Journal of
Research in Psychopathology
https://doi.org/10.22098/jrp.2024.16084.1263

2025; Vol. 6, No. 2
Pages: 46 - 55

Original Article

The Mediating Role of the Empathy in the Relationship Between Effortful Control and Antisocial Behavior in Adolescents

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Abstract

Antisocial behaviors include actions that violate social norms and harm others. These behaviors can stem from individual, environmental, and social factors, such as ineffective upbringing, stress, or social pressures. Managing and reducing such behaviors requires effective educational and social interventions. Therefore, the aim of the present study was to investigate the mediating role of empathy in the relationship between effortful control and antisocial behaviors in adolescents. The population consisted of all high school students in the academic year 2022-2023 in Shiraz city, from whom a sample of 567 students was selected using a multistage cluster random sampling. The questionnaires of effortful control, empathy, and antisocial behaviors were distributed among them. The proposed model was evaluated using path analysis with the help of SPSS-24 and AMOS-24 software. The findings indicated that the proposed model had a good fit with the data. Additionally, the results showed that effortful control was significantly related to empathy, and empathy was significantly related to antisocial behaviors. However, no significant relationship was found between effortful control and antisocial behaviors. Further, the results revealed that empathy has a mediating role in the relationship between effortful control and antisocial behaviors. Therefore, empathy plays a crucial role in the influence of effortful control on antisocial behaviors and acts as a mediator. Strengthening empathy can thus be an effective approach to reducing antisocial behaviors, even in cases where effortful control does not have a direct impact.

Keywords

Effortful control
Empathy
Antisocial behaviors
Adolescents

Received: 2024/10/26
Accepted: 2024/11/30
Available Online: 2025/05/20

Introduction

Adolescence is a stage of growth stages that are characterized by confusion and conflict caused by multifaceted changes, including physical, emotional, and behavioral changes. Many of the challenges of this course are related to adolescent adolescent behaviors, including anti -social behaviors (Jansen & Franse, 2024; Best & Ban, 2024). Antisocial behaviors refer to a wide range of actions considered by society as violations of social norms, laws, and/or the rights of others (Calkins & Keane, 2009; Carroll et al., 2023). These behaviors can range from minor acts such as lying and bullying to more severe offenses like extreme violence and committing assault (Gubbels et al., 2024; Campos et al., 2022). Loeber et al. (1993) argue that minor antisocial behaviors can escalate into more serious forms. Moffitt (1993), in his influential developmental taxonomy of antisocial behaviors, proposed two distinct types of adolescents with such behaviors, based on the timing and duration of their involvement: a large group that displays antisocial behavior only during adolescence, and a smaller group that exhibits these behaviors throughout life. The first group shows temporary antisocial behaviors during adolescence, which are considered normal for this age. However, the second group starts displaying antisocial behaviors at an earlier age, continuing into adolescence and adulthood, leading to more severe and problematic conduct. The absence of interventions, or delayed interventions, increases the likelihood of these behaviors worsening.

Antisocial behaviors and Antisocial Personality Disorder (ASPD) are sometimes mistakenly used interchangeably. ASPD, as described in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), is characterized by a pervasive pattern of disregard for and violation of the rights of others. However, antisocial behaviors differ from ASPD. While the definition of

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antisocial behaviors can provide a diagnostic basis for Conduct Disorder (CD) and ASPD, it encompasses a broader scope than these disorders (Kamali, 2017; Jebraeili, 2024). ASPD is marked by persistent antisocial and criminal actions, with a prevalence of 3% in men and 1% in women. The onset of this disorder occurs before age 15, with symptoms appearing in girls before puberty and earlier in boys (Boland. Et al., 2022). Conduct Disorder in the DSM-5 is associated with tendencies toward cruelty and callousness, severe and premeditated aggression, stronger association with delinquent peers, early school dropout, and greater encouragement of peers to commit crimes (Viding & McCrory, 2019; Falcón, Dobbins & Stickle, 2021). The onset of CD typically occurs in middle childhood and adolescence, and is more common in boys (Wakschlag et al., 2007; Mohamadi et al., 2024).

The causes of antisocial behaviors in students vary and stem from different backgrounds. For some students, these behaviors may be linked to environmental factors such as poverty, family instability, and domestic violence. There is also a social component, which may involve peer groups and how they interact with each other (Khaliq & Rasool, 2019).

Antisocial behaviors are the most common and costly mental health problems among children and adolescents, leading to significant challenges at various levels (Cohen, 1998; Welsh et al., 2008; Sawyer, Borduin & Dopp, 2015; Mazza et al., 2025). At the individual level, young people who exhibit antisocial behaviors experience a range of psychosocial issues, as well as reduced educational and occupational opportunities (Lyons et al., 2001; Odgers et al., 2008). Additionally, antisocial behaviors by adolescents cause emotional, physical, and economic harm to victims, their families, and society at large (Britt, 2001; Kilpatrick & Acierno, 2003; Miller, Fisher & Cohen, 2001; Robinson & Keithley, 2000). Along with harming others, individuals with antisocial behaviors are at higher risk of criminal convictions, mental health issues, and substance abuse (Abram et al., 2015). As a result, antisocial behavior has financial, personal, familial, and societal consequences, with both short-term and long-term effects. According to Scott et al. (2001), the rehabilitation costs for individuals exhibiting antisocial behaviors in childhood were ten times higher than for those without such behaviors.

From a preventive perspective, studying the causal factors of antisocial behaviors during adolescence and youth is crucial, as these behaviors represent a serious social problem with harmful physical and mental health outcomes for both victims and offenders (Burt et al., 2018; Cook et al., 2015; Piquero et al., 2007; Beelmann et al., 2023). Research also indicates that the factors predicting chronic antisocial behavior and later delinquency can be identified early in adolescence (Assink et al., 2015; Loeber, Slot & Stouthamer-Loeber, 2008). adolescence and youth offer more opportunities for treatment and prevention of antisocial behaviors compared to adulthood. Also, given that little research has been conducted on protective factors for antisocial behaviors (Gubbels et al., 2024), Therefore, protective factors against antisocial behaviors, including empathy and effortful control, were examined in this study.

Effortful control, a component of executive attention, is defined as "the ability to inhibit a dominant response and/or activate a subdominant one, plan, and detect errors" (Rothbart & Bates, 1998; Dong et al., 2024; Chae, 2022). Researchers view effortful control as a type of active, flexible, and voluntary regulation that allows individuals to respond adaptively to the situations they encounter (Eisenberg et al., 2002; Zhang et al., 2024; Wass, 2021). Failure in effortful control is associated with maladaptive behaviors, such as antisocial behaviors (Krueger & South, 2009). Tangney et al. (2018) found that individuals with higher effortful control tend to have more secure and satisfying relationships, and experience less anger and aggression. Furthermore, Moffitt et al. (2011) demonstrated that higher effortful control in childhood predicts better financial self-control, physical health, reduced substance abuse, and fewer criminal offenses in later life.

Since effortful control is essential for following many rules and standards, including moral guidelines, it has been referred to as a "moral muscle," representing the capacity to overcome selfish impulses and behave in socially desirable ways (Baumeister & Juola Exline, 1999; Sofia & Cruz, 2015). DeWall et al. (2007) showed that effortful control relies on a limited amount of energy, which depletes with use. This means that an individual who has recently regulated their behavior or emotions may respond aggressively when faced with another triggering situation shortly afterward. Therefore, individuals have a limited capacity to regulate their behavior and emotions. This raises the hypothesis that effortful control might have a more effective influence on antisocial behavior through the mediation of another factor. In other words, another factor might mediate the relationship between effortful control and antisocial behavior. In this study, empathy was considered as the mediating variable.

Numerous studies have shown that empathy is related to antisocial behaviors (Chaux et al., 2009; LeSure-Lester, 2000; Jami et al., 2024). Empathy is defined as the ability and skill to understand another person's emotional states or conditions, or the ability to put oneself in another person's shoes (Taylor et al., 2013; Nembhard et al., 2022). Perpetrators of antisocial behavior, violence, and aggression are often described as individuals with low empathy (Marshall et al., 1995; Miller & Eisenberg, 1988; Plata Ordoñez, Riveros & Moreno, 2010). This lack of empathy can stem from an inability to understand others' emotions, meaning these individuals cannot experience or comprehend the pain and suffering of others. In fact, empathy, as a critical social skill, is closely related to an individual's ability to control and manage their emotions as well as understand others' feelings. Moreover, empathy plays a fundamental role in preventing harmful and aggressive behaviors. When an individual is able to understand the emotions of others, the likelihood of harming them is significantly reduced

(Cricchio et al., 2022). For this reason, mental disorders such as conduct disorder, antisocial personality disorder, and narcissistic personality disorder are commonly associated with a lack of empathy. These disorders enable individuals to easily cross social boundaries and engage in unacceptable behaviors because they cannot comprehend the emotional consequences of their actions on others. Therefore, empathy not only helps foster positive and healthy relationships, but also serves as a key factor in preventing antisocial behaviors and violence (Gantiva et al., 2021; Wu et al., 2024).

As previously mentioned, antisocial behaviors are predicted by effortful control and empathy. Some studies suggest that empathy can be predicted by effortful control (Hirtenlehner et al., 2023; Wang et al., 2012). Empathy, defined as the capacity of an individual to feel and understand what another person is experiencing, plays a significant role in social relationships and human interactions (Wang et al., 2012). This trait is linked to prosocial behaviors and consideration for the needs of others (Benita, Levkovitz & Roth, 2017). In fact, empathy can be regarded as a fundamental construct for establishing positive and effective connections in society. Research by Eisenberg et al. (1998), Panfile & Laible (2012), and Rothbart et al. (1994) has shown that children with higher effortful control demonstrate greater empathy. Children who have better abilities to regulate and inhibit their emotions and behaviors naturally tend to understand the emotions of others more effectively. Those with higher effortful control usually have enhanced abilities to manage and control their own emotions and behaviors. This capacity allows them to better comprehend others' emotions in more complex social situations and respond more appropriately. In other words, due to their greater self-control, these children have a higher ability to pay attention to the needs and feelings of others. This process can lead to an increased sense of concern and care for others, ultimately resulting in more helpful and empathetic behaviors. Thus, empathy and effortful control complement each other, contributing to improved social interactions and human relationships (Benita et al., 2017)**.**

The present study aims to address several gaps in the existing research literature. While numerous studies have examined predictors of antisocial behaviors individually, limited data exist on these predictors during adolescence. Most research to date has focused on exploring these relationships in adulthood. The lack of studies on adolescence, in itself, highlights the necessity of conducting this research. Moreover, a review of the literature reveals that no prior study has simultaneously examined the relationship between effortful control, empathy, and antisocial behaviors. A closer look at empirical work on effortful control and empathy in individuals exhibiting antisocial behaviors indicates that the relationship between these constructs is far more complex than simplistic hypotheses suggest. Accordingly, this study aims to investigate the mediating role of empathy in the relationship between effortful control and antisocial behaviors in adolescents. These relationships are examined within the framework of Conceptual Model 1.

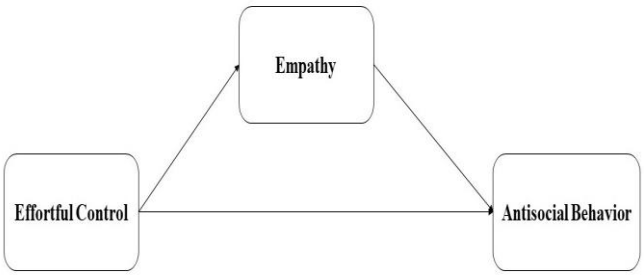

Figure 1. Conceptual Model of Research

Method

Participants

The participants of the present study were all high school students from Shiraz city. The sample size was determined using the sample size formula for structural equation modeling (5q< n<15q), where (n) is the sample size and (q) is the number of items in the questionnaire. Since the questionnaire for the present study had 68 items, 567 students were selected as the sample using a multi-stage cluster sampling method. This sample consisted of 342 girls (60.3%), 222 boys (39.2%), and 3 unspecified (0.5%). The distribution across grades was as follows: 189 10th graders (33.3%), 173 11th graders (30.5%), 193 12th graders (34.03%), and 12 unspecified (2.11%). The age range of these students was between 15 and 18 years.

Instrument

Demographics: Participants reported their gender,age, and grade level. The frequencies and percentages of these characteristics are presented in the "Participants" section.

Ellis and Rothbart's Effortful Control Questionnaire:

This questionnaire, developed by Ellis and Rothbart (2001), is designed to assess the dimension of adolescent effortful control. Originally composed of 20 items, it was first translated into Persian by Keramati et al. (2021). Scoring is based on a five-point Likert scale ranging from (5) Always, (4) Often, (3) Sometimes, (2) Rarely, to (1) Never. Items 1, 2, 4, 5, 11, 12, 14, 15, 17, and 20 are reverse-scored. A maximum score of 100 indicates a high level of effortful control, while a minimum score of 20 signifies a low level .

This scale measures three dimensions: Attentional Control (items 2, 5, 8, 11, 14, and 20), Activation Control (items 1, 4, 7, 10, 13, 16, and 18), and Inhibitory Control (items 3, 6, 9, 12, 15, 17, and 19). Ellis and Rothbart (2001) reported satisfactory validity for the questionnaire. In the study by Keramati et al. (2021), the findings showed that the structure of the effortful control scale

demonstrated acceptable model fit indices, supporting the validity of the model.

Reliability of this scale was tested by Evans and Rothbart (2007), with Cronbach's alpha coefficients for Activation Control, Attentional Control, Inhibitory Control, and Total Score found to be 0.74, 0.83, 0.84, and 0.90, respectively. Test-retest reliability over a two-week interval for these dimensions and the total score was 0.79, 0.89, 0.81, and 0.90, respectively. In the study by Keramati et al. (2021), Cronbach's alpha for Activation Control, Attentional Control, Inhibitory Control, and the Total Score was 0.68, 0.61, 0.64, and 0.79, respectively. In the present study, reliability for the Attentional Control, Activation Control, Inhibitory Control, and Total Score was 0.74, 0.64, 0.70, and 0.84, respectively.

Toronto Empathy Questionnaire:

This questionnaire, developed by Spreng et al. (2009), was designed to assess empathy. The Toronto Empathy Questionnaire aims to consolidate all empathy-related measures aligned with empathy processes, addressing any limitations in existing empathy assessment tools. Consisting of 16 items and measuring a single component, it was first translated into Persian by Memarian et al. (2021). The questionnaire is scored on a Likert scale of (5) Always, (4) Often, (3) Sometimes, (2) Rarely, and (1) Never, with items 2, 4, 7, 10, 11, 12, 14, and 15 reverse-scored.

Spreng et al. (2009) claim that the Toronto Empathy Questionnaire is a concise, clear, and cohesive tool with strong psychometric properties, featuring a unidimensional factor structure, high internal consistency, construct validity, and reliable test-retest reliability. Memarian et al. (2021) conducted a standardization study in Iran, reporting satisfactory validity for the questionnaire. The reliability of this scale was reported as 0.85 by Spreng et al. (2009). In studies by Kourmousi (2017) and Memarian et al. (2021), Cronbach's alpha coefficients were calculated at 0.70 and 0.77, respectively. In the present study, the overall reliability of the questionnaire was found to be 0.79.

Burt & Donnellan Antisocial Behavior Questionnaire:

This questionnaire, developed by Burt and Donnellan (2009), was designed to assess antisocial behaviors and was first translated into Persian in Iran by Taravian et al. (2024). The scale consists of 32 items rated on a five-point Likert scale from Never (1) to Almost Always (5). It measures three dimensions: Physical Aggression (items 1, 4, 7, 10, 13, 16, 19, 22, 25, and 28), Social Aggression (items 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, and 32), and Rule-Breaking (items 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, and 31) .

Burt and Donnellan (2009) examined the validity of this scale across five studies, all of which supported the scale's validity. In the study by Taravian et al. (2024), the validity of this questionnaire was also confirmed. Additionally, they reported the reliability coefficients for the total antisocial behavior scale, with Cronbach's alpha and split-half reliability coefficients at 0.88 and 0.76, respectively. For the subscales, the reliability was 0.87 and 0.80 for Physical Aggression, 0.65 and 0.57 for Social Aggression, and 0.72 and 0.52 for Rule-Breaking.

Procedure

A two-stage cluster sampling method was employed to select a sample of 567 students from high schools in Shiraz city. First, two educational districts (1 and 4) were randomly chosen from the city's four districts. All high schools within these districts were then listed, and eight schools were randomly selected from this combined list. Within each chosen school, four classes were selected as the sample. 600 written questionnaires were distributed to the students in these classes. Thirty-three questionnaires were excluded due to incompleteness or damage. After obtaining necessary coordination with school principals, researchers visited the selected schools. They provided explanations about the study, obtained informed consent from the students, and distributed the questionnaires. Students were instructed to contact the researchers if they encountered any difficulties while completing the questionnaires. Finally, the completed questionnaires were collected.

Every research study, including this one, has specific inclusion and exclusion criteria for its sample. The inclusion criteria for this study included full consent from participants to complete the questionnaires, normal intelligence, and no history of delinquent behaviors as indicated by academic records and counseling history. The exclusion criteria included unwillingness to complete the questionnaires and incomplete or damaged questionnaires.

Voluntary participation is crucial in any research study. Therefore, the purpose of the study was clearly explained to the participants, and they were assured that they were not required to disclose their personal information. Additionally, adhering to academic integrity and honesty, and assuring school officials and administrators that the questionnaires solely assessed the topics covered in the questionnaires, were other essential aspects of the current study.

The collected data were analyzed in two sections: descriptive and inferential statistics. The descriptive section included the mean, standard deviation, minimum and maximum scores, skewness, and kurtosis for the variables studied. In the inferential section, data obtained from the questionnaires were analyzed using path analysis and the bootstrap method with SPSS-24 and AMOS-24 software, and the research hypotheses were tested.

Results

Table 1 presents the descriptive statistics and correlation coefficients for the research variables. The skewness and

kurtosis values were evaluated to check for data normality, and, as shown, these values fall within the range of -2 to +2 for all variables, indicating no significant deviation from a normal distribution. The findings also revealed that none of the tolerance values were below the threshold of 0.1, and none of the variance inflation factors (VIF) exceeded the threshold of 10. Since no multicollinearity was observed among the predictor variables, parametric tests such as Pearson correlation and path analysis were deemed reliable.

The Durbin-Watson statistic was between 1.5 and 2.5, indicating the independence of errors, supporting the use of path analysis. Additionally, since significant correlations among variables are an important assumption in path analysis, correlation coefficients were also examined. The results showed a significant negative correlation between effortful control and antisocial behaviors ($r = -0.57$, $p < 0.01$), a significant negative correlation between empathy and antisocial behaviors ($r = -0.45$, $p < 0.01$), and a significant positive correlation between effortful control and empathy ($r = 0.38$, $p < 0.01$).

Table 1. Descriptive Statistics and Correlation Matrix Coefficients of Research Variables

Variable	1	2	3	mean	standard deviation	Minimum scores	maximum scores	skewness	kurtosis
1.Effortful control	1			66.91	13.39	23	99	-0.16	-0.33
2.Empathy	0.38**	1		55.42	9.99	19	75	-0.32	-0.009
3.Antisocial behaviors	-0.57**	0.45**	1	56.82	21.77	14	121	0.09	-0.32

Structural equation modeling (SEM) was used to evaluate the proposed model. All analyses were conducted using the Amos-24 software. The following fit indices were used to assess the fit of the proposed model to the data: chi-square ($\chi 2$), normed chi-square ($\chi 2/df$), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), comparative fit index (CFI), incremental fit index (IFI), tucker-lewis index (TLI) and root mean square error of approximation (RMSEA). The proposed model for the present study included four variables: effortful control, empathy, and antisocial behaviors. Before examining the structural coefficients, the fit of the main model was examined. Figure 2 shows the proposed model in standard mode.

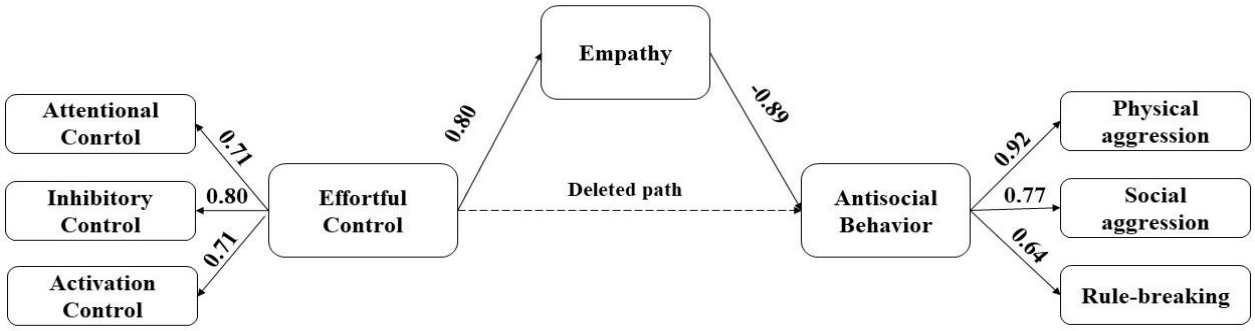

Figure 2. The Research Model with Standard Coefficients of the Paths

Table 2 shows the model fit indices for the proposed model.

Table 2. Model Fit Indices for the Proposed Model

Fit Indices	X^2	df	X^2/df	GFI	AGFI	NFI	CFI	IFI	TLI	RMSEA
Proposed Model	40.53	11	3.68	0.98	0.97	0.97	0.98	0.98	0.96	0.06 (0.04-0.09)

To assess the fit of the hypothesized model, the chi-square ($\chi 2$) and root mean square error of approximation (RMSEA) fit indices were examined. For good models, RMSEA should be less than 0.05, for moderate models between 0.05 and 0.08, and for poorer models greater than 0.10 (Browne & Cudeck, 1992). As a general rule of thumb, the comparative fit index (CFI) and goodness of fit (GFI) indices should be between 0.90 and 0.95 for good models. The closer these values are to 1, the better the model fit (Kline, 2005). As can be seen in Table 2, all values are within the appropriate range; therefore, the proposed model has an acceptable fit to the data. The direct paths of the proposed model were then examined, and the findings are presented in Table 3.

Table 3. Examination of Direct Paths in the Proposed Model

Path	Estimate	S.E.	C.R.	P
Effortful Control ⟶ Empathy	1.14	0.12	8.85	0.001
Empathy ⟶ Antisocial Behavior	-1.37	0.14	-9.71	0.001

As shown in Table 3, the path coefficients from effortful control to empathy ($\beta = 1.14$, $p = 0.001$) and from empathy to antisocial behaviors ($\beta = -1.37$, $p = 0.001$) are significant. (The path from effortful control to antisocial behaviors was removed from the model due to lack of significance.) The indirect path in the proposed model is then examined.

Table 4. Examination of the Indirect Path in the Overall Proposed Model

	Estimate	Upper Bound	Lower Bound	P
Indirect Path	-0.72	-0.66	-0.76	0.001

As shown in Table 4, the indirect effect of effortful control on antisocial behaviors is -0.72. This indicates that effortful control indirectly leads to a reduction in antisocial behaviors through the mediating variable, empathy. This negative effect suggests that higher levels of effortful control contribute to increased empathy, which in turn reduces antisocial behaviors. Additionally, the confidence interval for this indirect path does not include zero, indicating that this indirect effect is statistically significant.

Discussion

The aim of this study was to investigate the mediating role of empathy in the relationship between effortful control and antisocial behaviors. The findings indicated that empathy mediates the relationship between effortful control and antisocial behaviors. This finding aligns with some of the findings of Plata Ordóñez et al. (2010), Gantiva et al. (2021), Hirtenlehner et al. (2023), and Wang et al. (2012) but contrasts with findings from Tangney et al. (2018) and Moffitt et al . (2011).

In interpreting these findings, it can be noted that effortful control is only one predictor of antisocial behaviors, and other factors may also contribute to such behaviors. Human behaviors are generally complex and influenced by a range of factors, so effortful control alone cannot fully explain or predict them. For example, environmental factors, such as social pressures, socio-economic changes, and cultural and social values, can have profound effects on human behavior. Social pressures, in particular, may lead to antisocial behavior, as individuals might act inappropriately to meet group expectations and gain social acceptance. Additionally, individual factors like past experiences, personality, and mental health status also play an important role in shaping antisocial behaviors (Jaffee et al., 2004; Luthar, Cicchetti & Becker, 2000). For instance, individuals raised in unstable family or social environments may be more susceptible to engaging in antisocial behaviors. Moreover, interactions between individuals and their environments add to this complexity. Factors such as access to economic resources, educational status, and social relationships can influence individual choices and, in turn, shape prosocial or antisocial behaviors. Therefore, studying human behavior requires attention to these varied factors and their complex interactions to provide a comprehensive and realistic understanding of the causes and influences on behaviors (Jaffee et al., 2004; Luthar, Cicchetti & Becker, 2000).

Effortful control, however, can indirectly impact antisocial behaviors through empathy. Individuals with lower effortful control are typically impulsive and risk-taking, which significantly affects their ability to empathize with others. Empathy, a complex emotional process, requires emotional balance and sensitivity to others' feelings. To empathize, a person must be able to understand others' perspectives and respond appropriately, which includes expressing emotions and accompanying others in their experiences (MacDonald & Price, 2019). Impulsive and risk-taking individuals often show instability in emotional regulation and are more prone to be influenced by momentary feelings, leading them to act reactively and physically rather than make logical, thoughtful decisions. In such cases, these individuals not only struggle to put themselves in others' positions but may also fail to deeply understand others' emotions and needs, leading to behaviors that may unintentionally harm or disrespect others (Ornaghi et al., 2020).

Research by Georgiou et al. (2019) demonstrated that a lack of empathy not only reduces positive and constructive behaviors in society but also fosters antisocial and self-centered behaviors. Empathy helps individuals establish more effective connections. When individuals lack empathy, they are less inclined to help and cooperate with others, weakening social bonds and diminishing the sense of social responsibility. On the other hand, increased empathy levels can strengthen these bonds and create a cooperative, positive environment. When individuals care about each other's emotions and needs, interpersonal relationships improve, and their likelihood of engaging in activities that benefit society also rises significantly. Such participation may include volunteering, supporting neighbors, or joining social programs, which ultimately benefit the entire community. In other words, empathy can act as a driving force for promoting ethical behavior and social responsibility (Van der Graaff et al., 2018; Lee & Madera, 2021; Rodriguez et al., 2021; Orm et al., 2022).

Conclusion

Overall, the findings revealed that effortful control does not have a direct relationship with antisocial behaviors but can have an indirect relationship through empathy. Additionally, as with any scientific research, this study faced inherent challenges and limitations that could influence the results and interpretation of data. One important limitation pertains to the study's sample population. Since the research was conducted solely with high school students in Shiraz, the results may not be fully generalizable to students from other regions or under different conditions. This limitation could stem from cultural, economic, and educational differences that impact students' behaviors and responses. Therefore, caution is warranted when generalizing the findings.

Furthermore, the measurement tools used, such as questionnaires, may have limited accuracy due to potential response biases or self-censorship by respondents. Thus, employing complementary data collection methods, such as in-depth interviews or field observations in non-experimental settings, could enhance the accuracy and validity of the findings. These methods provide additional insights into the behavioral context and motivations of respondents, contributing to a more

in-depth understanding of the research subject. Combining quantitative and qualitative approaches ultimately facilitates a more comprehensive analysis and a deeper grasp of the phenomena under study.

Therefore, it is recommended that appropriate interventions, including empathy enhancement techniques, be provided to all segments of society to foster a healthier community and reduce antisocial behaviors. Techniques like storytelling, role-playing games, modeling empathetic and warm responses to others' distress, and explaining the impact of one's actions on others are effective strategies for empathy development. Additionally, early life stages play a key role in setting a path away from antisocial behaviors. The results of this study clearly indicate that empathy not only directly but also indirectly, as a mediating variable, influences the reduction of antisocial behaviors. Consequently, it is recommended that empathy development programs be broadly implemented at the community level.

Acknowledgment

We gratefully acknowledge the students who participated in the study, without whom this work would not be possible.

Disclosure Statement

The authors declare no competing interests.

This paper is based on the first author's Master's thesis. The first author was responsible for the execution of the work and the initial drafting of the paper, while the second author provided research guidance. The third author served as a research advisor.

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