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The personality architecture of online aggression: A network analysis integrating HEXACO, the Dark Tetrad, and Life History Strategy in Iranian adolescents

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A B S T R A C T

Cyberbullying is a pervasive form of adolescent aggression, yet its underlying personality architecture remains poorly understood. This study applied psychological network analysis to integrate three major frameworks—the HEXACO model, the Dark Tetrad, and Life History Theory—in mapping the personality system underlying cyberbullying among Iranian adolescents. A sample of 624 participants (ages 11–19) who reported engaging in cyberbullying completed validated Farsi versions of the HEXACO-60, the Short Dark Tetrad (SD4), and the Mini-K-F. A Gaussian Graphical Model estimated partial correlations among eleven personality constructs to identify central and bridging traits. Results revealed a coherent structure: Honesty–Humility was the most central node, positively associated with Emotionality and Conscientiousness, and negatively with antagonistic traits. Machiavellianism and Psychopathy acted as primary bridges between adaptive and dark domains, while Life History Strategy was inversely related to antagonistic traits, indicating slower, self-regulatory orientations. Males exhibited denser antagonistic connectivity than females. These findings suggest that cyberbullying arises from an interconnected antagonistic personality system anchored by low Honesty–Humility, manipulative strategy, and fast life-history orientation. From an evolutionary perspective, online aggression may represent a modern manifestation of dominance strategies adapted to low-cost digital environments.

1. Introduction

1.1. Introduction

The digital age has transformed adolescent social interaction, leading to a heightened prevalence of cyberbullying, which allows peer victimization to extend beyond the schoolyard into the continual connectivity of personal devices (Kowalski et al., 2019). Unlike traditional bullying, cyberbullying is characterized by anonymity, a vast audience, and the permanence of digital content, resulting in severe reputational damage and social exclusion linked to anxiety, depression, and suicidality in victims (Gámez-Guadix et al., 2013; John et al., 2018).

Research on cyberbullying has predominantly focused on identifying isolated risk factors, often overlooking the complex interplay of personality traits (Baumert et al., 2017; Wright & Zimmermann, 2019). Understanding why adolescents engage in online aggression requires a holistic, system-level perspective on their personality.

This study aims to fill this gap through a comprehensive network analysis of adolescent cyberbullies, integrating three psychological frameworks: (1) the HEXACO model, emphasizing Honesty-Humility; (2) the Dark Tetrad traits (Narcissism, Machiavellianism, Psychopathy, Sadism); and (3) Life History Theory. By mapping the interactions among these constructs, the study seeks to identify core components of the personality of adolescent perpetrators.

1.2. Theoretical framework

1.2.1. Beyond the dark side: the centrality of honesty-humility

Early research on cyberbullying logically focused on antisocial personality traits. The Dark Triad—and more recently, the Dark Tetrad—has been consistently linked to online aggression, as these traits encapsulate a tendency toward antagonism, exploitation, and a lack of

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empathy (Goodboy & Martin, 2015). These traits provide a compelling portrait of a perpetrator: the entitled and status-seeking narcissist, the strategically manipulative Machiavellian, the callous and impulsive psychopath, and the sadist who derives genuine pleasure from the suffering of others (Paulhus, 2014). However, focusing only on these "dark" traits tells only half the story.

A comprehensive model of personality should account for the pro-social traits that individuals may lack. The HEXACO model, which comprises six personality factors, uniquely features Honesty-Humility (Ashton & Lee, 2009). This factor encompasses traits like sincerity and fairness, reflecting a tendency to treat others ethically rather than exploit them. Research has linked high Honesty-Humility scores to various pro-social behaviors, such as cooperation in economic games and altruism in social contexts (Hilbig et al., 2014; Wertag & Bratko, 2016). This suggests that Honesty-Humility plays a central role in the moral and interpersonal domains of personality, bridging dispositional traits with ethical behavior.

Theoretically, Honesty–Humility is considered the opposite of the Dark Tetrad traits—Machiavellianism, Narcissism, Psychopathy, and Sadism. Referred to as the "H-factor," it includes sincerity, fairness, and modesty, marking prosocial behavior (Lee & Ashton, 2013). In contrast, the Dark Tetrad traits reflect manipulative and callous behaviors. Research shows that low Honesty–Humility correlates with high Dark Tetrad scores, leading to reduced empathy and altruism (Aghababaei et al., 2014; Međedović & Petrović, 2015). Thus, understanding cyber-bullying requires placing Honesty-Humility at its core as a key element influencing both prosocial and antisocial behaviors.

1.2.2. An evolutionary framework: life history strategy

While personality models describe *what* an individual is like, evolutionary psychology seeks to explain *why* these patterns exist. Life History Theory provides a powerful framework for this, proposing that individuals, in response to early environmental cues of stability and resource availability, develop strategies to allocate their time and energy toward survival and reproduction (Figueredo et al., 2006; Kaplan & Gangestad, 2015).

Life history strategies range from "fast" to "slow." A slow strategy, associated with stable childhood environments, involves long-term planning, caution, strong pair bonds, and high investment in fewer offspring. In contrast, a fast strategy adapts to unpredictable environments, prioritizing immediate gratification, impulsivity, and short-term mating—a "live fast, die young" approach to maximize reproductive opportunities amid uncertainty (Belsky, 2012; Yang et al., 2023).

Crucially, these strategies are systematically linked to personality. A fast life history is consistently associated with the traits of the Dark Tetrad and low Honesty-Humility, which can be viewed as psychological tools that facilitate an opportunistic and exploitative social strategy (Jonason et al., 2010; Jonason et al., 2017). From this perspective, cyberbullying is not a random act of malice. It can be conceptualized as a modern, low-cost, and low-risk tactic for social dominance, harassment of rivals, and status-seeking—behaviors that are perfectly congruent with a fast life history strategy operating in the novel environment of the internet (Volk et al., 2012).

Research shows that while cyberbullying occurs among both sexes, there are key developmental and behavioral differences. Girls are more likely to engage in relational cyberbullying during early adolescence, while boys show an increase in direct or public bullying as they get older (Barlett & Coyne, 2014; Kowalski et al., 2019). These trends may be linked to different socialization and dominance strategies, with males often displaying higher levels of overt aggression (Grijalva et al., 2015). This study also explores sex-linked variations in the traits underlying online aggression.

1.2.3. The current study: a network approach

No study has yet integrated the HEXACO model, the Dark Tetrad, and Life History Theory into a unified framework for understanding the perpetration of cyberbullying. This requires a methodology that can manage 11 interacting variables, which is where psychological network analysis comes in (Borsboom et al., 2021).

Instead of treating personality as a set of independent traits, network analysis visualizes it as an interconnected system. Each trait is a "node," and their relationships are "edges," allowing us to explore direct influences while accounting for the effects of other traits (Epskamp et al., 2018). This approach focuses on the emergent properties of personality and aligns with evolutionary perspectives, positing that traits are integrated adaptations shaped by natural selection (Antonopoulou, 2023; Baumert et al., 2017).

The study will construct an 11-node network to address key questions:

1. Which traits are central to the personality system of adolescent cyberbullies?

2. What is the relationship between Honesty-Humility and the Dark Tetrad traits?

3. How does Life History Strategy relate to HEXACO and Dark Tetrad traits?

By answering these questions, we aim to map the personality architecture of online aggression, providing a deeper understanding of this social issue.

2. Methods

2.1. Participants

The study sample consisted of 624 adolescents drawn from a larger pool of 2000 Iranian volunteers aged 11 to 19. Participants were recruited through online platforms with criteria including regular internet access and active social media use. After screening, the final sample showed a 31.2 % prevalence rate of cyberbullying perpetration, comprising 417 males (66.8 %) and 207 females (33.2 %).

2.2. Measures

2.2.1. HEXACO Personality Inventory-60 (HEXACO-60)

The 60-item Farsi version of the HEXACO-PI-R (Ashton & Lee, 2009) was used to assess six personality dimensions: Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience, each with 10 items. Responses followed a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The Farsi version shows good psychometric properties in Iranian samples (e.g., Aghababaei et al., 2016).

2.2.2. Dark Tetrad (SD4)

The Short Dark Tetrad scale (Paulhus et al., 2021) assessed four dark personality traits: Narcissism, Machiavellianism, Psychopathy, and Sadism, using a 28-item Farsi version with seven items per trait. Participants rated items on a 5-point Likert scale. The Farsi SD4 version has shown strong reliability and validity (Qaderi Bagajan et al., 2024).

2.2.3. Life History Strategy (Mini-K-F)

Farsi version of the 20-item Farsi Mini-K (Figueredo et al., 2006) Scale assessed individual differences along the fast-slow continuum. It measured cognitions, attitudes, and behaviors related to long-term planning, with responses on a 7-point Likert scale. A total score indicated a slower life history strategy. The internal consistency in the current sample was excellent ($\alpha = 0.84$).

2.2.4. Cyberbullying and online aggression survey

This survey (Patchin & Hinduja, 2015) assessed cyberbullying involvement, utilizing the perpetration subscale with nine items asking adolescents about their online aggressive behaviors over the past year. The measure has established reliability and validity for Iranian adolescents (e.g., Shadmanfaat et al., 2021).

2.3. Procedure

The study received ethical approval from the institutional review board (Protocol Number: [retracted for blind review]) and was conducted in accordance with the principles outlined in the Declaration of Helsinki. An online survey was distributed through popular social media among Iranian adolescents. The initial page explained the study's purpose, voluntary participation, and assured anonymity. Participants provided digital informed consent prior to commencing. The survey, conducted in Farsi, included demographic questions and psychological questionnaires, taking about 20–25 min to complete.

2.4. Data analysis

To investigate the complex relationships among Dark Tetrad traits, HEXACO factors, and life history strategy, we employed psychological network analysis using the R software (version 4.3.1) with the qgraph, bootnet, and psych packages. In this framework, psychological variables are represented as "nodes," and the statistical relationships between them are represented as "edges" (Borsboom et al., 2021).

We estimated a Gaussian Graphical Model (GGM), where edges represent partial correlations between nodes, controlling for all other nodes in the network. This approach allows for the visualization of direct relationships between variables (Epskamp et al., 2018). We estimated a partial-correlation network among HEXACO domains, Dark Tetrad traits, and Mini-K. The covariance matrix was regularized using the Ledoit–Wolf estimator to obtain a stable precision matrix; partial correlations were then derived by standardizing the precision matrix off-diagonals.

We report three families of centrality:

1. Classical indices—strength (sum of absolute edge weights), betweenness, and closeness (computed on distance weights, i.e., inverse |partial r|). These provide familiar graph-theoretic summaries.
2. Expected Influence (EI, signed)—the sum of signed edge weights for each node. EI is preferred over strength when both inhibitory (negative) and excitatory (positive) ties matter; it preserves the directionality important for personality–maladaptivity contrasts.
3. Bridge Expected Influence—the sum of signed edges from a node to other communities. Communities were defined a priori (HEXACO, Dark Tetrad, Mini-K). Bridge EI identifies cross-cluster conduits (e.g., antagonism → prosocial/LHS) more directly than classical centralities.

Uncertainty for EI and Bridge EI was quantified using a nonparametric bootstrap (B = 500), reported as 95 % percentile intervals. Complete estimation details and code are available on request.

3. Results

3.1. Network structure

The partial-correlation network (Fig. 1) shows three coherent groupings: (a) HEXACO traits, (b) Dark Tetrad traits, and (c) Mini-K. The Dark Tetrad cluster is densely connected (e.g., Psy–Sad, Nar–Psy, Nar–Sad). Within the adaptive personality cluster, Honesty–Humility (H) is strongly connected to Emotionality (E), Extraversion (X), and Openness (O).

Mini-K sits toward the long-term/self-regulatory pole, as it is negatively linked with Machiavellianism and Psychopathy, and positively with Conscientiousness, consistent with a slower life-history orientation, greater behavioral control, and reduced antagonistic strategies (Table 1).

3.2. Node centrality, bridge centrality, and stability

Classical centralities. Strength, betweenness, and closeness (Table 2) corroborate the EI pattern: **Honesty–Humility (H)** ranks highest in strength, followed by Psychopathy, Mini-K, Machiavellianism, and Sadism. **Honesty–Humility** and **Mini-K** show notable betweenness—consistent with their positions along the adaptive–antagonistic axis.

Expected influence. As shown in Fig. 2A, Honesty–Humility (H)

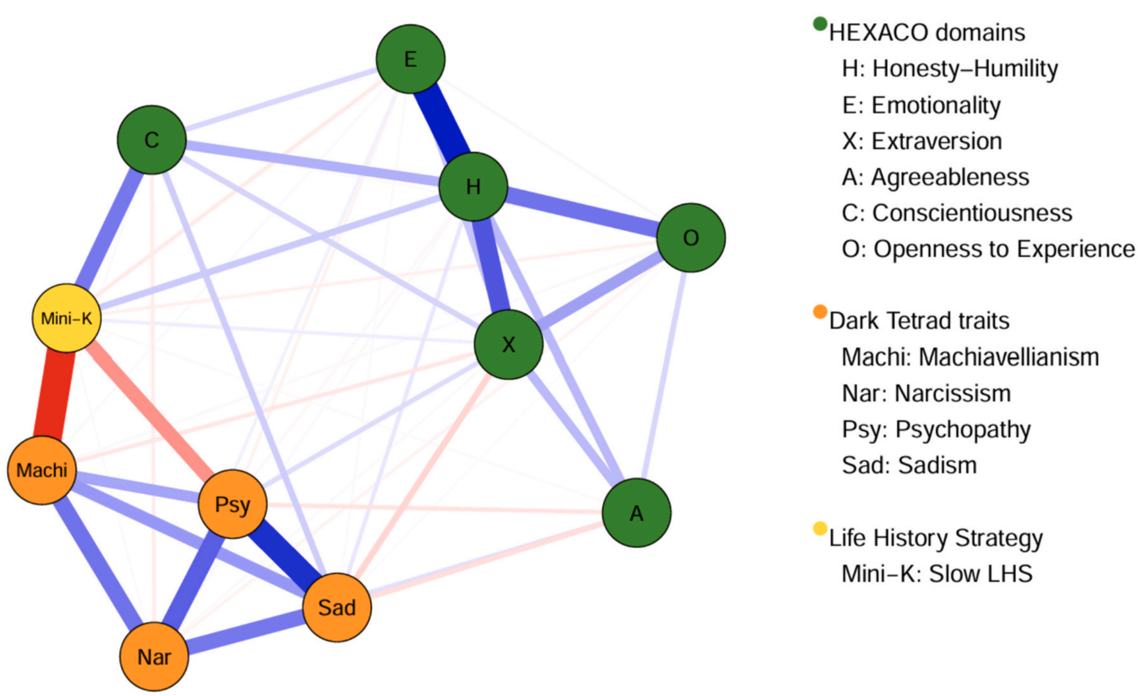

Fig. 1. Network of personality domains, Dark Tetrad traits, and Life History Strategy. *Note. Edges are partial correlations; blue = positive, red = negative. Node size = strength centrality. HEXACO nodes = green (H, E, X, A, C, O); Dark Tetrad = orange (Machi, Nar, Psy, Sad); Mini-K = yellow.*

Table 1
Ten strongest partial edges.

Rank	Node 1	Node 2	Partial r	Direction
1	Machi	Mini-K	−0.37	Negative
2	H	E	0.33	Positive
3	Psy	Sad	0.30	Positive
4	H	X	0.24	Positive
5	Nar	Psy	0.23	Positive
6	H	O	0.20	Positive
7	Machi	Nar	0.20	Positive
8	C	Mini-K	0.19	Positive
9	Nar	Sad	0.19	Positive
10	Psy	Mini-K	−0.17	Negative

Note. Entries are regular (non-penalized) partial r from the precision matrix; only the ten highest-magnitude edges are shown.

Table 2
Centrality (strength, betweenness, closeness).

Node	Strength	Betweenness	Closeness
H	**1.084**	**0.444**	**0.080**
Psychopathy	**0.947**	0.022	0.070
Mini-K	**0.903**	**0.289**	**0.080**
Machiavellianism	**0.885**	0.111	0.073
Sadism	**0.879**	0.111	0.071
X	**0.791**	0.067	0.072
Narcissism	**0.747**	0.000	0.064
E	**0.640**	0.000	0.065
C	**0.525**	0.000	**0.082**
O	**0.490**	0.000	0.060
A	**0.478**	0.000	0.055

exhibits the highest EI (≈ 1.06; 95 % CI ≈ 0.86–1.28). Within antagonistic traits, Sadism (≈ 0.64; 0.48–0.82), Narcissism (≈ 0.61; 0.44–0.80), and Psychopathy (≈ 0.43; 0.25–0.62) display comparatively high positive influence within the dark cluster. Mini-K shows negative EI (≈ −0.28; −0.44 to −0.11), consistent with its alignment with long-term planning/self-regulation and away from antagonistic tendencies.

Bridge expected influence. Fig. 2B highlights Machiavellianism as the strongest cross-cluster conduit in the maladaptive direction (Bridge EI ≈ −0.37; −0.51 to −0.24). Mini-K also bridges negatively across clusters (≈ −0.28; −0.44 to −0.11), whereas Conscientiousness provides the clearest adaptive cross-cluster linkage (≈ 0.22; 0.07–0.37). Honesty–Humility shows a small positive cross-cluster connection (≈ 0.10; −0.04 to 0.25).

3.3. Sex-specific networks

We compared male (n = 417) and female (n = 207) partial-correlation networks. Three components were tested: global strength, overall structure, and edge-wise differences (FDR-controlled).

Global strength. The male network showed greater overall connectivity than the female network (ΔS = 2.83, p = .001), indicating a denser pattern of conditional associations among traits in males.

Network structure invariance. The omnibus structure test was significant (M = 4.10, p = .011), consistent with detectable differences in the configuration of edges across sex.

Edge-wise differences (FDR). No single edge survived FDR correction at q < 0.05. Uncorrected screening suggested relatively larger Machiavellianism–Dark couplings and weaker Mini-K cross-cluster links in females. However, these did not meet the multiple-comparisons threshold (Table 3).

Sex-linked differences primarily appear at the network-wide level (denser male connectivity) rather than at isolated edges. This pattern aligns with the view that adolescent males exhibit tighter antagonistic coupling and broader cross-links, whereas female associations are comparatively sparse overall.

4. Discussion

This study used psychological network analysis to map the personality traits of Iranian adolescents involved in cyberbullying, combining the HEXACO model, the Dark Tetrad, and Life History Theory. By moving beyond single-trait approaches, we aimed to develop a comprehensive understanding of traits associated with online aggression. The findings reveal a coherent personality network with significant implications for understanding cyberbullying from an evolutionary standpoint, contributing both to personality research and offering a crucial non-Western perspective on traits associated with digital aggression.

4.1. The architecture of the cyberbully personality

The present network analysis uncovered a coherent personality system underlying online aggression, with Honesty–Humility emerging as the most central and influential node. This finding reinforces its role as a moral and regulatory anchor of social behavior. Individuals low in Honesty–Humility consistently demonstrate a higher propensity for deceit, exploitation, and aggressive conduct, both offline and online. Empirical evidence shows that lower Honesty–Humility is a robust predictor of cyberbullying perpetration, often mediated by materialistic values and moderated by environmental factors such as parental psychological control (Geng et al., 2022). Network-based findings further support this by identifying Honesty–Humility as a central suppressor of antagonistic behavior in digital contexts (MacDonell & Willoughby, 2020). The present findings extend this to cyber contexts, suggesting that Adolescents who are insincere, manipulative, and self-entitled—hallmarks of low Honesty-Humility—are consistently among the most prone to engage in digital hostility. This disposition facilitates exploitation and antagonistic online behavior, often reinforced by diminished Emotionality (reduced empathy) and heightened Extraversion (social boldness), which together support active engagement in aggressive online acts. Additionally, high Openness may exacerbate risk-taking or provocative behaviors in fluid social environments. Research confirms that adolescents low in Honesty-Humility and Emotionality, and high in Extraversion, are significantly more likely to perpetrate cyberbullying (Pronk et al., 2021; Smith, 2016). These traits form a psychosocial profile well-suited to competitive and performative digital ecosystems, especially where reputational visibility and peer dynamics intensify behavioral expression.

Within the Dark Tetrad cluster, Psychopathy and Sadism were closely intertwined, highlighting the reinforcing relationship between emotional detachment and pleasure derived from others' suffering (Sest & March, 2017). Narcissism is bridged with both Psychopathy and Sadism, suggesting that status-driven entitlement interacts with callousness to sustain antagonistic online behavior. Machiavellianism served as the strongest cross-cluster bridge, connecting dark and adaptive domains—implying that strategic manipulation is the cognitive hub that enables goal-directed exploitation within social systems (Jonason et al., 2017; Paulhus, 2014).

Life History Strategy (as measured by the Mini-K) was inversely associated with Machiavellianism and Psychopathy and positively correlated with Conscientiousness, supporting the view that individuals pursuing faster life strategies—those oriented toward immediate rewards and short-term gains—are more inclined toward opportunistic and antisocial digital behaviors, particularly in environments with diminished long-term social accountability (Jonason et al., 2017). Altogether, these patterns indicate that cyberbullying is not a random act of malice but an emergent outcome of an integrated antagonistic personality system organized around low Honesty–Humility, strategic manipulation, and fast life-history orientation.

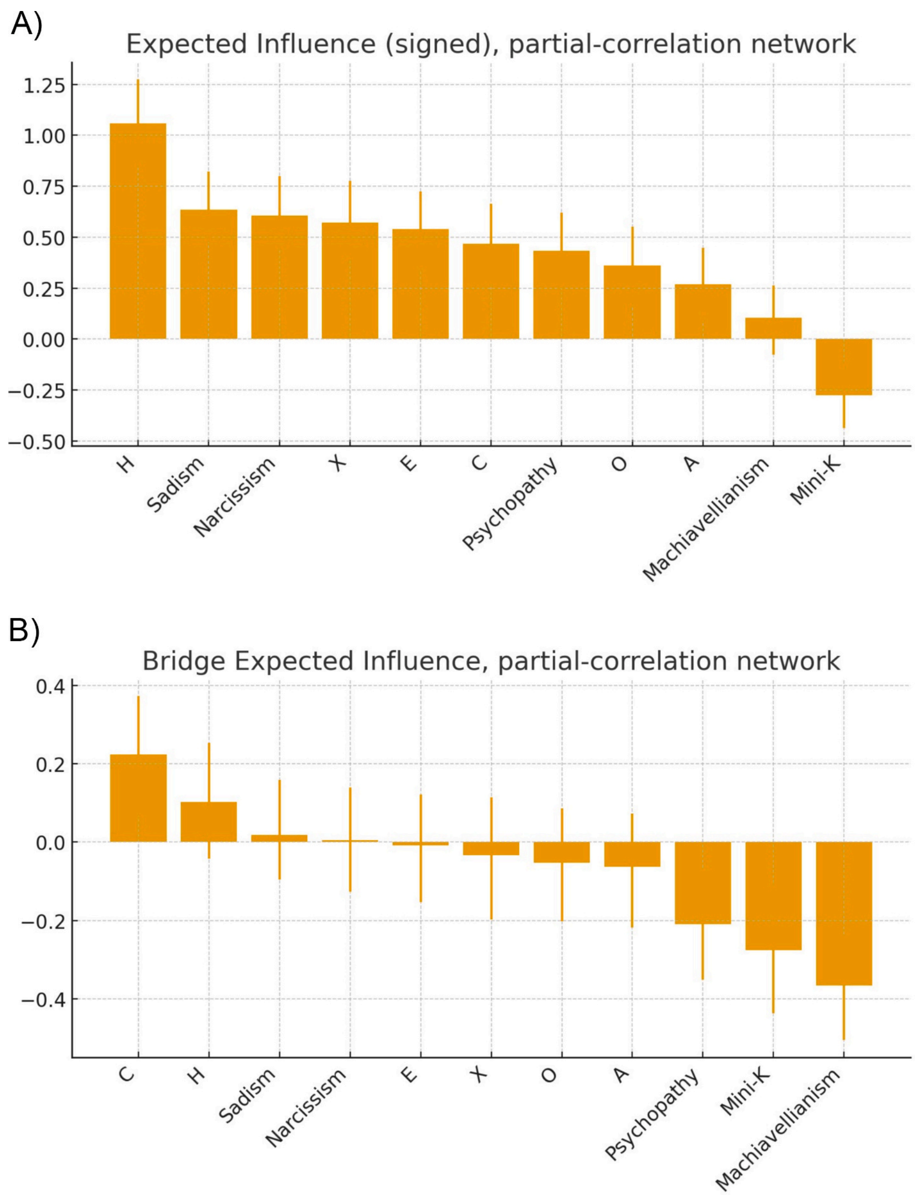

Fig. 2. A. Expected Influence (signed) with 95 % bootstrap CIs. **B.** Bridge Expected Influence with 95 % bootstrap CIs.

Table 3
Network Comparison Test by sex.

Test	Statistic	*p*-value	Interpretation
Global strength (ΔS = Smale − Sfemale)	**2.831**	**0.001**	**Male > Female**
Structure invariance (M)	**4.101**	**0.011**	**Different**

4.2. Evolutionary and theoretical implications

The integration of Life History Theory, HEXACO, and the Dark Tetrad within a single network offers an evolutionary framework for understanding cyberbullying as an adaptive but contextually misapplied behavior. Life History Theory posits that individuals calibrate their psychological and behavioral strategies based on early environmental cues of stability or harshness, balancing somatic investment and reproductive effort (Figueredo et al., 2006; Kaplan & Gangestad, 2015). When environments are unpredictable or resource-scarce, fast life strategies emerge—emphasizing risk-taking, impulsivity, and dominance (Belsky, 2012; Yang et al., 2023).

Our findings support this model: adolescents low on Mini-K and Honesty–Humility—traits associated with fast life strategies—demonstrated higher Machiavellianism and Psychopathy. These traits facilitate short-term gains in social competition but undermine cooperation, echoing cross-cultural evidence that fast strategies favor manipulative and exploitative behavior (Jonason et al., 2017).

In modern online environments, these ancestral mechanisms find novel outlets. Digital communication creates an evolutionary mismatch (Li et al., 2018): social interactions occur in high-reward, low-risk environments that exaggerate competitive and status-oriented behaviors. Online anonymity, disinhibition, and lack of direct retaliation make cyberbullying a low-cost means to achieve social dominance and gratification (Giumetti & Kowalski, 2019). Thus, cyberbullying can be interpreted as an evolutionary-consistent dominance tactic maladaptively expressed in the digital sphere.

The central role of Honesty–Humility underscores its importance as a stabilizing force in cooperative social systems. From an evolutionary standpoint, it reflects mechanisms supporting reciprocal altruism and reputation management (Hilbig et al., 2013; Trivers, 1971). Low Honesty–Humility may thus signify a breakdown in the evolved equilibrium between cooperation and exploitation. Within this framework, the "H-factor" represents a fundamental adaptive axis balancing self-interest and prosociality (Lee & Ashton, 2013).

The observed sex-specific differences, with males showing denser antagonistic connectivity, align with sexual selection theory: males have historically faced stronger selection pressures for dominance and competition (Grijalva et al., 2015; Kruger & Fitzgerald, 2012). In the digital context, where aggression is symbolic and reputational rather than physical, these competitive drives are expressed through manipulative and status-enhancing behaviors (Craker & March, 2016). The expected influence results sharpen this account: Honesty–Humility exhibits the strongest positive influence overall, while Mini-K shows a negative expected influence, indicating a counter-pull toward self-regulatory organization. Bridge expected influence clarifies where systems interface: Machiavellianism is the primary negative bridge into the adaptive/LHS space, whereas Conscientiousness provides the clearest positive cross-cluster linkage. These bridges identify leverage points—weakening Machiavellian cross-links and reinforcing planning/long-horizon ties may be more impactful than trait-by-trait interventions.

This study advances a systems-evolutionary model of online aggression, positioning cyberbullying as the emergent outcome of a personality system shaped to navigate ancestral dominance hierarchies but now operating in a hyperconnected and mismatched digital environment. The network perspective enables visualization of how these traits dynamically interact: low Honesty–Humility permits exploitation; Machiavellianism provides strategic manipulation; Sadism and Psychopathy confer emotional detachment and insensitivity to harm; and a fast life history orientation prioritizes short-term gains over long-term social investment. Together, these traits form a cyber-ecological phenotype—an adaptive configuration suited for immediate advantage in online contexts where social accountability is diminished. This model is supported by growing empirical literature linking these personality profiles to cyberbullying behaviors and by evolutionary theories emphasizing life history trade-offs in digital environments (Ekinci, 2023; Ildirim, 2021).

Intervention efforts should therefore target systemic leverage points—for example, increasing cues of accountability (e.g., verified identities, public moderation) or promoting empathy-based norms that trigger slow-strategy pathways (Kaufman et al., 2019; Volk et al., 2012). Such strategies would reorient adolescents toward long-term cooperative behavior, addressing not just moral outcomes but the evolutionary payoffs that sustain online aggression.

4.3. Limitations and future directions

Several limitations should be noted. First, the cross-sectional design restricts causal inference about relationships between traits and cyberbullying; longitudinal studies are needed (Borsboom et al., 2021). Second, cultural values specific to Iranian adolescents may limit the generalizability of findings; cross-cultural replication will test for universality. Third, self-report reliance may introduce bias; using multi-method designs, including peer reports and behavioral indicators, would enhance validity. Fourth, modeling nodes at the domain level could be refined by analyzing facet-level networks for more precise targets. Lastly, while the partial-correlation approach supports interpretations, future studies should apply network-informed SEM to evaluate unique contributions and mediation. Environmental moderators like socioeconomic stress could further illuminate the dynamics of online aggression (Belsky, 2012; Li et al., 2018).

Future research should explore the heritability of personality and life-history traits. Twin and genomic studies indicate that personality dimensions in the Big Five and HEXACO models have moderate heritability of about 40–60 % (Vukasović & Bratko, 2015). Evidence for the heritability of life history strategy is less clear, suggesting both genetic influence and significant environmental factors (Figueredo et al., 2004; Dunkel, 2013). Understanding these genetic contributions may clarify whether online aggression is driven by evolved predispositions or social learning.

4.4. Conclusion

This study presents the first integrative network model of cyberbullying, which combines HEXACO, the Dark Tetrad, and Life History Theory. The results reveal a coherent personality system anchored by low Honesty–Humility, strategic manipulation, and fast life-history orientation. This constellation reflects an adaptive but contextually maladaptive strategy for achieving dominance and social advantage in digital environments. By conceptualizing online aggression as an emergent system rather than a sum of isolated traits, this study provides both theoretical and practical insights—informing interventions that target the central psychological mechanisms sustaining cyberbullying.

CRediT authorship contribution statement

Mohammad Soleimanian: Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Abbas Pourshahbaz:** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Formal analysis, Conceptualization. **Todd K. Shackelford:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Investigation, Conceptualization.

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Declaration of competing interest

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Data availability

The data supporting this study's findings are available from the corresponding author upon reasonable request. The data are not publicly available but can be shared under appropriate conditions with interested researchers.

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