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The impact of the Dark Triad personalities and parental interaction patterns in predicting the tendency toward risky behaviors among adolescent girls in Ardabil, Iran in 2024

Roya Motavalli^{1,6} , Hanieh Shayeghi² , Tavakkol Mousazadeh³ , Serap Ejder Apay⁴ and Elif Odabaşı Aktaş^{5,6*}

Abstract

Background The escalating prevalence of risky behaviors during adolescence has emerged as a grave threat to public health, posing one of the most significant psychological, social, and health-related challenges globally. These behaviors impact the individual and have negative consequences on families and society. As a pressing concern for communities, healthcare organizations, and social policymakers, identifying factors leading adolescents toward risky behaviors is paramount and urgent.

Methods This descriptive correlational study was conducted in Ardabil, Iran, in 2024. Using convenience sampling, 200 s-year high school girls with an average age of 17 were selected. Participants were asked to complete three questionnaires: the Dark Triad Personality Test, the Revised Family Communication Patterns Scale (RFCP), and the Questionnaire of Risky Behaviors (QRB). The data were analyzed using Pearson correlation and multiple regression analysis, utilizing SPSS version 20.

Results The findings revealed a significant positive correlation ($p < 0.01$) between machiavellianism, narcissism, psychopathy, and the conformity interaction pattern with a tendency toward risky behaviors in adolescents. Additionally, there was a significant negative correlation ($p < 0.01$) between the conversation interaction pattern and risky behaviors. The results further indicated that 30.4% ($p < 0.01$) of the variance in risky behavior tendencies in adolescent girls could be explained by the Dark Triad personality traits. In comparison, the interaction patterns of conversation and parental conformity could account for 37% ($p < 0.01$).

Conclusions This study suggests that the Dark Triad personality traits and parental interaction patterns can effectively predict adolescent girls' tendencies toward risky behaviors. These results underscore the need for effective management strategies addressing these variables in school programs to provide early interventions that may prevent the escalation of risky behaviors among adolescents.

Keywords Adolescent girls, Dark triad personality traits, Parental interaction patterns, Risky behaviors

*Correspondence:
Elif Odabaşı Aktaş
elifaktas@bayburt.edu.tr

Full list of author information is available at the end of the article



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Introduction

Adolescence is a critical and challenging phase in which individuals assert their identity while deciding who they are and what role they wish to play in society. Adolescence is considered the most influential period of a person's life, often referred to as a time of crisis and turmoil [1]. When adolescents are unable to overcome developmental crises and challenges, they experience psychological distress, leading to significant disruptions in their emotional, social, and cognitive functioning, which in turn can result in personality confusion [2, 3]. During this period, one of the critical areas of concern is the emergence of risky behaviors, defined as actions that threaten an individual's health and well-being [4, 5]. These behaviors are actions that endanger personal health, such as alcohol consumption, smoking, and unprotected sexual activity, as well as actions that threaten the well-being of others, such as theft, aggression, truancy, and running away from home [4].

The prevalence of risky behaviors in societies is a public health threat [5]. Global studies have shown that most risky behaviors begin before the age of 18, including smoking, alcohol consumption, and drug use [6, 7]. Research conducted in Iran indicates a significant prevalence of risky behaviors, such as smoking, hookah use, alcohol consumption, and drug abuse, among adolescents aged 14 to 18 [8, 9]. One study in Iran found that hookah use had the highest prevalence (59.2%) compared to cigarette smoking (32.7%), drug use (7.3%), and alcohol consumption (16.7%). Physical altercations at school and outside of school over a year, carrying weapons to school within a month, smoking at school within a month, and the use of hookah, alcohol, and drugs within a month were more common among boys than girls. The use of seat belts when riding in a car was more prevalent among girls than boys, with an overall rate of 23.7% for seatbelt use by passengers [8]. Research over recent decades has indicated an increase in the prevalence of risky behaviors among adolescents. Findings suggest that adolescence is one of the most crucial stages of life, fraught with numerous stresses and potential harms [10]. A prominent feature of adolescence is the new experiences and the inclination toward engaging in risky behaviors, which can have severe consequences for the individual, their family, and society [5].

Personality traits are among the most significant factors influencing individual behaviors. In this regard, researchers have increasingly focused on the Dark Triad personality traits. In recent years, some personality psychologists have shown interest in studying socially disruptive personality traits, particularly those classified as "dark" [11]. Among these traits, the Dark Triad is particularly noteworthy. The term "Dark Triad" was first introduced in 2002 when two researchers, Paulhus and Williams, from

the University of British Columbia, proposed that in an average population with no overt behavioral anomalies, we can regard narcissism, Machiavellianism, and psychopathy as a single unit. The Dark Triad is associated with various negative attributes, including unpleasantness [12], dishonesty [13], aggression [14], and predictors of short-term relationships [15]. Although these traits exhibit high internal correlations, they are not identical. In other words, while they share considerable overlap, they are distinct constructs [11]. In this context, studies have demonstrated a significant positive correlation between the Dark Triad personality traits and the tendency toward risky behaviors [16, 17].

The family and its interaction network play a crucial role in either the emergence or prevention of risky behaviors in adolescents through various communication patterns. In this context, the emotional security of adolescents must also be considered. The lack of proper communication and the absence of healthy interaction patterns within the family can lead to issues such as violence, delinquency, smoking, alcohol and drug use, sexual intercourse, and involvement with delinquent peer groups [18]. Parental interaction patterns serve as a model for behavior, shaping children's communication skills and behaviors. In other words, the interactive environment within the family influences the communication behaviors of family members and their perception of the family unit [19].

Fitzpatrick & Ritchie [20] introduced two underlying dimensions of family communication patterns: conversation and conformity. In families characterized by conversation orientation, members create a warm and open atmosphere where all family members are encouraged to engage freely and comfortably in interaction, discussion, and exchanging views on a wide range of topics. In such families, diverse opinions are accepted, and children, while respecting their parents, are allowed to disagree with them. Conformity orientation, on the other hand, emphasizes uniformity in feedback, values, and beliefs and the avoidance of conflict within the family [21]. Abbasi et al. reported that 32% of the tendency toward risky behaviors could be explained by the adolescent's perception of the family's emotional and psychological atmosphere [22]. In addition, Nazari et al. reported a significant relationship between the conformity orientation of family communication patterns and the tendency toward risky behaviors and internet addiction [23].

Educational and health interventions effectively reduce risky behaviors, especially when considering an individual's interactions and communication with others [24]. It is predicted that by 2030, the number of illnesses and deaths resulting from tobacco use alone will reach 10 million per year. If the physical, psychological, and social consequences of other risky behaviors, such

as substance abuse, violence, and risky sexual behaviors, are also taken into account, the damages will be multiplied [25]. Regarding the population of adolescent girls in this study, it is worth noting that the prevalence of risky behaviors in this group is rapidly increasing [8]. Given the importance of the issue, this study aims to examine the role of Dark Triad personality traits and parental interaction patterns in predicting the tendency toward risky behaviors in adolescent girls.

Research questions

The present study aims to address the following research questions:

1. Is there a relationship between the Dark Triad personality traits (Machiavellianism, narcissism, psychopathy) and the tendency toward risky behaviors in adolescent girls?
2. Is there a relationship between parental interaction patterns (conversation and conformity) and adolescent girls' tendency toward risky behaviors?
3. Do the Dark Triad personality traits (Machiavellianism, narcissism, psychopathy) play a role in predicting the tendency toward risky behaviors in adolescent girls?
4. Do parental interaction patterns (conversation and conformity) play a role in predicting adolescent girls' tendency toward risky behaviors?

Methods

Setting and sample

The present study was conducted in Ardabil, Iran, during June and July 2024. The target population was all second-year high school female students in Ardabil, with an average age of 17, within District 1 of the Ardabil Education Department. These students were enrolled in 28 public and private girls' schools, with a total population of 7,742 female high school students. The sampling method used in this study was convenience sampling. A total of 200 s-year high school female students were selected as the sample. Based on the formula ($n = 8x + 50$), the minimum required sample size was 90 participants, but 200 students were chosen to increase the study's external validity. In the formula mentioned above, proposed by Tabachnick & Fidell, X represents the number of criterion and predictor variables [26].

Study design

This descriptive-correlational research examined the role of Dark Triad personality traits and parental interaction patterns in predicting the tendency toward risky behaviors in adolescent girls. The variables investigated included the Dark Triad personality traits and parental

interaction patterns as predictor variables and risky behaviors as the criterion variable.

Inclusion and exclusion criteria

This study included all second-year high school female students in Ardabil, with an average age of 17. Data collection involved students who had parental consent and agreed to participate. Inclusion criteria were female gender, enrollment in the second year of high school, full consent to participate in the study, and no physical or mental illness. Exclusion criteria included incomplete questionnaire responses.

Data collection tools

Questionnaire of risky behaviors (QRB)

According to Safari Nezhad, the Questionnaire of Risky Behaviors (QRB) was developed by Ahmadpour Turkman in 2011 and consists of 24 items. This questionnaire assesses the prevalence of risky behaviors, such as addiction, AIDS, maladaptive behaviors, substance use, aggression, and others. The scoring is based on a 5-point Likert scale, ranging from strongly agree (5 scores) to strongly disagree (1 score), and the total score ranges from 24 to 120. Scores between 24 and 48 indicate low risky behavior prevalence, scores between 48 and 72 indicate moderate prevalence and scores above 72 indicate high prevalence. The cutoff score for this questionnaire is 50. Ahmadpour Turkman validated the questionnaire's content and face validity through expert review and reported a reliability coefficient above 0.71 using Cronbach's alpha [27, 28].

The Dark Triad personality traits

This self-report tool was designed by Jonason & Webster [14] and consists of 12 items. Each item is scored on a Likert scale from strongly disagree (1 score) to strongly agree (9 scores). The scale includes three subscales: Machiavellianism (4 items), psychopathy (4 items), and narcissism (4 items). Jonason and Webster (2010) reported an internal consistency reliability (Cronbach's alpha) of 0.83 for the test and test-retest reliability between 0.76 and 0.83 [14]. In Iran, Hajloo et al. reported internal consistency reliability for Machiavellianism, psychopathy, and narcissism as 0.74, 0.63, and 0.83, respectively, with item-total correlations ranging from 0.42 to 0.90. They also demonstrated that the test has adequate content and construct validity [29]. Additionally, Jahani Zingir et al. [30] reported Cronbach's alpha coefficients for Machiavellianism, psychopathy, and narcissism as 0.71, 0.70, and 0.63, respectively, with a total score reliability of 0.68 in Iran [30]. The statistical population of the study by Jahani Zingir et al. included all second-year high school students of Ardabil city with a mean age and standard deviation of 17.15 ± 1.08 years. 52.67% of the students participating in

the study were male and 47.33% were female [30]. Despite the increasing interest in the research on the dark triad aspects of personality, there is still no short and effective instrument. Therefore, if we want to test these characters using different scales, we need to use more than 90 items to measure these three aspects. For this purpose, it was necessary to use an effective and short instrument in this field to measure the validity and reliability of the questionnaire in the Iranian society in the present research. After Hajloo et al. measured the validity and reliability, they stated that the majority of the sample group had high school education and above, so this scale should be used with caution in people with a high school diploma [29]. Therefore, the researcher visited the high schools between 8:30 and 12:00 in the morning and introduced himself to the sample group consisting of female students studying in the second year of high school and having an average age of 17, and explained the research objectives, and full explanations were given in this context.

The revised family communication patterns Scale

This tool was designed by Fitzpatrick & Ritchie in 1990 [20] to assess parental interaction patterns. This tool is a self-report questionnaire comprising 26 items rated on a five-point Likert scale, ranging from strongly agree (5 scores) to strongly disagree (1 score). The first 15 items pertain to conversation orientation, while the remaining 11 relate to conformity orientation. Consequently, each respondent yields two scores. Higher scores on each scale indicate a stronger alignment with the family communication pattern [31]. Regarding validity in Iranian studies, the average Cronbach's alpha values reported are 0.89 (between 0.84 and 0.92) for the conversation dimension and 0.79 (between 0.73 and 0.84) for the conformity dimension. Test-retest reliability coefficients were reported as 0.99 for conversation orientation and between 0.73 and 0.93 for conformity orientation [32].

Data collection

This study employed library and field methods for data collection.

Library method

Relevant topics and critical issues related to the research were identified and compiled by reviewing electronic and library sources.

Field method

After the university's research council approved the research topic and an ethical code was issued (IR.IAU.ARDABIL.REC.1403.051), necessary arrangements for its execution were made. These included obtaining permission from the Research Office of the Faculty of Medicine at the Islamic Azad University, Ardabil Branch, and from

the Ardabil Education Department to identify schools and introduce the researcher to school principals. The researcher visited high schools during the morning shift, between 8:30 and 12:00. After introducing themselves, explaining the research objectives, and obtaining verbal informed consent from the students, they assured that all information would remain confidential and that all questionnaires would be anonymous. A total of 200 s-year female high school students, with an average age of 17, were selected through convenience sampling. Consent forms were signed by the parents. Each student was given a questionnaire package (including the Dark Triad Personality Traits Questionnaire, the Family Interaction Patterns Questionnaire, and the Risky Behaviors Questionnaire) to complete at their convenience. Students were instructed to place completed questionnaires in sealed envelopes (provided in advance) and deliver them to the school principal if they were absent two days later. Finally, after collecting all the completed questionnaires, the data were analyzed.

Data analysis

Data analysis was conducted in two stages. Initially, a descriptive analysis was performed, which included calculating the mean and standard deviation. In the second stage, hypotheses were tested using Pearson correlation coefficients and multiple regression analysis. These analyses were carried out using SPSS version 20. Normal distribution compliance was assessed based on skewness and kurtosis coefficients (within ± 2 range) as outlined [33]. Statistical significance was set at $p < 0.01$ and $p < 0.05$.

Results

The results of Table 1, show the demographic characteristics of the students (Table 1).

According to Table 2, the mean score for risky behaviors is 86.12, for Machiavellianism is 23.57, for narcissism is 25.24, for psychopathy is 22.81, for the conversation pattern is 30.19, and for the conformity pattern is 27.85 (Table 2).

According to Table 3, there is a significant relationship between Machiavellianism ($p < 0.01$, $r = 0.30$), narcissism ($p < 0.01$, $r = 0.31$), and psychopathy (antisociality) ($p < 0.01$, $r = 0.45$) with the inclination toward risky behaviors in adolescents (see Table 3).

According to the results of Table 4, the results of the Kolmogorov-Smirnov normality test are shown. The significance level above 0.05 in the statistical probability in the variables indicates the normality of the variables and the use of parametric test for hypothesis testing (Table 4).

According to Table 5, there is a significant relationship between conversation ($r = -0.43$, $p < 0.01$) and conformity

Table 1 Demographic characteristics of the studied samples

Variables	Mean and Std. Deviation	
Average grades of students	17.40 ± 2.12	
Mother's Age	40.91 ± 4.93	
Father's Age	46.88 ± 5.06	
Number of family members	Frequency	Percent(%)
2	8	4.0
3	53	26.5
4	91	45.5
5	24	12.0
6<	24	12.0
Father's occupation		
Doctor	8	4.0
Engineer	19	9.5
Employee	65	32.5
Freelance job	96	48.0
Teacher	3	1.5
Nurse	1	0.5
Lawyer	1	0.5
Faculty Member	5	2.5
Others	2	1.0
Mother's occupation		
Doctor	10	5.0
Engineer	1	0.5
Midwife	1	0.5
Employee	20	10.0
Freelance job	25	12.5
Housewife	128	64.0
Teacher	11	5.5
Nurse	1	0.5
Faculty Member	1	0.5
Others	2	1.0
The number of children		
1	111	55.5
2	59	29.5
3	16	8.0
> 4	14	7.0
Financial situation		
Good	148	74.0
Bad	52	26.0

Table 2 Mean and standard deviation of study variables

Variable	Mean	Standard Deviation
Risky Behaviors	86.12	6.28
Dark Triad Personality Traits		
Machiavellianism	23.57	3.40
Narcissism	25.24	3.98
Psychopathy (Antisocial)	22.81	3.05
Parental Interaction Patterns		
Dialogue Pattern	30.19	3.94
Conformity Pattern	27.85	3.82

patterns ($r = 0.38$, $p < 0.01$) with risky behaviors in adolescents (Table 5).

The findings of Table 6, show that the assumption of multiple co-linearity of the predictor variables has been

Table 3 Pearson correlation coefficients for the relationship between Dark Triad traits (Machiavellianism, Narcissism, psychopathy) and risky behaviors in adolescent girls

Independent variable	Statistic	Risky behavior
Machiavellianism	Correlation Coefficient	0.301**
	Significance Level	0.001
Narcissism	Correlation Coefficient	0.314**
	Significance Level	0.001
Psychopathy (Antisocial)	Correlation Coefficient	0.452**
	Significance Level	0.001

**Significance at the 0.01 error level. *Significance at the 0.05 error level

Table 4 Kolmogorov-Smirnov normality test of the data distribution

Significance Level	K-S statistic	Variables
0.204	1.088	Risky behaviors
0.137	1.613	Machiavellianism
0.698	0.584	Narcissism
0.451	0.980	Psychopathy (Antisocial)
0.227	1.150	Dialogue Pattern
0.518	0.654	Conformity Pattern

Table 5 Pearson correlation coefficients for the relationship between parental communication patterns (dialogue and conformity patterns) and risky behaviors in adolescent girls

Independent variable	Statistic	Risky behavior
Dialogue Pattern	Correlation Coefficient	-0.429**
	Significance Level	0.001
Dialogue Pattern	Correlation Coefficient	0.385**
	Significance Level	0.001

**Significance at the 0.01 error level. *Significance at the 0.05 error level

Table 6 Results of multiple regression analysis for determining the contribution of the Dark Triad personality traits (Machiavellianism, Narcissism, psychopathy) in Predicting Risky behaviors in adolescent girls

Predictor variables	Non-standard Coefficients		Standard Coefficients	T	P
	B	SE	BETA		
Constant	27.375	2.295	-	11.207	0.001
Machiavellianism	0.298	0.097	0.284	4.013	0.001
Narcissism	0.312	0.157	0.302	4.975	0.001
Psychopathy (Antisocial)	0.745	0.097	0.383	5.741	0.001
F = 16.919	R = 0.304		R ² = 0.552		P < 0.001

realized because the calculated VIF values are at the optimal level (less than 2) and the tolerance values of the predictor variables are at the optimal level (close to 1) are located (Table 6).

The findings of Table 7, show that the assumption of independence of error sources has been fulfilled. Because the value of Durbin-Watson test is at the optimal level (between 1.5 and 2.5) (Table 7).

Table 7 Durbin-Watson test

Amount	Test
2.307	Durbin-Watson

Table 8 Multiple colinearity indices of predictor variables

Psychopathy (Antisocial)	Narcissism	Machiavellianism	Variable Indicator
1.760	1.910	1.514	VIF
0.880	0.849	0.905	Tolerance

Table 9 Multiple colinearity indices of predictor variables

Conformity Pattern	Dialogue Pattern	Variable Indicator
1.905	1.812	VIF
0.858	0.919	Tolerance

Table 10 Durbin-Watson test

Amount	Test
2.228	Durbin-Watson

Table 11 Results of multiple regression analysis for determining the contribution of parental Interaction patterns (dialogue and conformity patterns) in Predicting the tendency toward Risky behaviors in adolescent girls

Predictor variables	Non-standard Coefficients		Standard Coefficients	T	P
	B	SE	BETA		
Constant	23.674	2.209	-	12.460	0.0001
Dialogue pattern	-0.458	0.184	-0.394	-5.034	0.001
Conformity pattern	0.406	0.163	0.367	4.662	0.001
F = 19.075	R = 0.371	R ² = 0.618	P < 0.001		

Considering that the specific presuppositions of multiple regression have been fulfilled, therefore, hypothesis testing and research hypothesis analysis were performed as described in Table 8.

The findings of Table 9, show that the assumption of multiple co-linearity of the predictor variables has been realized because the calculated VIF values are at the optimal level (less than 2) and the Tolerance values of the predictor variables are at the optimal level (close to 1) are located (Table 9).

The findings of Table 10, show that the assumption of independence of error sources has been fulfilled. Because the Durbin-Watson test value is at the optimal level (between 1.5 and 2.5) (Table 10).

Considering that the specific presuppositions of multiple regression have been fulfilled, therefore, hypothesis testing and research hypothesis analysis were performed as described in Table 11. According to Table 11, the role of each variable within parental interaction patterns as predictor variables and the tendency toward risky behaviors in adolescent girls as the criterion variable was analyzed through a regression equation. As shown

in Table 11, the observed F-value is significant ($p < 0.01$), and the predictor variables explain 37% of the variance in the tendency toward risky behaviors in adolescent girls. Based on the beta values, both the conversation orientation ($\beta = -0.39$) and conformity orientation ($\beta = 0.367$) significantly predict changes in the tendency toward risky behaviors in adolescent girls (Table 11).

Discussion

The present study aimed to examine the role of the Dark Triad personality traits and parental interaction patterns in predicting the tendency toward risky behaviors in adolescent girls. The findings of the current research indicated a significant positive relationship between Machiavellianism, narcissism, and psychopathy (antisocial behavior) and the tendency toward risky behaviors in adolescents. These results align with the theoretical findings of studies conducted by Nazari et al. [23], Gholami et al. [34], Tajmirriyahi et al. [16], Maneiro et al. [17], and Jahani-Zingir et al. [30]. In this context, Tajmirriyahi et al. [16] also demonstrated in their study that there is a significant positive relationship between the Dark Triad and the tendency toward risky behaviors. Similarly, Gholami et al. [34] found in their research a significant positive correlation between the Dark Triad personality traits and vulnerability to addiction (one form of risky behavior). Moreover, the results of studies by Nazari et al. [23] and Babakr & Fatahi [35] showed a significant relationship between early childhood experiences, risky behaviors, and the Dark Triad personality traits. Maneiro et al. [17] also reported a correlation between the Dark Triad traits and risky behaviors. In addition, when these findings are considered from a developmental perspective, it can be emphasized that adolescence is a critical period in which personality traits and risk-taking behaviors are shaped. Adolescence is a period when individuals try to establish their social identities, the influence of peer groups is strong, and their tendency to resist authority increases. In this context, the relationship between personality traits and risky behaviors may become even more complex due to the influence of environmental and social factors (e.g., parent-child interactions, peer pressure). In addition, it should be taken into account how cultural norms and values may shape this relationship [34]. In different cultural contexts, the expression of Dark Triad traits and the acceptability of risk-taking behaviors may vary. Therefore, the findings of the study reveal the need for more comprehensive research that takes into account cultural and social influences on personality development and risky behaviors.

Machiavellianism refers to a tendency to manipulate and deceive others in social situations to achieve personal goals [36]. Since successful aggressive acts require social manipulation, these adolescents may perceive

aggression and manipulation as essential for maintaining their social status and power within a group [37]. Narcissism is characterized by grandiosity, entitlement, and self-absorption. While such individuals may appear self-centered, they have relatively low self-esteem. It has been emphasized that individuals with low self-esteem are more likely to engage in risky behaviors [38]. Additionally, according to the selfish herd theory, narcissism directly leads to aggression, which may serve as a defensive mechanism to protect fragile self-esteem [39]. Given the significant link between aggression and risky behaviors, and considering that risky behaviors are viewed as a specific form of aggression [40], it can be inferred that individuals engaging in risky behaviors may possess fragile self-esteem beneath their narcissistic facade. These individuals constantly seek validation from others and society, and when they fail to receive it, they feel threatened and may unconsciously resort to bullying, especially cyberbullying, where they feel a greater sense of power and freedom. Narcissists' attraction to the internet stems from the greater opportunities it provides for self-presentation, typically via social networking sites, which, in turn, reinforce shallow emotional connections in narcissistic individuals [39]. The interaction of Machiavellianism and narcissism can have an increasing effect on risky behaviors. Machiavellian individuals' manipulation skills, combined with narcissists' need for attention and appreciation, can lead to more strategic and risky behaviors, especially on social media platforms. While social media supports narcissistic individuals' need for self-expression and seeking appreciation, it also provides a suitable ground for Machiavellian strategies [40]. It should also be noted that ways of thinking, such as the imaginary audience in adolescence, can interact with narcissists' search for social approval and trigger risky behaviors. In this context, it can also be argued that narcissism can increase conflict and manipulation dynamics in social relationships.

Furthermore, regarding psychopathy (antisocial behavior), it can be stated that three characteristics are identified within the antisocial construct: impulsivity, callous-unemotional traits, and narcissism. These traits are somewhat present in individuals engaging in risky behaviors, as they show little interest in close, warm relationships and demonstrate no empathy toward those who were originally the target of their aggression [41]. These findings are consistent with research suggesting that risky behaviors may be symptomatic of antisocial tendencies [42]. Lacking empathy and acting ruthlessly, these individuals are willing to engage in any form of aggression to compensate for the damage to their self-esteem. For these individuals, risky behaviors serve as a means through which individuals with antisocial personality

traits fulfill their aggressive desires and outwardly feel a sense of worth [43], as evidenced by the study's findings.

The present study revealed a significant negative relationship between conversation orientation and the tendency toward risky behaviors in adolescents and a significant positive relationship between conformity orientation and the tendency toward risky behaviors. These findings are consistent with the studies by Abbasi et al. [22], Nazari et al. [23], and Farzaneh et al. [44]. In explaining this finding, it is important to note that adolescence is one of the most sensitive periods in a person's life, during which the influence of family and peers plays a significant role in shaping adolescent's behavior. When family members maintain strong bonds (conversation orientation), they consider themselves part of the family unit and work towards its development. When faced with problems or challenges, other family members assist in resolving them and helping the adolescent readjust. Such familial bonds can lead to a reduction in risky behaviors, such as delinquency or internet addiction. Furthermore, in these families, adolescents are more likely to engage in healthy activities to release energy and fill their free time, which can also serve as a protective factor against risky behaviors. On the other hand, regarding the positive relationship between conformity orientation and risky behaviors, it can be explained that an inappropriate family interaction style may influence adolescents' inclination toward risky behaviors. Students, particularly during this critical developmental stage, are vulnerable to any form of harshness or lack of support from the family (as seen in conformity-oriented families), which can lead to lower self-esteem. In stressful situations, these adolescents often need more help, and this lack of support may contribute significantly to their tendency toward risky behaviors.

The present study showed that the predictor variables can explain 30.4% of the variance in the tendency toward risky behaviors in adolescent girls. These results are consistent with the studies by Gholami et al. [34], Tajmirriyahi et al. [16], and Jahani-Zingir et al. [30]. In this regard, the study by Jahani-Zingir et al. [30] demonstrated that the Dark Triad of personality traits can predict the tendency toward risky behaviors such as bullying in adolescents. Similarly, Tajmirriyahi et al. [16] found a significant positive relationship between the Dark Triad and risky behaviors. Furthermore, Gholami et al. [34] indicated a significant positive correlation between the Dark Triad personality traits and vulnerability to addiction (risky behavior).

The research by Vanessa Permana et al. also revealed that, compared to parental monitoring, the Dark Triad personality traits were stronger predictors of aggressive behavior, with Machiavellianism contributing the most to aggression in adolescents [45]. In a study by Morelli et al.

examining the relationship between the Dark Triad traits and sexual behaviors among adolescents in 11 countries, it was concluded that Machiavellianism and narcissism were predictors of sexting, while Machiavellianism and psychopathy positively predicted the occurrence and escalation of risky sexual behaviors [46].

In explaining these findings, it can be argued that individuals with Dark Triad traits have a pessimistic view of human nature. This pessimism leads to distrust of others, undermining interpersonal ethics. As a result, individuals with such traits may easily manipulate and deceive others without feeling shame or guilt. This mindset devalues human dignity, and when combined with selfishness, exploitation, and deceit, it creates a fertile ground for criminal and harmful behaviors, including risky behaviors [47]. Moreover, studies on individuals who engage in risky behaviors indicate that they share traits similar to those of the Dark Triad. For instance, research has shown that individuals engaging in risky behaviors prioritize their own personal interests over spending time with others. Also, they are indifferent to the well-being or comfort of others, are less likely to make sacrifices for others and describe themselves as suspicious and unfriendly [48]. Additionally, all three aspects of the Dark Triad are characterized by a tendency to deceive, manipulate, and exploit others in pursuit of selfish goals [12]. It can be emphasized that Dark Triad traits can create an environment of insecurity by weakening social ties in the long term. The constant manipulation and deception behaviors of individuals with these personality traits can lead to the violation of ethical norms in society and the loss of trust in relationships. It can be argued that the search for social approval and peer pressure, especially during adolescence, can increase the negative effects of these personality traits [47]. In addition, it can be stated that these risky behaviors can lead to social and academic problems, and individuals can face negative consequences on both personal and societal levels.

The results of this study revealed that 37% of the variance in the tendency toward risky behaviors in adolescent girls can be explained by the conversation and conformity interaction patterns of parents. These findings are consistent with the research by Maktabi et al. [49], Dare Kordi et al. [50], Kouhbananinejad and Sanatkah [51], and Farzaneh et al. [44]. In this context, Farzaneh et al. [44] highlighted the role of parenting styles in influencing the tendency toward risky behaviors. Additionally, Kouhbananinejad and Sanatkah [51] emphasized the predictive role of family factors in the inclination toward risky behaviors among students. Dare Kordi et al. [50] discussed the influence of family structure and functioning in predicting destructive behaviors in children. Moreover, the study by Shokri et al. [52] demonstrated that parenting styles can influence risky behaviors in adolescents.

Since the family is the first social institution that shapes individual behavior, its communication patterns can positively and negatively affect adolescents' behavior. One of the most important ways this influence manifests is through the individual's modeling of family members. Furthermore, the feedback and reactions experienced during communication play a crucial role in shaping behavior. A communication pattern based on conversation can help prevent certain risky behaviors, such as violence, reckless driving, and smoking. In contrast, a conformity-based interaction pattern may contribute to risky behaviors such as sexual misconduct, smoking, alcohol consumption, and drug use. In general, the network of communication and the range of interactions an individual has, whether at the family or social level, can establish models for behavior and serve as a source for developing risky behaviors.

Limitations

Given that this study was conducted among students in Ardabil, it may be influenced by specific cultural and regional characteristics, as the living environment is one of the factors that can affect the quality of life. Therefore, the generalizability of the results to other regions is limited. Additionally, this study was conducted on female students in the second year of high school, which restricts the applicability of the findings to other educational levels and age groups. Age-specific developmental differences, as well as variations in parental communication patterns between male and female students, further limit the study's generalizability. Moreover, the data in this study were collected using questionnaires, which did not allow for controlling variables such as education level, family income, or a history of risky behaviors in other family members. For future studies, interviews are recommended to explore the factors influencing the tendency toward risky behaviors, allowing data to be collected through this method to gain a more comprehensive understanding.

Conclusion and suggestions

The results of this study indicated a significant positive relationship between Machiavellianism, narcissism, psychopathy (antisocial behavior), and the conformity interaction pattern with the tendency toward risky behaviors in adolescents. Conversely, a significant negative relationship was found between the conversation interaction pattern and adolescents' tendency toward risky behaviors. The dark triad personality traits and parental interaction patterns have predictive power for risky behaviors in adolescent girls, highlighting the need for effective management of these variables through proper planning for students. It is recommended that education authorities, in collaboration with school counselors and

psychologists, implement programs such as parenting education and training on effective communication with children. These initiatives, like parent-teacher conferences, could be organized periodically to equip parents with the necessary skills. Additionally, counseling students exhibiting risky behaviors, with attention to their personality traits, is crucial. Furthermore, school administrators should develop programs to identify students at risk of engaging in such behaviors. Early intervention strategies could then be implemented to prevent the escalation of risky behaviors among adolescents.

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Author contributions

Conception and design of the study: RM, HSH, TM; Data collection: HSH; Data analysis and figures: TM; Manuscript write-up: RM, SEA, HSH, EOA; Critical comments: SEA; Study supervision: RM, TM. Writing - original draft; Writing - review & editing: RM, SEA, HSH, EOA.

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Data availability

The data are not publicly available due to privacy or ethical restrictions. The present article is the result of a research project with permission from the ethics committee of the Islamic Azad University of Ardabil (IAU.ARDABIL.REC.1401.102).

Declarations

Ethical approval

The data are not publicly available due to privacy or ethical restrictions. The present article is the result of a thesis with permission from the ethics committee of the Islamic Azad University of Ardabil (ID: IRIAU.ARDABIL.REC.1403.051). Before the data were collected by the researchers, parents and children were informed about the study in accordance with the Declaration of Helsinki and their written/verbal consent was obtained. Children who had parental permission and volunteered to participate in the study were briefly informed and included in the study. Informed consent was obtained from the children's parents and/or legal guardians. All methods were conducted in accordance with relevant guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Department of Midwifery, Ardabil Branch, Islamic Azad University, Ardabil, Iran

²Department of Clinical Psychology, Ardabil Branch, Islamic Azad University, Ardabil, Iran

³Department of Psychology, Ardabil Branch, Islamic Azad University, Ardabil, Iran

⁴Faculty of Health Sciences, Department of Midwifery, Ataturk University, Erzurum, Türkiye

⁵Faculty of Health Sciences, Department of Midwifery, Bayburt University, Bayburt, Türkiye

⁶Institute of Health Sciences, Department of Midwifery, Ataturk University, Erzurum, Türkiye

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