Original Article

Effectiveness of peer group-based psychosocial empowerment training on high-risk behaviors in male secondary school Students at risk for behavioral issues

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Abstract

Background: Adolescence is a critical developmental stage where high-risk behaviors can jeopardize well-being and future outcomes. This study evaluated the efficacy of peer group-based psychosocial empowerment training in reducing high-risk behaviors among male secondary school students at risk for behavioral issues in Tehran, Iran.

Methods: This quasi-experimental study employed a two-group, pre-test, post-test, and three-month follow-up design with a control group. A purposeful sample of 40 at-risk male students, identified through teacher reports and a high-risk behaviors questionnaire, was randomly assigned to a peer-led experimental group (n=20) or a wait-listed control group (n=20). The experimental group received eight 90-minute sessions of psychosocial empowerment training facilitated by trained peers. Data were collected using a validated high-risk behaviors questionnaire (42 items, seven subscales). Repeated measures ANOVA and Bonferroni post-hoc tests were used to analyze group differences over time, with effect sizes (η^2) reported.

Results: The peer-led intervention significantly reduced high-risk behaviors, including cigarette/hookah use, alcohol/substance consumption, aggressive behaviors, suicidal ideation/attempts, running away, and opposite-sex relationships ($F=59.22$, $P<0.001$, $\eta^2=0.61$, 95% CI [14.63, 22.83] for total score). These reductions were sustained at the three-month follow-up, indicating a robust effect of the intervention on vulnerable adolescents.

Conclusion: This study demonstrates the efficacy of peer group-based psychosocial empowerment training as an effective strategy for reducing high-risk behaviors among at-risk male adolescents. The findings support the integration of peer-led interventions into school-based mental health programs to enhance resilience and promote positive youth development.

Keywords: Adolescent health; Empowerment; Peer group; Risk reduction behavior.

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Introduction

Adolescence, spanning approximately ages 10 to 19, is a period of significant cognitive, emotional, and social development critical for identity formation (1). However, it is also characterized by vulnerabilities that can lead to high-risk behaviors, particularly among at-risk male adolescents. These vulnerabilities include exposure to adverse childhood experiences (e.g., trauma, neglect), socioeconomic challenges, family dysfunction, and peer pressure, which may

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precipitate psychological distress, low self-esteem, and maladaptive coping (2, 3). For this study, at-risk adolescents are defined as those exhibiting early indicators of high-risk behaviors, such as substance use, aggression, or disengagement from school, identified through teacher reports and validated screening tools. Without timely intervention, these behaviors can lead to long-term consequences, including academic failure, mental health disorders, and reduced life opportunities (4). Addressing these challenges requires a nuanced understanding of adolescents' developmental needs and socio-cultural contexts.

High-risk behaviors during adolescence encompass actions that threaten physical, mental, or social well-being. These behaviors, often rooted in psychological distress or social maladjustment, include substance use (e.g., cigarettes, hookah, alcohol, illicit drugs), aggression, suicidal ideation or attempts, running away from home, and risky interpersonal relationships (5, 6). Such behaviors are influenced by peer dynamics, media exposure, family environment, school climate, and individual traits (7, 8). Their immediate impacts include academic decline and legal issues, while long-term consequences involve chronic health problems, reduced educational attainment, unemployment, and increased criminal justice involvement (9). The theoretical foundation for addressing these behaviors lies in psychosocial empowerment, which emphasizes fostering agency, self-efficacy, and resilience. Peer-led interventions, grounded in social learning theory, leverage the influence of peers to promote positive behaviors, making them particularly effective for adolescents. Despite the global prevalence of adolescent health programs, few studies have examined peer-led psychosocial empowerment training specifically for at-risk male adolescents in non-Western contexts, such as Iran, where cultural and social dynamics shape behavioral patterns (10). This study addresses this gap by evaluating a peer-led intervention tailored to this population, contributing to the evidence base for culturally sensitive approaches.

Psychosocial empowerment is a process through which individuals gain control over their lives, develop agency, and enhance decision-making capacity to promote well-being. In adolescents, empowerment training focuses on building life skills such as problem-solving, critical thinking, communication, emotional regulation, and resistance to negative influences. These skills foster an internal locus of control, boost self-efficacy, and strengthen resilience against social pressures (11). Programs based on empowerment principles aim to enhance personal strengths, build social support networks, and promote a positive self-concept, enabling adolescents to navigate challenges and make healthy choices (12).

The use of peer groups in psychosocial empowerment training is a powerful strategy. Adolescents are highly influenced by peers, who serve as key sources of support and identity formation (13). Peer-led interventions capitalize on this dynamic by using trained peers to deliver content and facilitate discussions, enhancing relatability and reducing perceived judgment. Peer educators, sharing similar experiences, model positive behaviors and provide credible insights into adolescent challenges (14). Research shows peer-led programs are effective in promoting health behaviors, reducing substance use, and fostering social-emotional learning, often matching or exceeding adult-led interventions due to their authenticity and credibility (15, 16).

Despite the documented efficacy of empowerment-based and peer-led approaches, there remains a critical need for culturally tailored interventions targeting high-risk male adolescents in unique socio-cultural settings like Tehran, Iran. Prior studies have often focused on general adolescent populations or adult-led programs, leaving a gap in understanding

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the effectiveness of peer-led models in non-Western contexts (17, 18). This study evaluates a peer group-based psychosocial empowerment training program designed to reduce high-risk behaviors among at-risk male secondary school students, addressing this research gap and informing school-based mental health strategies.

Methods

This study employed a quasi-experimental design with a two-group, pre-test, post-test, and three-month follow-up structure, including a control group. The target population comprised all male public secondary school students in high-risk areas of Tehran, Iran, during the 2022-2023 academic year. A purposeful sample of 40 at-risk male students was selected from three public secondary schools based on specific inclusion and exclusion criteria. At-risk status was determined using teacher reports of behavioral issues (e.g., aggression, truancy, suspected substance use) and scores above the 75th percentile on the high-risk behaviors questionnaire. Exclusion criteria included diagnosed severe mental disorders (e.g., schizophrenia, bipolar disorder, severe depression) or significant learning disabilities, assessed via school health records and clinical screening by a licensed psychologist. A power analysis indicated that a sample size of 40 was sufficient to detect a medium effect size (η^2=0.14) with 80% power at α=0.05. Participants were randomly assigned to the experimental (n=20) or control group (n=20) using a computer-generated random number sequence, with allocation concealed from participants and school staff to minimize bias. Ethical approval was obtained from the Institutional Review Board of Islamic Azad University under code IR.IAU.QOM.REC.1403.149. Informed consent was obtained from parents/guardians through written forms sent home, and assent was secured from participants via verbal and written agreement during an initial meeting, with procedures clearly explained in age-appropriate language. Participants were assured of confidentiality and their right to withdraw at any time.

Instrument

High-Risk Behaviors Questionnaire: Data were collected using a 42-item high-risk behaviors questionnaire, designed to assess seven subscales: cigarette and hookah use (6 items, e.g., “How often do you smoke cigarettes?”), alcohol consumption (6 items, e.g., “Have you consumed alcohol in the past month?”), psychoactive substance use (6 items), aggressive behaviors (6 items, e.g., “How often do you engage in physical fights?”), suicidal thoughts and attempts (6 items, e.g., “Have you thought about harming yourself?”), running away from home (6 items), and relationships with the opposite sex (6 items, e.g., “Do you engage in risky romantic relationships?”). Items are rated on a 5-point Likert scale (1=never, 5=always), yielding a total score from 42 to 210, with higher scores indicating greater engagement in high-risk behaviors. The questionnaire, originally developed in Persian, demonstrated strong psychometric properties in this sample (Cronbach’s α=0.89, construct validity confirmed via factor analysis) and has been validated in Iranian adolescent populations (19). No adaptations or translations were required, as the instrument was culturally appropriate for the study context.

Intervention

Peer group-based psychosocial empowerment training: The experimental group participated in an eight-week program of weekly 90-minute sessions delivered by trained peer facilitators. The intervention followed a structured manual to ensure fidelity, with content outlined in Table 1. Peer facilitators were selected based on leadership skills, positive behavior, and relatability, identified through teacher nominations and peer surveys. They underwent a 20-hour training program over two weeks, covering group

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facilitation, active listening, communication, crisis response, and ethical considerations, delivered by a clinical psychologist. To ensure consistency, sessions were monitored by a research assistant, and fidelity checklists were completed weekly. The control group, wait-listed during the study, received standard school curriculum without additional psychosocial support but was offered the intervention post-study to address ethical concerns regarding withholding treatment from at-risk youth.

Data Analysis

Data were analyzed using SPSS version 25. Descriptive statistics (means, standard deviations) summarized sample characteristics and baseline behaviors. Repeated measures ANOVA assessed changes in high-risk behaviors over time within and between groups, with partial eta-squared (η^2) as the effect size measure. Assumptions of normality (Shapiro-Wilk test) and homogeneity of variance (Levene's test) were confirmed, and sphericity was verified (Mauchly's test, $p>0.05$). Significant F-statistics prompted Bonferroni post-hoc tests to identify specific group and time differences. Confidence intervals (95%) were calculated for mean differences. Significance was set at $P<0.05$.

Table 1. Summary of psychosocial empowerment training sessions (peer-led)

Session	Objectives	Core activities & content
1	Establish group rules and safety; foster trust and rapport; introduce empowerment concept.	Welcome and ice-breaker activities; discussion of confidentiality and group norms; introduction to the concept of personal strengths and collective support; setting individual and group goals for the program.
2	Enhance understanding of personal emotions and their triggers; develop healthy coping strategies.	Identifying different emotions; discussing the link between thoughts, feelings, and behaviors; practicing deep breathing and mindfulness techniques; introducing strategies for managing anger, anxiety, and sadness.
3	Develop skills to critically evaluate situations; improve rational decision-making processes.	Analyzing common scenarios involving peer pressure or risky choices; brainstorming pros and cons of different actions; introducing a step-by-step decision-making model; discussing consequences of impulsive behaviors.
4	Improve verbal and non-verbal communication; practice assertive refusal and expression of needs.	Role-playing challenging conversations (e.g., saying no to substances); distinguishing between passive, aggressive, and assertive communication; practicing "I" statements; active listening exercises.
5	Educate on risks of tobacco/alcohol/drugs; strengthen resistance skills against peer pressure.	Discussion on immediate and long-term health, social, and legal consequences of cigarette, hookah, alcohol, and psychoactive substance use; role-playing refusal strategies in various social settings; exploring alternatives to substance use for stress relief and fun.
6	Develop strategies for anger management; learn constructive conflict resolution techniques.	Identifying triggers for aggressive behavior; practicing "time-out" and de-escalation techniques; role-playing conflict resolution scenarios without violence; discussing empathy and perspective-taking in conflicts.
7	Address suicidal thoughts/running away; identify signs of distress; enhance help-seeking behaviors.	Open discussion on feelings of hopelessness or thoughts of self-harm/running away (in a safe context); identifying trusted adults/resources for support; understanding that help is available; developing a personal safety plan; exploring healthy ways to cope with severe stress.
8	Promote healthy social interactions; discuss safe online/offline relationships; reinforce learned skills.	Discussion on characteristics of healthy vs. unhealthy relationships (including with opposite sex); safe online behavior; reviewing all learned psychosocial skills; planning for future challenges; celebrating progress and reinforcing commitment to positive behaviors.

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Results

Forty participants were systematically allocated to an experimental group (n=20) and a control group (n=20). The mean age and standard deviation for the experimental group were 14.35±0.75 years, while the control group had a mean age of 14.10±0.97 years. In terms of educational status, the experimental group comprised 2 seventh-grade, 6 eighth-grade, and 12 ninth-grade students. The control group consisted of 1 seventh-grade, 8 eighth-grade, and 11 ninth-grade students. As detailed in Table 2, mean scores for high-risk behavior subscales and the total score were calculated for both groups across three phases: pre-test, post-test, and follow-up. A notable decrease in these scores was observed in the experimental group at both the post-test and follow-up phases. Conversely, no significant changes were documented within the control group during these same assessment periods (Table 2).

Following preliminary analyses, a meticulous assessment of the assumptions for repeated measures ANOVA was conducted. The Shapiro-Wilk test confirmed the data's normal distribution. Levene's test was then employed to evaluate the homogeneity of variance across groups and assessment phases, revealing no statistically significant variance in error scores for any subscales or the total score, thus meeting this crucial assumption. Additionally, Mauchly's test of sphericity yielded non-significant results for all variables, indicating that the sphericity assumption was also met. Consequently, the data were analyzed using repeated measures ANOVA. The comprehensive results of the multivariate analysis, which examined the effect of the peer group-based psychosocial empowerment training on high-risk behaviors, are presented in Table 3.

In addition to significant main effects for both group and time, the interaction effect between these factors was also significant for several high-risk behavior subscales and the total score, as shown in Table 3. Significant interactions were noted for aggressive behaviors ($F=13.80$, $P=0.001$, $\eta^2=0.27$), running away ($F=13.23$, $P=0.001$, $\eta^2=0.26$), relationships with the opposite sex ($F=13.23$, $P=0.001$, $\eta^2=0.26$), suicidal thoughts and attempts ($F=12.84$, $P=0.001$, $\eta^2=0.25$), cigarette and hookah use ($F=23.93$, $P=0.001$, $\eta^2=0.39$), alcohol consumption ($F=12.11$, $P=0.001$, $\eta^2=0.24$), psychoactive substance use ($F=12.99$, $P=0.001$, $\eta^2=0.25$), and the total score ($F=59.22$, $P=0.001$, $\eta^2=0.61$).

Table 2. Mean and standard deviation (Mean ± SD) of subscales and total score of high-risk behaviors across three assessment phases

Variable	Group	Pre-test	Post-test	Follow-up
Aggressive behaviors	Experimental	18.25 ± 2.84	11.90 ±2.22	12.70 ± 1.87
	Control	19.35 ± 2.98	18.41 ± 2.58	18.90 ± 2.67
Running away	Experimental	14.32 ± 3.30	9.35 ± 1.89	9.68 ± 1.89
	Control	13.40 ± 2.64	13.80 ± 1.91	13.85 ± 2.08
Relationships with opposite sex	Experimental	12.70 ± 2.58	8.85 ± 1.53	9.60 ± 1.85
	Control	12.10 ± 2.38	12.55 ± 1.76	12.67 ± 1.93
Suicidal thoughts & attempts	Experimental	4.95 ± 1.60	1.85 ± 1.14	1.70 ± 1.26
	Control	4.40 ± 1.64	4.45 ± 1.82	4.03 ± 1.65
Cigarette & hookah use	Experimental	23.35 ± 4.02	15.45 ± 3.42	14.85 ± 3.62
	Control	22.65 ± 4.31	23.35 ± 2.74	23.10 ± 2.78
Alcohol consumption	Experimental	15.00 ± 1.83	11.10 ± 2.38	10.90 ± 2.92
	Control	15.09 ± 2.34	15.80 ± 2.02	15.65 ± 2.39
Psychoactive substance use	Experimental	16.55 ± 2.96	10.25 ± 2.57	9.55 ± 2.21
	Control	18.20 ± 3.12	16.85 ± 2.56	16.78 ± 2.67
Total score	Experimental	106.15 ± 9.59	68.75 ± 8.38	69.10 ± 7.25
	Control	105.20 ± 10.68	105.15 ± 8.39	105.00 ± 7.52

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The substantial effect sizes, particularly for the total score (η^2=0.61) and subscales such as cigarette and hookah use (η^2=0.71) and psychoactive substance use (η^2=0.71), indicate a large practical impact of the intervention. These values suggest that the peer-led psychosocial empowerment training accounted for a significant proportion of the variance in reduced high-risk behaviors, implying meaningful improvements in participants' behavioral outcomes. For instance, the large effect size for the total score (η^2=0.61) reflects a robust reduction in overall high-risk behaviors, which could translate to decreased engagement in activities like substance use and aggression, potentially lowering associated risks such as academic failure or legal issues in real-world settings.

The findings suggest that the psychosocial empowerment training had a substantial effect on these behaviors.

As presented in Table 4, the Bonferroni post-hoc test revealed statistically significant mean differences in high-risk behavior scores from the pre-test to the post-test and from the pre-test to the follow-up phases (P<0.01). However, no significant difference was found between the post-test and follow-up phases. The peer-led psychosocial empowerment training effectively reduced mean scores for all subscales and total high-risk behaviors, with these reductions maintained at the follow-up assessment. The sustained decrease in mean scores suggests that the positive effects of the intervention persisted beyond its completion. Thus, the findings confirm that peer-led psychosocial empowerment training is an effective method for reducing high-risk behaviors in at-risk male students.

Discussion

This study rigorously evaluated the efficacy of a peer group-based psychosocial empowerment training program in mitigating high-risk behaviors among at-risk male secondary school students.

Table 3. Results of repeated measures ANOVA on the effect of the independent variable on high-risk behaviors

Variable	Source	MS	EMS	F	P	η^2
Aggressive behaviors	Group	630.21	242.45	98.78	0.001	0.72
	Time	180.00	245.95	27.81	0.001	0.42
	Group × Time	182.32	502.20	13.80	0.001	0.27
Running away	Group	195.08	185.92	39.88	0.001	0.51
	Time	88.20	273.75	12.24	0.001	0.24
	Group × Time	184.20	441.93	15.84	0.001	0.29
Relationships with opposite sex	Group	126.08	170.25	28.14	0.001	0.43
	Time	32.51	182.38	6.77	0.013	0.15
	Group × Time	107.45	380.60	13.23	0.001	0.26
Suicidal thoughts & attempts	Group	63.08	90.52	26.48	0.001	0.41
	Time	66.61	88.28	27.68	0.001	0.43
	Group × Time	60.45	178.93	12.84	0.001	0.25
Cigarette & hookah use	Group	795.68	326.78	92.53	0.001	0.71
	Time	324.01	434.98	28.31	0.001	0.43
	Group × Time	513.95	816.17	23.93	0.001	0.39
Alcohol consumption	Group	304.01	175.65	65.76	0.001	0.63
	Time	63.01	218.38	10.97	0.002	0.22
	Group × Time	142.62	447.50	12.11	0.001	0.24
Psychoactive substance use	Group	806.01	330.78	92.59	0.001	0.71
	Time	348.61	346.27	38.26	0.001	0.50
	Group × Time	189.72	555.17	12.99	0.001	0.25
Total score	Group	17021.01	8278.35	78.11	0.001	0.66
	Time	6975.11	2814.88	94.16	0.001	0.71
	Group × Time	9201.62	5904.60	59.22	0.001	0.61

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Table 4. Results of Bonferroni post-hoc test for pairwise comparisons of time effects on high-risk behaviors

Variable	Time Points	Mean Difference	SE	P	95% CI
Aggressive behaviors	Pre-test and Post-test	3.68	0.64	0.001	[2.33, 5.03]
	Pre-test and Follow-up	3.00	0.56	0.001	[1.84, 4.16]
	Post-test and Follow-up	0.68	0.51	0.579	[-0.37, 1.73]
Running away	Pre-test and Post-test	2.30	0.56	0.001	[1.14, 3.46]
	Pre-test and Follow-up	2.10	0.60	0.001	[0.88, 3.32]
	Post-test and Follow-up	-0.20	0.45	0.999	[-1.12, 0.72]
Relationships with opposite sex	Pre-test and Post-test	1.70	0.44	0.001	[0.79, 2.61]
	Pre-test and Follow-up	1.28	0.49	0.039	[0.29, 2.27]
	Post-test and Follow-up	0.43	0.42	0.952	[-0.43, 1.29]
Suicidal thoughts & attempts	Pre-test and Post-test	1.53	0.35	0.001	[0.80, 2.26]
	Pre-test and Follow-up	1.83	0.31	0.001	[1.19, 2.47]
	Post-test and Follow-up	0.30	0.31	0.999	[-0.34, 0.94]
Cigarette & hookah use	Pre-test and Post-test	3.60	0.65	0.001	[2.23, 4.97]
	Pre-test and Follow-up	4.03	0.76	0.001	[2.47, 5.59]
	Post-test and Follow-up	0.43	0.79	0.999	[-1.18, 2.04]
Alcohol consumption	Pre-test and Post-test	1.60	0.52	0.011	[0.52, 2.68]
	Pre-test and Follow-up	1.78	0.54	0.006	[0.67, 2.89]
	Post-test and Follow-up	0.18	0.57	0.999	[-0.99, 1.35]
Psychoactive substance use	Pre-test and Post-test	3.83	0.60	0.001	[2.61, 5.05]
	Pre-test and Follow-up	4.18	0.68	0.001	[2.79, 5.57]
	Post-test and Follow-up	0.35	0.53	0.999	[-0.73, 1.43]
Total score	Pre-test and Post-test	18.73	2.16	0.001	[14.63, 22.83]
	Pre-test and Follow-up	18.68	1.93	0.001	[14.77, 22.59]
	Post-test and Follow-up	0.05	1.81	0.999	[-3.67, 3.77]

The findings unequivocally demonstrate that the intervention significantly reduced a wide spectrum of high-risk behaviors, encompassing aggressive conduct, instances of running away from home, engagement in precarious relationships, suicidal ideation and attempts, and various forms of substance use (specifically, cigarettes, hookah, alcohol, and psychoactive drugs). This reduction was evident in both individual behavioral subscales and the overall composite score for high-risk behaviors within the experimental group when compared to the control group. The observed significant interaction effect between group and time robustly underscores the specific effectiveness of the peer-led program in fostering positive and sustained behavioral change, which was notably maintained at the follow-up assessment.

The discernible reduction in high-risk behaviors can be largely ascribed to the fundamental principles underpinning psychosocial empowerment. The training curriculum was meticulously designed to furnish adolescents with an essential repertoire of life skills, including, but not limited to, enhanced self-awareness, improved emotional regulation capabilities, sharpened critical thinking, and the development of more effective communication strategies. By cultivating an internalized locus of control and substantially bolstering self-efficacy, the program effectively empowered participants to exert greater agency over their decisions and actions (20, 21). When adolescents perceive themselves as capable of adeptly navigating challenging situations and resiliently resisting adverse external influences, they are demonstrably less prone to resorting to maladaptive coping mechanisms, which frequently manifest as high-risk behaviors (22). The significant decrease in critical components such as suicidal thoughts and aggressive behaviors directly reflects an augmented capacity for emotional self-regulation and the judicious adoption of more constructive, rather than

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reactive or destructive, problem-solving approaches (23).

A particularly salient and influential aspect contributing to this study's success resides in its peer-led delivery model. Adolescence, by its very nature, is fundamentally characterized by the profound and pervasive influence of peer relationships, wherein peers serve as pivotal conduits for social learning, indispensable sources of support, and crucial facilitators of identity validation (24). By strategically leveraging this inherent and potent social dynamic, the trained peer facilitators, sharing similar developmental stages and lived experiences with the participants, cultivated an environment of heightened relatability and significantly reduced perceived judgment. This conducive atmosphere fostered greater openness, enhanced trust, and rendered the educational content more resonant and impactful for the participants. While this study did not directly compare the peer-led model to adult-led interventions, the positive outcomes observed here align with prior research suggesting that peer educators possess a unique capacity to effectively model positive behaviors and offer credible, empathetic insights into managing the multifaceted challenges inherent to adolescence from a deeply lived perspective (25, 26). The sustained positive changes observed in the follow-up phase further corroborate the enduring power of this peer-mediated influence, strongly suggesting that the skills, positive norms, and adaptive behaviors internalized within the peer-led group are more profoundly integrated and maintained over extended periods.

While the observed reductions in high-risk behaviors are attributed to the psychosocial empowerment principles embedded in the peer-led intervention, alternative explanations warrant consideration. For instance, the structured group setting and regular interaction with peers could have fostered social bonding or accountability, independently contributing to behavioral changes. Additionally, the Hawthorne effect, where participants modify their behavior due to awareness of being observed, could have influenced the results. However, the study’s quasi-experimental design, with a control group receiving no intervention, strengthens the attribution to empowerment principles. The sustained effects at the three-month follow-up further support this, as transient effects like the Hawthorne effect typically diminish over time. The targeted focus on empowerment skills, such as emotional regulation and decision-making, directly aligns with the observed outcomes, making these principles the most plausible explanation for the intervention’s success (20, 21).

These findings align with an expanding body of scholarly literature that supports the efficacy of empowerment-based approaches and peer-led interventions in the realm of adolescent health promotion. Prior research has highlighted how psychosocial empowerment can considerably enhance resilience and fortify protective factors against various adversities encountered during development (21). Concomitantly, numerous studies have consistently demonstrated the effectiveness of peer education in diverse domains, including substance abuse prevention and the promotion of mental well-being (23, 26). The current study, by focusing on a comprehensive array of high-risk behaviors within a vulnerable male adolescent population, empirically confirms the holistic and multifaceted benefits inherent in such an integrative approach.

This study's findings suggest that the peer-led psychosocial empowerment program may contribute to a reduction in high-risk behaviors among at-risk male secondary school students. The execution of this study within the specific socio-cultural context of Tehran, Iran, furnishes invaluable context-specific empirical evidence. Cultural nuances, deeply embedded societal values, and intricate social dynamics can

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profoundly influence both adolescent behavioral patterns and, critically, the overall effectiveness of intervention strategies (27). The demonstrated success of this program within this unique context strongly suggests its inherent cultural adaptability and indicates its considerable potential for broader implementation in analogous cultural settings. The substantial and enduring societal costs intrinsically linked to untreated high-risk behaviors, encompassing elevated healthcare burdens, significantly diminished economic productivity resulting from unfulfilled potential, and pervasive social instability, collectively underscore the urgent and undeniable necessity for robust, evidence-based preventive and ameliorative strategies (28). The compelling positive results emanating from this research consequently offer a promising and viable pathway for the strategic design and subsequent implementation of targeted, culturally sensitive, and sustainable intervention programs specifically tailored for at-risk youth populations globally. For instance, future programs may consider incorporating a similar peer-led format within existing school-based mental health services.

A number of limitations should be considered when interpreting these results. The relatively small sample size and a specific focus on male students in Tehran limit the generalizability of the findings to broader populations, including female adolescents or those from different cultural backgrounds. Furthermore, reliance primarily on self-report measures for assessing high-risk behaviors could potentially introduce response bias, such as underreporting of sensitive behaviors. The study also lacked blinding, which may have influenced participant responses or facilitator behavior. The short follow-up period (e.g., three months) also precludes definitive conclusions about the long-term sustainability of the observed behavioral changes. Future research should endeavor to incorporate larger, more diverse samples and utilize multiple, objective assessment methods to enhance methodological rigor, and extend the follow-up period to better understand the durability of the intervention's effects.

Conclusion

This study provides evidence that peer group-based psychosocial empowerment training is associated with significant reductions in high-risk behaviors among at-risk male adolescents, with sustained effects at three-month follow-up. The intervention’s focus on life skills and peer-led delivery offers a promising approach for school-based mental health programs. While not yet ready for large-scale implementation, the program shows potential for replication in similar socio-cultural contexts. Future research should refine the intervention through larger trials, incorporate objective measures, and explore scalability within school systems to inform policy and practice.

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Authors’ contribution

AR contributed to the study design, data collection, and drafting of the manuscript. NM supervised the overall project, including intervention development, statistical analysis, and critical revision of the manuscript. MZ contributed to the literature review, participant screening, and interpretation of results. All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Ethical considerations

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Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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