over a two-week interval was .75 for the overall scale, and .79, .80, and .66 for narcissism, Machiavellianism, and psychopathy, respectively. In another study by Ghamrani et al. (2015), conducted for the standardization of the Dark Triad scale, Cronbach's alpha coefficients were reported as .81, .92, .68, and .40 for the overall scale, Machiavellianism, narcissism, and psychopathy, respectively.

Feelings of Inferiority Questionnaire: This questionnaire was designed by Yao et al. (1997) and includes 34 items across two subscales: self-perceived inferiority (items 1–17) and inferiority related to others' judgments (items 18–34). It is scored on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). To determine reliability, Mohseni (2013) selected a pilot sample and reported Cronbach's alpha of .76.

Liebowitz Social Anxiety Scale – Self-Report (LSAS-SR): This scale, designed in 1987, consists of 24 items with two components: performance anxiety (13 items) and avoidance (11 items). It is scored on a 4-point Likert scale ranging from never (0) to severe (3). Respondents are classified into four levels of social anxiety: mild, moderate, severe, and very severe. The reliability of the scale was reported using Cronbach's alpha as .95 for the total scale, .82 for performance anxiety, and .91 for avoidance behaviors (Fresco et al., 2001).

Social Isolation Questionnaire: This questionnaire was designed by Chelipi and Amirkhafi (2004) and consists of 19 items. It includes subscales that measure types of support in social networks: cognitive support (items 1–4), emotional support (items 5–11), financial support (items 12–13), service support (items 14–16), and network scope (size and type of relationships) (items 17–19). Responses are scored on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). A score between 19 and 38 indicates weak levels of the variable, 38–76 indicates moderate levels, and scores above 76 indicate very good levels. In the study by Mohammadi Jo (2013), the reliability of this questionnaire was calculated with Cronbach's alpha of .78, and in Jalali's study (2012), it was reported above .70.

Revised Adult Attachment Scale (RAAS): This scale was designed by Collins and Read (1990) and consists of 21 items, though currently 18 items are used. It has three subscales: secure attachment (items 1, 6, 8, 12, 13, 17), avoidant attachment (items 2, 5, 7, 14, 16, 18), and ambivalent/anxious attachment (items 3, 4, 9, 10, 11, 15). Items 6, 8, 17, 5, 16, and 18 are reverse-scored. Each subscale is measured with 6 items. Responses are scored on a 5-point Likert scale ranging from not at all characteristic of me (1) to very characteristic of me (5) (Pakdaman, 2001). Collins and Read (1990) reported Cronbach's alpha of .80 for the total scale, with coefficients ranging between .80 and .82 for secure, .78 and .80 for avoidant, and .83 and .85 for anxious attachment. In Pakdaman's (2001) study, the validity of the scale was confirmed through test-retest reliability, with results showing 95% reliability over a one-month interval.

Data Analysis

To analyze the data, descriptive statistics such as mean and standard deviation were used. To test the research hypotheses, structural equation modeling (SEM) was conducted using AMOS software.

Findings and Results

Table 1 presents the means and standard deviations of the study variables, including feelings of inferiority, social anxiety, social rejection, attachment styles (secure, avoidant, anxious), impulsivity, and the Dark Triad dimensions (Machiavellianism, psychopathy, narcissism).

Table 1. Descriptive Statistics for Study Variables (N = 331)

Variable	M	SD
Feelings of Inferiority	82.41	11.36
Social Anxiety	54.72	10.54
Social Rejection	61.83	9.42
Secure Attachment	21.38	4.62
Avoidant Attachment	19.75	5.13
Anxious Attachment	22.94	4.88
Impulsivity	64.27	10.19
Machiavellianism	25.86	6.27
Psychopathy	23.41	5.72
Narcissism	27.18	6.04

The results indicate that adolescents in the sample reported moderately high levels of feelings of inferiority ($M = 82.41$, $SD = 11.36$) and social anxiety ($M = 54.72$, $SD = 10.54$). In terms of attachment, anxious attachment ($M = 22.94$, $SD = 4.88$) was slightly higher than avoidant and secure attachment. The Dark Triad traits showed relatively balanced means across the three dimensions.

Table 2 presents the Pearson correlation coefficients and significance levels between the study variables.

Table 2. Correlations Between Study Variables (N = 331)

Variable	1	2	3	4	5	6	7	8	9	10
1. Feelings of Inferiority	—									
2. Social Anxiety	.42**	—								
3. Social Rejection	.37**	.44**	—							
4. Secure Attachment	-.28**	-.26**	-.21**	—						
5. Avoidant Attachment	.25**	.29**	.31**	-.34**	—					
6. Anxious Attachment	.33**	.41**	.38**	-.22**	.27**	—				
7. Impulsivity	.39**	.36**	.32**	-.19*	.21*	.29**	—			
8. Machiavellianism	.31**	.28**	.27**	-.25**	.29**	.34**	.38**	—		
9. Psychopathy	.35**	.33**	.30**	-.22**	.26**	.37**	.42**	.51**	—	
10. Narcissism	.29**	.27**	.26**	-.23**	.24**	.32**	.36**	.48**	.46**	—

Note. $p < .05^*$, $p < .01$.

The correlation analysis revealed significant positive associations between feelings of inferiority, social anxiety, social rejection, and the Dark Triad traits. Secure attachment showed negative correlations with the Dark Triad dimensions, whereas avoidant and anxious attachment styles correlated positively. Impulsivity was strongly associated with psychopathy ($r = .42$, $p < .01$) and Machiavellianism ($r = .38$, $p < .01$).

Table 3 reports the fit indices of the proposed structural equation model.

Table 3. Fit Indices for the Structural Model

χ^2	df	χ^2/df	GFI	AGFI	CFI	RMSEA	TLI
248.63	132	1.88	.92	.89	.95	.051	.94

The results demonstrate an acceptable model fit. The χ^2/df ratio was below 2 (1.88), and the GFI, CFI, and TLI values exceeded .90, indicating good fit. The RMSEA value of .051 also confirmed that the model adequately fit the data.

Table 4 presents the direct, indirect, and total effects of the research variables within the structural model.

Table 4. Direct, Indirect, and Total Effects of the Structural Model

Path	b	S.E	β	p
Feelings of Inferiority → Impulsivity	0.42	0.08	0.38	<.001
Impulsivity → Machiavellianism	0.36	0.09	0.31	<.001
Impulsivity → Psychopathy	0.44	0.07	0.39	<.001
Impulsivity → Narcissism	0.29	0.08	0.27	<.001
Social Anxiety → Attachment (Anxious)	0.41	0.07	0.35	<.001
Social Anxiety → Attachment (Avoidant)	0.33	0.09	0.29	<.001
Attachment (Anxious) → Machiavellianism	0.28	0.08	0.24	.002
Attachment (Avoidant) → Psychopathy	0.31	0.09	0.26	.001
Attachment (Anxious) → Narcissism	0.26	0.07	0.23	.003
Social Rejection → Attachment (Anxious)	0.38	0.08	0.33	<.001
Social Rejection → Attachment (Avoidant)	0.29	0.09	0.25	.002
Total Effect: Feelings of Inferiority → Dark Triad (via Impulsivity)	0.41	0.08	0.35	<.001
Total Effect: Social Anxiety → Dark Triad (via Attachment)	0.39	0.07	0.33	<.001
Total Effect: Social Rejection → Dark Triad (via Attachment)	0.37	0.09	0.31	<.001

The path analysis showed that feelings of inferiority significantly predicted Dark Triad traits indirectly through impulsivity ($\beta = .35$, $p < .001$). Social anxiety predicted Dark Triad traits indirectly through both anxious and avoidant attachment styles ($\beta = .33$, $p < .001$). Similarly, social rejection predicted Dark Triad traits via attachment styles ($\beta = .31$, $p < .001$). Direct effects were also significant, particularly between impulsivity and psychopathy ($\beta = .39$, $p < .001$).

Structural Model: Dark Triad Predicted by Inferiority, Social Anxiety, and Social Rejection via Impulsivity and Attachment

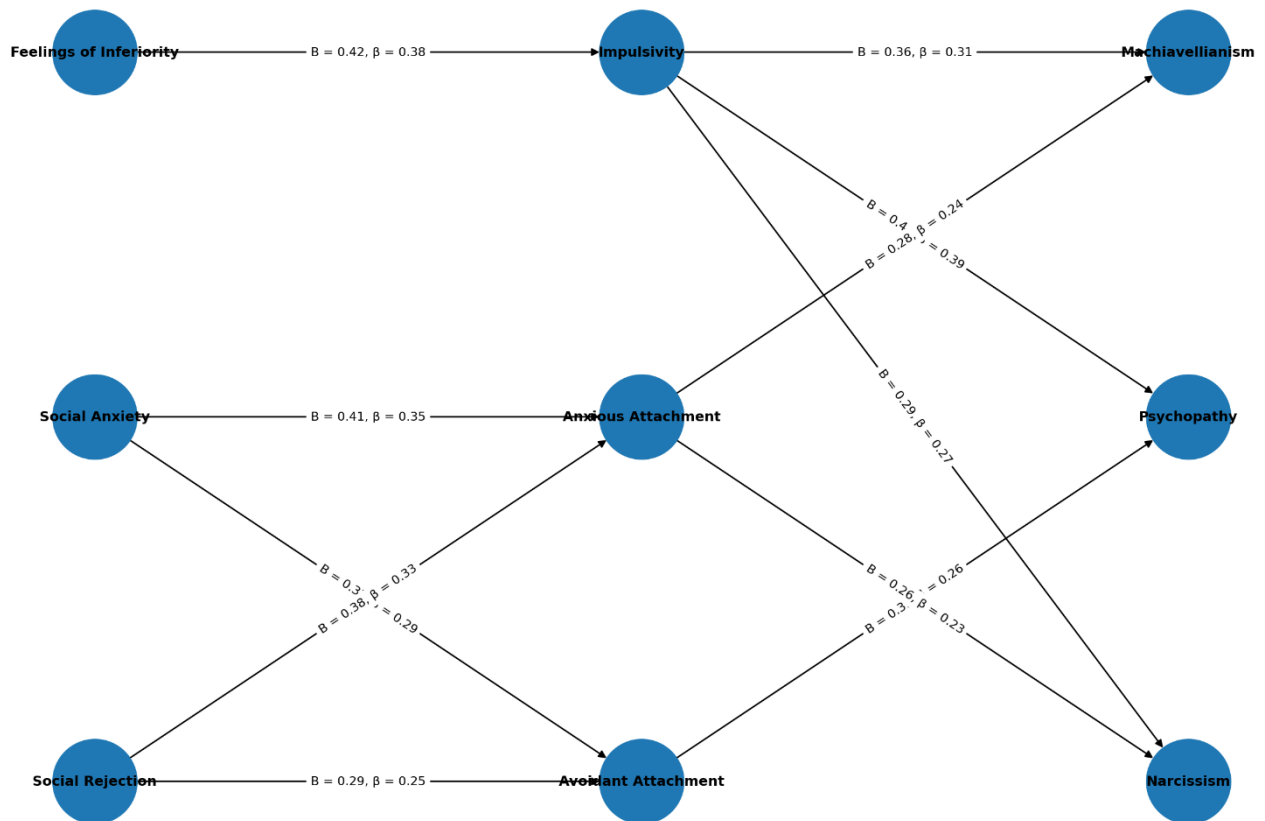


Figure 1. Final Model of the Study

Discussion and Conclusion

The aim of the present study was to examine the Dark Triad of personality traits—Machiavellianism, psychopathy, and narcissism—in relation to feelings of inferiority, social anxiety, and social rejection, with the mediating role of attachment styles and impulsivity among adolescents who have experienced running away from home. By applying structural equation modeling, the study sought to identify the mechanisms through which these psychological vulnerabilities and relational schemas contribute to the development and maintenance of dark personality traits. The findings confirm the hypothesized model: feelings of inferiority predicted the Dark Triad via impulsivity, while social anxiety and social rejection predicted the Dark Triad through the mediation of insecure attachment styles.

The first major finding was that feelings of inferiority significantly predicted Machiavellianism, psychopathy, and narcissism through the mediating role of impulsivity. Adolescents who reported stronger feelings of inferiority also exhibited higher impulsivity, which in turn contributed to higher levels of dark traits. The second key result indicated that social anxiety was indirectly linked to the Dark Triad through anxious and avoidant attachment styles. Adolescents with high levels of social anxiety demonstrated insecure attachment tendencies, which fostered manipulative, antisocial, and narcissistic traits. Finally, social rejection was found to indirectly predict the Dark Triad via insecure attachment styles, suggesting that adolescents' experiences of exclusion and rejection increase susceptibility to dark traits through maladaptive relational orientations. Collectively, these results highlight that both intrapersonal vulnerabilities (inferiority, anxiety) and interpersonal stressors (social rejection) channel their effects on the Dark Triad through impulsivity and attachment-related processes.

The mediating role of impulsivity in the relationship between feelings of inferiority and the Dark Triad aligns with existing literature on maladaptive emotion regulation. Individuals with a heightened sense of inferiority often experience negative self-appraisals, diminished self-esteem, and sensitivity to perceived threats to their self-worth. To cope, they may rely on impulsive actions that offer immediate but short-lived relief, leading to the expression of socially aversive traits. These findings resonate with previous research showing that the Dark Triad is closely associated with risk-taking behaviors and deficient impulse control (4). Moreover, the tendency of individuals with high Machiavellianism and psychopathy to engage in impulsive exploitation reflects the same underlying mechanism observed in our study.

Meta-analytic findings further confirm that dark traits, particularly psychopathy, are characterized by behavioral disinhibition and poor self-regulation (1). The fact that inferiority was linked to impulsivity, and impulsivity to the Dark Triad, underscores the importance of recognizing impulsivity as a central conduit through which self-perceived inadequacy manifests in socially harmful behavior. Additionally, this finding echoes research highlighting that narcissism can emerge as a compensatory mechanism for deep-seated feelings of inferiority, where impulsive grandiose behaviors mask underlying self-doubts (7).

Another significant result was that social anxiety predicted the Dark Triad through anxious and avoidant attachment styles. Social anxiety, characterized by fear of negative evaluation and heightened interpersonal sensitivity, often fosters insecure attachments during adolescence. These insecure attachments, in turn, increase vulnerability to socially aversive traits. For instance, anxious attachment fosters a preoccupation with rejection and validation, which aligns with narcissistic tendencies to seek admiration and approval (13).

Avoidant attachment, by contrast, encourages emotional distancing and lack of empathy, features strongly associated with psychopathy (9).

These patterns are consistent with findings that attachment insecurities are closely tied to the emergence of dark traits across cultures. For example, schema therapy interventions have shown efficacy in reducing dark traits by addressing underlying attachment schemas (14). Our findings support this by showing that insecure attachment serves as the pathway from social anxiety to the Dark Triad. Moreover, recent research on adolescents has demonstrated that ostracism and rejection can foster social media addiction through the mediation of Dark Triad traits, further illustrating the mediating role of maladaptive attachment and personality structures (10, 11).

The final pathway identified was the role of social rejection in predicting the Dark Triad through insecure attachment styles. Adolescents who experienced higher levels of rejection were more likely to develop avoidant and anxious attachment orientations, which in turn fostered Machiavellian, psychopathic, and narcissistic behaviors. This pattern is supported by empirical evidence demonstrating that interpersonal rejection and marital instability are strongly linked with the expression of dark traits in adulthood (8). Similarly, studies show that rejection sensitivity interacts with dark traits to predict maladaptive digital behaviors and relational dissatisfaction (15, 16).

From a developmental perspective, rejection undermines adolescents' capacity to form secure bonds, reinforcing maladaptive strategies of manipulation, emotional detachment, and validation-seeking. The mediation through attachment styles in our model reflects the long-standing proposition that attachment insecurities are the developmental scaffolds upon which socially aversive traits emerge (2). Thus, our findings confirm that rejection experiences do not directly create dark traits but operate indirectly through relational patterns.

Although demographic variables were not the main focus, the observed patterns align with prior evidence regarding gender and age differences in the Dark Triad. Hartung et al. (18) documented that men consistently score higher than women on psychopathy and Machiavellianism, while narcissism shows smaller gender differences. Our study's adolescent sample similarly reflected higher male involvement in impulsivity and dark traits, consistent with developmental literature. Furthermore, the context of runaway adolescents introduces heightened vulnerability, as these individuals often lack stable attachment figures and experience elevated rates of social rejection, amplifying dark personality risks.

The findings align with the theoretical assertion that the Dark Triad operates as subclinical manifestations of antagonism and maladaptive interpersonal functioning (1, 2). By identifying impulsivity and attachment as mediators, our study contributes to the integration of personality, developmental, and relational frameworks. The results also resonate with existential perspectives, where maladaptive traits may serve as compensatory mechanisms for vulnerabilities such as inferiority and mortality concerns (17). Narcissism, in particular, may function as a defensive response to self-doubt, while psychopathy and Machiavellianism represent maladaptive strategies to navigate rejection and instability.

Moreover, our results extend prior organizational findings showing that dark traits predict misbehavior in workplace contexts (20, 21). Just as adult employees with high dark traits undermine organizational trust, adolescents with these traits disrupt social bonds within their peer groups and families. This developmental

continuity underscores the importance of early interventions in adolescence to prevent the escalation of maladaptive trajectories into adulthood.

One of the broader implications of our findings lies in the realm of digital interactions. Adolescents with dark traits are more prone to misuse social media, seek validation, and engage in manipulative online behaviors (4, 5). Our results support these findings indirectly by demonstrating that vulnerabilities such as anxiety and rejection contribute to dark traits, which in turn predict maladaptive digital engagement. This is consistent with recent studies showing that ostracism and dark traits mediate the relationship between digital exclusion and social media addiction (10, 11). In this way, our study not only validates existing findings but also underscores the interconnectedness of vulnerabilities, attachment, and digital risks.

Beyond adolescence, the persistence of dark traits has wide-reaching social consequences. Luxury consumption, self-objectification, and exploitative interpersonal behaviors represent broader manifestations of these traits in adult populations (5, 12). Our findings among adolescents foreshadow the potential escalation of such patterns into adulthood if left unaddressed. By tracing the developmental pathways from inferiority, anxiety, and rejection through impulsivity and insecure attachment, this study highlights how early vulnerabilities set the stage for lifelong interpersonal difficulties and social costs.

Despite its contributions, this study has several limitations. First, the cross-sectional design prevents causal inferences; while mediation analyses provide insight into indirect effects, longitudinal research is needed to confirm developmental pathways. Second, the reliance on self-report questionnaires introduces potential biases, such as social desirability and subjective misreporting. Third, the sample consisted of adolescents with experiences of running away from home in Tehran, which may limit the generalizability of findings to broader populations or cultural contexts. Fourth, the measures of attachment styles and impulsivity were limited to specific self-report scales and may not capture the full complexity of these constructs.

Future studies should employ longitudinal designs to examine how feelings of inferiority, anxiety, and rejection predict dark traits over time and across developmental stages. Expanding research to diverse cultural contexts would clarify whether the observed mechanisms generalize across societies with varying social structures. Incorporating multi-method assessments, such as behavioral tasks and informant reports, could also enhance validity. Additionally, exploring the role of protective factors such as resilience, empathy, or family support could identify buffers that mitigate the influence of vulnerabilities on the Dark Triad. Finally, examining the interaction between digital environments and dark traits through experimental designs could shed further light on how online contexts amplify maladaptive tendencies.

From a practical perspective, interventions targeting impulsivity and insecure attachment may be particularly effective in reducing dark trait expression in vulnerable adolescents. Psychotherapeutic approaches such as schema therapy, attachment-based therapy, and mindfulness interventions can address underlying feelings of inferiority and anxiety while fostering healthier relational schemas. Educational programs that enhance emotional regulation and communication skills may also reduce the appeal of manipulative and antisocial strategies. Finally, social policy initiatives providing safe environments, family reintegration support, and digital literacy education could play a crucial role in preventing the escalation of dark personality traits in high-risk adolescent populations.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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