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Proposed Model of the Relationship Between Problem-Solving Skills and Aggression Mediated by Emotional Intelligence in Male Secondary School Students

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A B S T R A C T

Purpose: The aim of this study was to investigate the relationship between problem-solving skills and aggression among male secondary school students, with emotional intelligence acting as a mediating variable.

Methods and Materials: This descriptive, correlational study employed a path analysis design. The statistical population included all male secondary school students in Ahvaz, Iran, from which 200 participants were selected using multistage random sampling. Data were collected through three standardized instruments: the Problem Solving Inventory (PSI), the Aggression Questionnaire (AQ), and the Wong and Law Emotional Intelligence Scale (WLEIS). Data analysis was conducted using Pearson correlation coefficients and path analysis via SPSS-23 and AMOS-22 software.

Findings: The results showed significant negative correlations between all dimensions of problem-solving skills and aggression: problem-solving confidence ($r = -0.413$, $p < .01$), approach-avoidance style ($r = -0.486$, $p < .01$), personal control ($r = -0.418$, $p < .01$), and the total problem-solving score ($r = -0.630$, $p < .01$). Emotional intelligence also demonstrated a strong negative correlation with aggression ($r = -0.702$, $p < .01$). Path analysis revealed that emotional intelligence significantly mediated the relationship between each problem-solving component and aggression. The strongest standardized path coefficient was observed between emotional intelligence and aggression ($\beta = -0.535$, $p < .01$). Fit indices confirmed the acceptability of the model (CFI = 0.99, TLI = 0.90, NFI = 0.98), despite a slightly elevated RMSEA (0.116).

Conclusion: The findings suggest that both problem-solving skills and emotional intelligence play significant roles in reducing aggressive behaviors among adolescents. Emotional intelligence serves as a key mediating factor, reinforcing the importance of integrating cognitive and emotional skill development in school-based interventions aimed at aggression prevention.

Keywords: *Problem-solving skills; Aggression; Emotional intelligence; High school students.*

1. Introduction

Aggression in adolescence remains a significant psychological and social concern, drawing attention from educators, psychologists, and policymakers due to its pervasive effects on individual development and community safety. Adolescence is marked by a range of emotional and behavioral changes, during which interpersonal sensitivity may contribute to the emergence of aggressive tendencies (Tajari, 2016). Aggressive behaviors in adolescents have been associated with a wide spectrum of challenges, including academic underachievement, school dropout, substance use, disciplinary infractions, and involvement in the juvenile justice system (Khalili et al., 2015; Sheikh Al-Islami et al., 2017). These behaviors, if left unaddressed, can compromise both mental health and social integration, emphasizing the necessity of identifying psychological factors that mitigate aggression and promote adaptive functioning.

Problem-solving ability, defined as the cognitive-behavioral process of discovering effective responses to difficult or novel situations, has emerged as a key protective factor against maladaptive behaviors, including aggression (Narangi, 2015). Adolescents who possess effective problem-solving skills tend to exhibit higher emotional regulation, more adaptive coping strategies, and fewer aggressive responses to interpersonal conflict (Khalili et al., 2015; Tajari, 2016). From a cognitive-behavioral perspective, problem-solving skills empower individuals to appraise situations more rationally, consider multiple outcomes, and employ nonviolent methods for conflict resolution (Shokoohi Yekta & Motamed Yeganeh, 2024). This approach is particularly relevant in educational settings, where structured interventions have successfully reduced aggressive behavior by enhancing students' cognitive flexibility and self-regulatory capacities (Abdulmalik et al., 2016).

Equally important in the etiology of aggressive behavior is emotional intelligence (EI), a multidimensional construct that includes the ability to perceive, understand, regulate, and utilize emotions in oneself and others (Faraji et al., 2017; Urquijo et al., 2015). Numerous empirical studies have confirmed the inverse association between EI and aggression across different age groups and populations. Adolescents with higher levels of emotional intelligence demonstrate greater capacity for emotional regulation, empathic concern, and constructive communication—all of which serve as buffers against impulsive and hostile behavior (Bibi et al., 2020; Coccaro et al., 2016; Peláez-Fernández et al., 2015). This emotional awareness enables youth to interpret social cues more accurately, thereby reducing the likelihood of misinterpretation and retaliatory aggression (Wang & Kong, 2014).

Recent theoretical models suggest that emotional intelligence may serve as a mediating factor between problem-solving skills and aggressive behavior. This proposition is grounded in findings showing that individuals with advanced cognitive problem-solving abilities often leverage emotional skills to effectively navigate stressful interpersonal situations (Tekeli & Özkoç, 2021). For instance, adolescents who are confident in their problem-solving skills may also be better at regulating their emotional responses during conflict, thereby reducing aggressive tendencies (Ergin et al., 2020). Furthermore, interventions targeting emotional intelligence have been shown to improve adolescents' ability to apply problem-solving strategies in emotionally charged contexts, suggesting a reciprocal and dynamic relationship between these constructs (Ndawo, 2021; Schonert-Reichl et al., 2014).

Despite extensive evidence on the individual roles of problem-solving skills and emotional intelligence in managing adolescent aggression, there remains a paucity of research investigating the interplay between these variables within a mediational framework. Previous studies often examined problem-solving and emotional regulation as independent predictors of aggression, failing to elucidate the potential process through which cognitive-behavioral competencies influence emotional outcomes (Jaloudari et al., 2016; Mohammadi et al., 2014). Moreover, while research has validated the Problem Solving Inventory (PSI) across different populations (Kourmousi et al., 2016), few studies have concurrently measured emotional intelligence using validated self-report instruments and assessed their joint contribution to aggression among adolescents.

A further complication in existing literature is the variability of findings across cultural contexts. For instance, the association between emotional intelligence and aggression appears to differ by gender, socioeconomic background, and schooling environment (Deng et al., 2023; Khan et al., 2025; Suardi Wekke et al., 2022). In collectivist societies, where emotional expression and interpersonal harmony are highly valued, emotional intelligence may play an even more central role in behavioral regulation. Conversely, in competitive and individualistic environments, cognitive problem-solving might be more strongly emphasized. These sociocultural dynamics

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underscore the necessity for localized research examining these constructs among adolescents in specific contexts—such as Iranian school systems—where both emotional expression and academic achievement are undergoing transitional shifts (Sigarchi et al., 2021).

Research conducted in Iran suggests that aggression among students is not only prevalent but also influenced by the lack of emotional regulation strategies and inadequate problem-solving skills (Sheikh Al-Islami et al., 2017; Tanha et al., 2020). This has been demonstrated in studies showing that interventions aimed at enhancing problem-solving competence and emotional awareness yield significant reductions in aggressive tendencies among high school students (Shokoohi Yekta & Motamed Yeganeh, 2024; Tajari, 2016). However, these studies typically report direct effects, and very few have explored the mediating mechanisms through which these variables operate.

In light of these gaps, the current study proposes and empirically tests a model that examines the relationship between problem-solving skills and aggression, with emotional intelligence as a mediating variable, among male secondary school students in Ahvaz.

2. Methods and Materials

2.1. Study Design and Participants

The present study employed a descriptive design using path analysis. The statistical population consisted of all male secondary school students in Ahvaz County, totaling over 7,000 individuals. From this population, a sample of 200 students was selected through multistage random sampling. Among the students' parents, 54 individuals (27%) held a diploma or lower educational attainment, 83 individuals (41.5%) held a bachelor's degree, 47 individuals (23.5%) held a master's degree, and 16 individuals (8%) held a doctoral degree.

2.2. Measures

2.2.1. Problem-Solving

The Problem-Solving Inventory was developed by Heppner and Petersen (1982, as cited in Kourmousi, Zitali, Tilogeitou, & Koutras, 2016) and consists of 35 items encompassing three subscales: (1) Problem-Solving Confidence, (2) Approach-Avoidance Style, and (3) Personal Control. Responses are rated on a 6-point Likert scale ranging from 1 = strongly agree to 6 = strongly disagree. The total score ranges from 32 to 192, with higher scores indicating better performance. Heppner and Petersen (1982, as cited in Kourmousi et al., 2016) reported internal consistency coefficients for the subscales ranging from .72 to .85 and .90 for the total scale. Narenji (2015) reported a reliability coefficient of .84 for the total inventory. In the present study, the Cronbach's alpha coefficient for the total scale was .93.

2.2.2. Aggression

This questionnaire was developed by Buss and Perry (1992) and comprises 29 items covering four subscales: Physical Aggression, Verbal Aggression, Anger, and Hostility. Responses are recorded on a 5-point Likert scale. Buss and Perry (1992) reported test-retest reliability coefficients for the four subscales (over a 9-week interval) ranging from .72 to .80, and inter-correlations among the subscales ranging from .38 to .49. Narenji (2015) reported a reliability coefficient of .81 for the entire questionnaire. In the present study, the overall Cronbach's alpha coefficient was .88.

2.2.3. Emotional Intelligence

This scale was developed in 2004 by Wong, Law, and Wong and contains 16 items. The items are scored on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The possible total scores range from 16 to 90, with higher scores indicating higher emotional intelligence. Wong et al. (2004) reported a Cronbach's alpha reliability of .94 and a convergent validity coefficient of .63 with the Trait Meta-Mood Scale. Jelodari et al. (2016) reported a Cronbach's alpha of .75 for this scale. In the present study, the Cronbach's alpha for the total scale was .87.

2.3. Data Analysis

In the present research, data were analyzed using descriptive statistics such as means and standard deviations, and inferential statistics including Pearson correlation coefficients and path analysis. Data analysis was conducted using SPSS version 23 and AMOS version 22.

3. Findings and Results

As shown in Table 1, the means and standard deviations of the study variables were as follows: for the subcomponent Problem-Solving Confidence, M = 36.20, SD = 10.60; for Approach-Avoidance Style, M = 50.06, SD = 17.14; for Personal Control, M = 16.78, SD = 4.97; and for the Total

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Problem-Solving Skills Score, M = 103.03, SD = 23.50. The mean and standard deviation for Aggression were 82.60 and 16.50, respectively, and for Emotional Intelligence, 55.04 and 11.34. The lowest and highest means belonged to Personal Control (M = 16.78) and Total Problem-Solving Skills (M = 103.03), respectively.

Table 1

Means and Standard Deviations of the Study Variables (n = 200)

Variable	Mean	SD	Min	Max
Problem-Solving Confidence	36.20	10.60	15	66
Approach-Avoidance Style	50.06	17.14	17	93
Personal Control	16.78	4.97	6	30
Total Problem-Solving Skills	103.03	23.50	45	170
Aggression	82.60	16.50	34	137
Emotional Intelligence	55.04	11.34	30	80

As shown in Table 2, there were significant negative correlations between Problem-Solving Confidence (r = -0.413, p < .01), Approach-Avoidance Style (r = -0.486, p < .01), Personal Control (r = -0.418, p < .01), Total Problem-Solving Skills (r = -0.630, p < .01), and Emotional Intelligence (r = -0.702, p < .01) with Aggression. The weakest and strongest correlations with aggression were found for Problem-Solving Confidence (r = -0.413) and Emotional Intelligence (r = -0.702), respectively.

Table 2

Pearson Correlation Coefficients Between Study Variables (n = 200)

Variable	PSC	AAS	PC	PSS Total	Aggression	EI
Problem-Solving Confidence (PSC)	—	.141*	.345**	.627**	-.413**	.236**
Approach-Avoidance Style (AAS)		—	.198**	.835**	-.486**	.339**
Personal Control (PC)			—	.512**	-.418**	.278**
Problem-Solving Skills Total				—	-.630**	.413**
Aggression					—	-.702**
Emotional Intelligence (EI)						—

*p < .05; **p < .01*

As shown in Table 3, the chi-square value of the proposed model with df = 1 was 3.67 (p = .055), which was not statistically significant. The goodness-of-fit indices were: TLI = 0.90, CFI = 0.99, NFI = 0.98, and IFI = 0.99, all of which exceeded the excellent threshold of 0.90. However, the Root Mean Square Error of Approximation (RMSEA) was 0.116, which is above the conventional cutoff of 0.10, indicating a higher model error. Nevertheless, the strong values of the other fit indices suggest that the proposed model is adequately acceptable.

Table 3

Goodness-of-Fit Indices of the Final Model

χ^2	df	p	TLI	CFI	NFI	IFI	RMSEA
3.67	1	.055	.90	.99	.98	.99	.116

As shown in Table 4, the path coefficients in the proposed model were statistically significant for the following direct relationships: Problem-Solving Confidence to Emotional Intelligence (β = 0.137, p < .05), Approach-Avoidance Style to Emotional Intelligence (β = 0.287, p < .01), Personal Control to Emotional Intelligence (β = 0.175, p < .05), Problem-Solving Confidence to Aggression (β = -0.206, p < .01), Approach-Avoidance Style to Aggression (β = -0.254, p < .01), Personal Control to Aggression (β = -0.154, p < .01), and Emotional Intelligence to Aggression (β = -0.535, p < .01).

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Table 4

Standardized and Unstandardized Path Coefficients of the Proposed Model

Path	β	B	S.E.	C.R.	p
Problem-Solving Confidence → Emotional Intelligence	0.137	0.145	0.073	1.989	p < .05
Approach-Avoidance Style → Emotional Intelligence	0.287	0.189	0.043	4.372	p < .01
Personal Control → Emotional Intelligence	0.175	0.399	0.158	2.524	p < .05
Problem-Solving Confidence → Aggression	-0.206	-0.314	0.071	-4.415	p < .01
Approach-Avoidance Style → Aggression	-0.254	-0.240	0.044	-5.501	p < .01
Personal Control → Aggression	-0.154	-0.503	0.155	-3.247	p < .01
Emotional Intelligence → Aggression	-0.535	-0.769	0.068	-11.241	p < .01

As shown in Table 5, the standardized indirect path coefficients were statistically significant. The indirect effect of Problem-Solving Confidence on Aggression through Emotional Intelligence was significant within a 95% confidence interval from -0.134 to -0.018 (β = -0.073, p < .05). The indirect effect of Approach-Avoidance Style on Aggression through Emotional Intelligence was significant within a 95% confidence interval from -0.201 to -0.082 (β = -0.154, p < .05). Similarly, the indirect effect of Personal Control on Aggression through Emotional Intelligence was significant within a confidence interval from -0.160 to -0.040 (β = -0.094, p < .01).

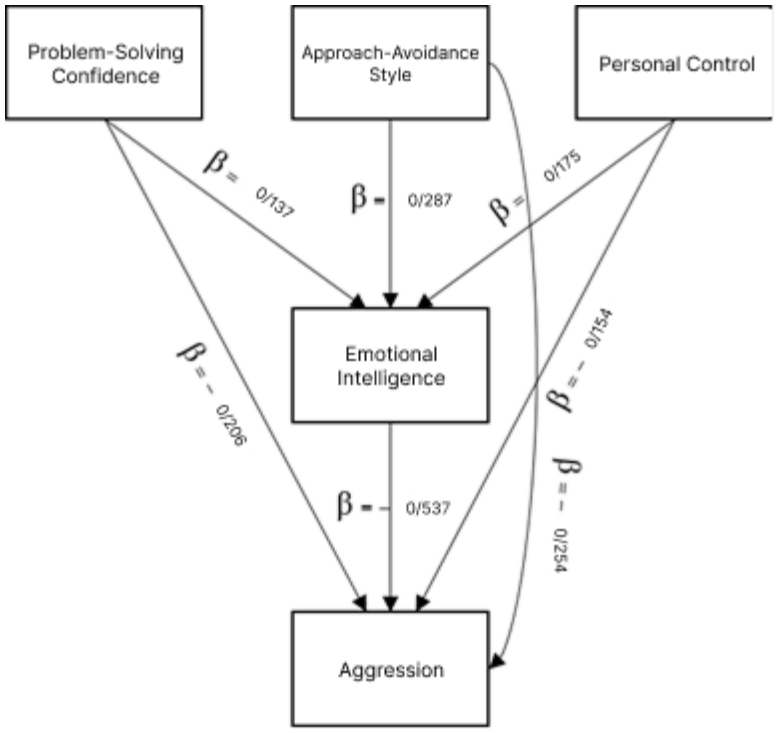
Table 5

Indirect Path Coefficients (Mediating Effect) of the Final Model Using Bootstrap Method

Path	β	p	CI Lower	CI Upper
Problem-Solving Confidence → Aggression via Emotional Intelligence	-0.073	0.017	-0.134	-0.018
Approach-Avoidance Style → Aggression via Emotional Intelligence	-0.154	0.023	-0.201	-0.082
Personal Control → Aggression via Emotional Intelligence	-0.094	0.005	-0.160	-0.040

Figure 1

Proposed Model of the Relationship Between Problem-Solving Skills and Aggression Mediated by Emotional Intelligence.



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4. Discussion and Conclusion

The present study examined the relationship between problem-solving skills and aggression among male secondary school students in Ahvaz, with emotional intelligence as a mediating variable. The findings revealed significant negative correlations between all dimensions of problem-solving skills (problem-solving confidence, approach-avoidance style, and personal control) and aggression. Moreover, emotional intelligence showed a strong inverse association with aggression. The path analysis confirmed that emotional intelligence partially mediated the relationship between problem-solving dimensions and aggressive behavior. Specifically, students with higher confidence in solving problems, lower avoidance tendencies, and greater perceived control not only exhibited lower aggression directly, but also indirectly through heightened emotional intelligence.

These findings align with prior research indicating that individuals equipped with effective cognitive strategies for managing challenges are less likely to resort to aggressive behaviors (Sheikh Al-Islami et al., 2017; Tajari, 2016). As problem-solving confidence increases, adolescents tend to assess conflictual situations more rationally and seek peaceful resolutions, thereby minimizing the risk of reactive aggression. Furthermore, an avoidant approach to problem-solving was shown to correlate positively with aggression. This supports previous assertions that avoidance reflects low coping efficacy and emotional dysregulation, which may exacerbate maladaptive behavioral responses in the face of interpersonal stress (Khalili et al., 2015; Narangi, 2015).

In terms of personal control, the results demonstrated that students who perceived greater control over problem-solving outcomes were significantly less aggressive. This resonates with cognitive-behavioral theories that emphasize internal locus of control as a protective factor against impulsive reactions. The current study reinforces earlier findings that adolescents who believe they can influence outcomes through logical strategies are less likely to act out aggressively (Abdulmalik et al., 2016; Shokoohi Yekta & Motamed Yeganeh, 2024). It also corroborates the role of cognitive appraisals in behavioral regulation, particularly in emotionally charged environments such as school settings.

A notable contribution of this study lies in confirming the mediating role of emotional intelligence in the problem-solving–aggression linkage. All dimensions of problem-solving skills were found to significantly predict emotional intelligence, which, in turn, strongly predicted lower aggression levels. This pathway underscores the interplay between cognition and emotion, suggesting that cognitive competencies like structured problem analysis and behavioral planning may foster emotional awareness, regulation, and social adaptation (Faraji et al., 2017; Urquijo et al., 2015). These findings are consistent with the model proposed by Tekeli and Özkoç, in which emotional intelligence was identified as a central mediating mechanism between cognitive traits (e.g., perfectionism or problem-solving efficacy) and behavioral outcomes (Tekeli & Özkoç, 2021).

This mediating effect also supports the growing consensus in the literature that emotional intelligence serves as a psychological bridge between cognitive functions and emotional-behavioral adjustment. Studies have shown that youth with strong emotional intelligence are better able to interpret social cues, tolerate frustration, and resolve interpersonal tension, thereby reducing the likelihood of aggressive or retaliatory behavior (Peláez-Fernández et al., 2015; Wang & Kong, 2014). In this study, the highest indirect effect was found between approach-avoidance style and aggression through emotional intelligence. This suggests that avoidant problem-solving styles may be particularly detrimental, as they not only reflect poor cognitive engagement but also hinder emotional processing, exacerbating the potential for aggressive outbursts.

The strong negative path coefficient between emotional intelligence and aggression ($\beta = -0.535$) in the current model confirms earlier findings by Coccaro et al., who demonstrated that emotional intelligence is inversely related to impulsive aggression, particularly among youth with explosive temperaments (Coccaro et al., 2016). Similarly, Bibi et al. identified emotional intelligence as a key determinant of aggression levels among university students, suggesting that these findings generalize beyond adolescence (Bibi et al., 2020). Within the Iranian educational context, where emotional expression is often influenced by cultural norms, the role of emotional intelligence may be even more pronounced, serving as a socially sanctioned means of self-regulation (Sigarchi et al., 2021).

Moreover, the findings align with intervention-based studies that have shown the effectiveness of emotional intelligence training in reducing disruptive behaviors in schools. For instance, Schonert-Reichl and colleagues implemented a mindfulness-based emotional learning program that significantly enhanced social-emotional competencies while reducing aggressive behavior among

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elementary students (Schonert-Reichl et al., 2014). Likewise, Abdulmalik et al. demonstrated that problem-solving interventions, when combined with emotional skill development, led to a substantial reduction in aggressive behavior among Nigerian students (Abdulmalik et al., 2016). The current findings strengthen this intervention logic by providing a structural model that quantitatively illustrates how cognitive and emotional competencies interact to mitigate aggression.

Interestingly, emotional intelligence was found to have the strongest individual predictive power on aggression compared to the other variables. This reinforces assertions by Wang and Kong that emotional intelligence contributes significantly to mental well-being by buffering the effects of stress and reducing the propensity for maladaptive responses such as aggression (Wang & Kong, 2014). In a similar vein, Khan et al. observed that emotional intelligence plays a critical role in psychological well-being and helps in managing behavioral difficulties among young adults (Khan et al., 2025). These converging lines of evidence validate the use of emotional intelligence as both a diagnostic and interventional target in adolescent behavioral management.

The findings also contribute to a growing body of literature that emphasizes the importance of integrating emotional and cognitive training in educational settings. Studies by Faraji et al. and Jaloudari et al. have highlighted the interconnectedness of emotional intelligence, self-esteem, and social adjustment among adolescents (Faraji et al., 2017; Jaloudari et al., 2016). These psychosocial dimensions are not only crucial for reducing behavioral risks but also for enhancing academic performance, resilience, and interpersonal relationships. As Ergin et al. noted, emotional intelligence and problem-solving abilities are mutually reinforcing, with each enhancing the other's effectiveness in real-life decision-making and stress management (Ergin et al., 2020).

Despite its valuable insights, this study has several limitations. First, the sample was restricted to male secondary school students from Ahvaz, which limits the generalizability of the findings to other regions, age groups, or female students. Second, the use of self-report instruments may have introduced social desirability bias, especially in measuring aggression, where underreporting is common. Third, the cross-sectional design restricts causal inferences. Longitudinal or experimental designs would be better suited to determine directional effects and the stability of the mediating role of emotional intelligence over time.

Future research should expand the demographic diversity of the sample to include female students and participants from various regions and educational levels to test the cross-cultural validity of the proposed model. Additionally, future studies could adopt multi-method data collection strategies, such as teacher ratings or behavioral observations, to triangulate self-reported aggression data. Researchers should also explore moderating variables, such as parenting styles, peer relationships, or school climate, which may influence the strength or direction of the observed relationships. Longitudinal designs could further clarify developmental trajectories and the lasting impact of interventions targeting cognitive-emotional integration.

In practice, educational policymakers and school psychologists should consider integrating structured emotional intelligence training with cognitive problem-solving curricula as part of life skills education. Programs should be tailored to enhance students' emotional self-awareness, impulse control, and interpersonal effectiveness alongside logical reasoning skills. Early identification of students with avoidant problem-solving tendencies or low emotional regulation could allow for targeted interventions, preventing the escalation of aggressive behaviors. Such initiatives, when implemented consistently, have the potential to transform school environments into emotionally safe and cognitively enriching spaces that support holistic adolescent development.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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