sKMANPUB | AI and Tech in Behavioral and Social Sciences Vol. 4 No. 1 (2026): 1-7

Article history:
Received 26 April 2025
Revised 19 June 2025
Accepted 25 June 2025
Published online 01 July 2025

The Effectiveness of a Digital Art-Based Social-Emotional Learning (SEL) Program on Reducing Aggression in Elementary School Students: An Intervention Study

Athar Rafati[1], Seyedeh Nafiseh Mohseni Mansour[2*], Hanieh Abbasi[3], Mehrnoosh Ranjbar[4], Fakhri Sadat Hosseini[5]

[1] Department of Psychology, Am.C., Islamic Azad University, Amol, Iran
[2] Department of Clinical Psychology, SR.C., Islamic Azad University, Tehran, Iran
[3] Department of Clinical Psychology, SR.C., Islamic Azad University, Tehran, Iran
[4] Department of Positive Psychology, Payame Noor University, Tehran, Iran
[5] Department of Psychology and Counseling, Faculty of Physical Education and Behavioral Sciences, Farhangian University, Tehran, Iran

*** Corresponding author email address**: mohsenimansournafiseh@gmail.com

A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Rafati, A., Mohseni Mansour, S. N., Abbasi, H., Ranjbar, M., & Hosseini, F. S. (2026). The Effectiveness of a Digital Art-Based Social-Emotional Learning (SEL) Program on Reducing Aggression in Elementary School Students: An Intervention Study. *AI and Tech in Behavioral and Social Sciences, 4*(1), 1-7. https://doi.org/10.61838/kman.aitech.5307

A B S T R A C T

Aggression during the early school years interferes with peer relationships, classroom adjustment, and academic functioning. School-based social-emotional learning (SEL) programs can reduce behavioral problems, yet children may benefit most from formats that are developmentally engaging and expressive. This study examined whether a digital art-based SEL program could reduce aggression in second-grade students.A quasi-experimental pretest-posttest design with a control group was used. Fifty-two second-grade students from public elementary schools in Mazandaran Province, Iran, were selected through cluster sampling and assigned to an experimental group (n = 28) or a control group (n = 24). Aggression was assessed at baseline and post-intervention using the Persian version of the Buss-Perry Aggression Questionnaire. The experimental group participated in an eight-week intervention comprising 16 sessions (two 60-minute sessions per week) integrating CASEL-based SEL competencies with digital art activities, whereas the control group continued routine instruction. Descriptive statistics and mixed-design ANOVA were used for analysis. The groups were comparable at baseline on demographic characteristics and aggression scores. From pretest to posttest, the experimental group showed marked reductions in total aggression (47.85 ± 5.20 to 31.80 ± 4.50), physical aggression (12.45 ± 2.10 to 8.30 ± 1.85), verbal aggression (11.80 ± 2.40 to 7.50 ± 1.90), anger (13.10 ± 2.60 to 9.20 ± 2.10), and hostility (10.50 ± 2.30 to 6.80 ± 1.70), whereas changes in the control group were small. Mixed ANOVA showed a significant group × time interaction for total aggression, $F(1, 50) = 26.07$, $p = .001$, $\eta^2 = .34$, as well as for physical aggression, $F(1, 50) = 22.15$, $p = .001$, $\eta^2 = .31$; verbal aggression, $F(1, 50) = 18.92$, $p = .001$, $\eta^2 = .27$; anger, $F(1, 50) = 24.56$, $p = .001$, $\eta^2 = .33$; and hostility, $F(1, 50) = 19.45$, $p = .001$, $\eta^2 = .28$. A digital art-based SEL program appears to be an effective and engaging school-based approach for reducing aggression in elementary school students. Larger multi-site studies with follow-up assessments are recommended.

Keywords: *Aggression; Digital Art; Elementary School Students; Intervention; Social-Emotional learning*

1. Introduction

Aggression in childhood is a clinically and educationally important problem because it is associated with peer rejection, classroom disruption, lower school adjustment, and risk for later externalizing difficulties. Developmental theories of social information processing indicate that aggressive behavior is shaped by maladaptive patterns of emotion processing, hostile attributional biases, and weak self-regulation (Crick & Dodge, 1994). Accordingly, prevention efforts in the school context increasingly target emotional competence and interpersonal functioning rather than relying exclusively on punitive or reactive approaches. Social-emotional learning (SEL) provides one of the most established frameworks for preventive school-based intervention. SEL programs are designed to improve self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. A large meta-analysis of school-based SEL interventions found that these programs improve social behavior, emotional skills, and academic performance while reducing conduct problems and emotional distress (Durlak et al., 2011). Follow-up evidence has shown that the benefits of SEL can persist over time (Taylor et al., 2017), and early social competence has meaningful long-term public health implications (Jones et al., 2015).

At the same time, the success of SEL depends partly on how it is delivered. Young children often find it difficult to verbalize complex internal states and may engage more readily with concrete, active, and visually mediated learning experiences. Emotional competence in the early school years is deeply connected to school readiness and behavioral adjustment (Denham, 2006). For this reason, expressive approaches that allow children to externalize feelings and practice regulation in an age-appropriate form may strengthen the impact of SEL content. Art-based approaches offer a useful complement to SEL because art making can facilitate emotional expression, psychological distance from distressing feelings, and reflective processing. Reviews of art therapy indicate that visual expression can support self-understanding and behavioral adjustment, especially when verbal communication is limited or emotionally demanding (Malchiodi, 2012; Slayton et al., 2010). Experimental evidence has also shown that art making can reduce physiological stress and improve subjective well-being (Kaimal et al., 2016). In educational contexts, creative production may therefore serve as a practical route for translating emotional concepts into behaviorally meaningful experiences for children.

Digital delivery further extends these possibilities. Digital mental health interventions for children and adolescents have attracted growing attention because they can be engaging, scalable, and adaptable to school settings (Hollis et al., 2017). Although the evidence base remains heterogeneous, systematic review findings suggest that digital interventions can support emotional and behavioral outcomes in young people when they are theory-driven and developmentally appropriate (Garrido et al., 2019). Digital art activities may be especially relevant because they combine expression, play, repetition, immediate feedback, and opportunities for revision, all of which can reinforce self-regulation and cooperative problem solving. Despite these theoretical advantages, relatively few intervention studies have specifically examined digital art integrated with a structured SEL framework as a strategy for reducing aggression in elementary school students. The present study addressed this gap by evaluating an eight-week digital art-based SEL program among second-grade students. It was hypothesized that, relative to the control group, students in the experimental group would show greater reductions in total aggression and in the subdomains of physical aggression, verbal aggression, anger, and hostility.

2. Methods and Materials

2.1. Study Design and Participants

This study used a quasi-experimental pretest-posttest design with a control group. The sample consisted of 52 second-grade students recruited through cluster sampling from public elementary schools in Mazandaran Province, Iran. Twenty-eight students were assigned to the experimental group and 24 to the control group. The mean age of participants was 7.82 years (SD = 0.41) in the experimental group and 7.75 years (SD = 0.38) in the control group. Eligibility criteria included enrollment in the second grade, parental consent, child willingness to participate, and attendance in the intervention sessions. Students with severe cognitive or communication difficulties that prevented participation in group activities were excluded. The control group continued to receive the regular curriculum during the study period.

AITBSS
AI and Tech in Behavioral and Social Sciences
E-ISSN: 3041-9433

2.2. *Instrument*

Aggression was measured using the Buss-Perry Aggression Questionnaire (Buss & Perry, 1992), which assesses four dimensions: physical aggression, verbal aggression, anger, and hostility. The Persian version of the scale has demonstrated acceptable psychometric properties in Iranian samples (Samani, 2008). Higher scores indicate greater aggression.

2.3. *Intervention*

The intervention lasted eight weeks and included 16 sessions delivered twice weekly for 60 minutes per session. The program was structured around the core SEL competencies and integrated digital art as the main activity format. The intervention was divided into four phases: (1) emotional awareness and self-regulation, (2) empathy and social awareness, (3) responsible decision-making and problem solving, and (4) relationship skills and self-management. Examples of activities included digital "emotion maps," collaborative digital murals, conflict-based digital storytelling, and a digital art gallery in which students presented their work and reflected on their emotional choices and social interactions. These tasks were intended to help students recognize emotions, regulate impulses, practice perspective taking, negotiate with peers, and make constructive decisions in social situations.

2.4. *Procedure and Statistical Analysis*

Both groups completed the aggression questionnaire at pretest and posttest. Descriptive statistics were computed for demographic variables and outcome measures. To evaluate intervention effects, mixed-design analysis of variance (ANOVA) was conducted with group (experimental vs. control) as the between-subjects factor and time (pretest vs. posttest) as the within-subjects factor. Statistical analyses were performed using SPSS version 26.0. A significance level of $p < .05$ was adopted.

3. Findings and Results

As shown in the table 1, the demographic characteristics of the participants indicated that the experimental and control groups were comparable at baseline. No statistically significant between-group differences were found for gender distribution ($\chi^2 = 0.008$, $p = .928$), age ($t = 0.612$, $p = .542$), or parental education ($\chi^2 = 0.15$, $p = .928$). These findings support the baseline equivalence of the two groups on the measured demographic variables.

Table 1

Demographic characteristics of the study participants

Variable	Category	Experimental Group (n = 28)	Control Group (n = 24)	Statistical Test	*p-value*
Gender	Male	15 (53.6%)	13 (54.2%)	$\chi^2 = 0.008$	.928
	Female	13 (46.4%)	11 (45.8%)	df = 1	
Age (years)	Mean (SD)	7.82 (0.41)	7.75 (0.38)	t = 0.612	.542
Parental Education	High school or less	12 (42.9%)	11 (45.8%)	$\chi^2 = 0.15$	.928
	Bachelor's degree	10 (35.7%)	8 (33.3%)	df = 2	
	Master's degree or higher	6 (21.4%)	5 (20.9%)		

Descriptive statistics showed very similar aggression scores in the two groups at pretest (Table 2). After the intervention, the experimental group displayed substantial reductions across all aggression outcomes, whereas the control group showed only minor decreases. For total aggression, the experimental group decreased from 47.85 (SD = 5.20) at pretest to 31.80 (SD = 4.50) at posttest, corresponding to an approximate 33.5% reduction. In contrast, the control group changed from 48.45 (SD = 5.40) to 46.30 (SD = 5.60), a reduction of approximately 4.4%. A similar pattern was evident for physical aggression (33.3% vs. 5.6% reduction), verbal aggression (36.4% vs. 4.6%), anger (29.8% vs. 3.4%), and hostility (35.2% vs. 4.2%).

AITBSS
AI and Tech in Behavioral and Social Sciences
E-ISSN: 3041-9433

Table 2

Descriptive statistics for aggression outcomes at pretest and posttest

Variable	Group	Pretest Mean (SD)	Posttest Mean (SD)
Total Aggression	Experimental	47.85 (5.20)	31.80 (4.50)
Total Aggression	Control	48.45 (5.40)	46.30 (5.60)
Physical Aggression	Experimental	12.45 (2.10)	8.30 (1.85)
Physical Aggression	Control	12.60 (2.25)	11.90 (2.30)
Verbal Aggression	Experimental	11.80 (2.40)	7.50 (1.90)
Verbal Aggression	Control	11.95 (2.35)	11.40 (2.50)
Anger	Experimental	13.10 (2.60)	9.20 (2.10)
Anger	Control	13.25 (2.70)	12.80 (2.80)
Hostility	Experimental	10.50 (2.30)	6.80 (1.70)
Hostility	Control	10.65 (2.40)	10.20 (2.50)

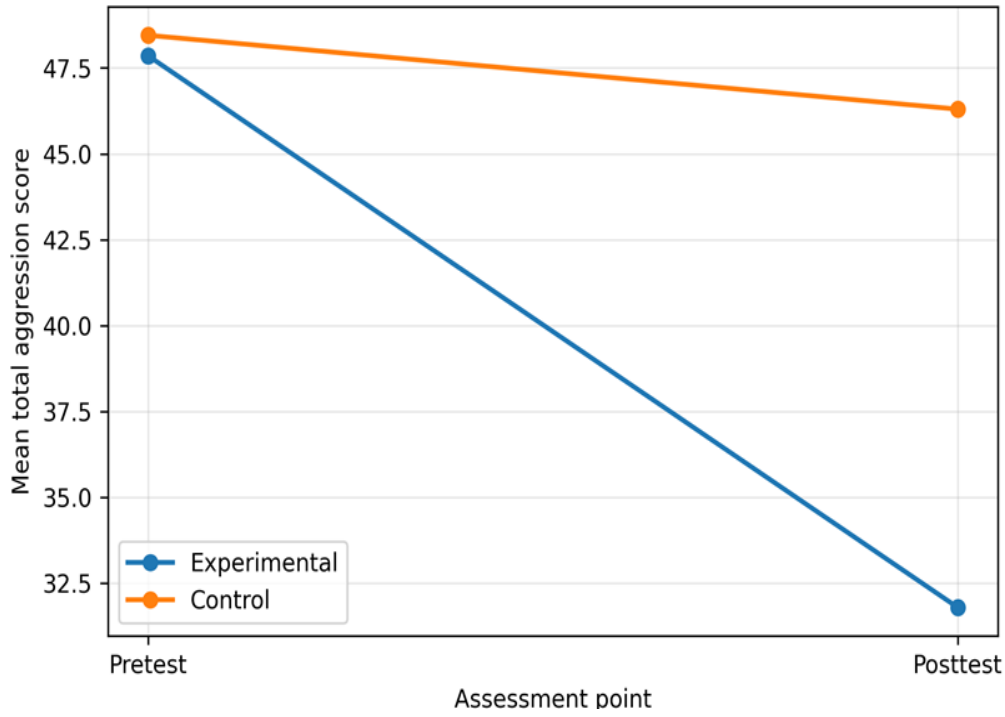

Figure 1. Mean total aggression scores at pretest and posttest by group.

The inferential analyses confirmed that the observed descriptive changes were statistically meaningful. For total aggression, a significant main effect of group was found, $F(1, 50) = 15.42$, $p = .001$, $\eta^2 = .23$, indicating lower aggression overall in the experimental group across measurement occasions. There was also a significant main effect of time, $F(1, 50) = 56.01$, $p = .001$, $\eta^2 = .53$, showing a reduction in aggression from pretest to posttest across the full sample. Most importantly, the group × time interaction was significant, $F(1, 50) = 26.07$, $p = .001$, $\eta^2 = .34$, demonstrating that the decline in aggression was substantially greater in the intervention group than in the control group. Significant interaction effects were likewise observed for physical aggression, $F(1, 50) = 22.15$, $p = .001$, $\eta^2 = .31$; verbal aggression, $F(1, 50) = 18.92$, $p = .001$, $\eta^2 = .27$; anger, $F(1, 50) = 24.56$, $p = .001$, $\eta^2 = .33$; and hostility, $F(1, 50) = 19.45$, $p = .001$, $\eta^2 = .28$. The effect sizes were in the medium-to-large range, indicating meaningful practical effects of the intervention.

AITBSS
AI and Tech in Behavioral and Social Sciences
E-ISSN: 3041-9433

Table 3

Mixed-design ANOVA results for aggression outcomes

Outcome	Effect	Sum of Squares	df	Mean Square	F	η^2	*p-value*
Total Aggression	Between-groups	1,245.60	1	1,245.60	15.42	.23	.001
Total Aggression	Time (pre/post)	4,520.30	1	4,520.30	56.01	.53	.001
Total Aggression	Group × time	2,105.40	1	2,105.40	26.07	.34	.001
Physical Aggression	Group × time	320.50	1	320.50	22.15	.31	.001
Verbal Aggression	Group × time	285.40	1	285.40	18.92	.27	.001
Anger	Group × time	345.20	1	345.20	24.56	.33	.001
Hostility	Group × time	210.80	1	210.80	19.45	.28	.001

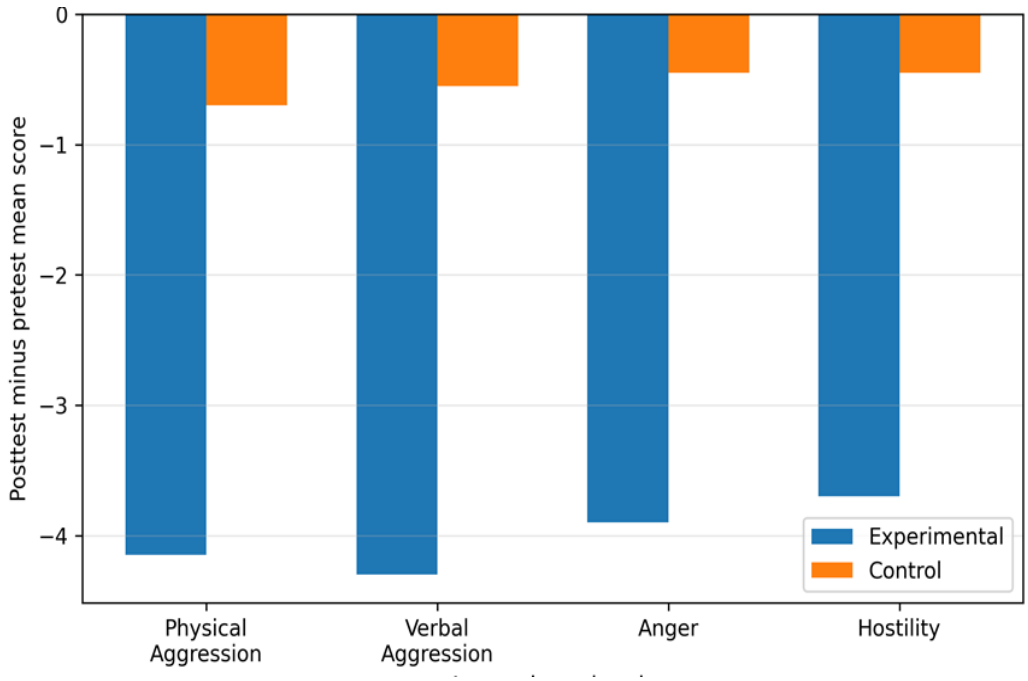

Figure 2

Change in aggression subscale scores from pretest to posttest (posttest minus pretest). More negative values indicate greater improvement.

4. Discussion

The aim of the present study was to determine whether a digital art-based SEL program could reduce aggression in elementary school students. The findings supported this hypothesis. Compared with the control group, students who participated in the intervention showed markedly lower posttest scores for total aggression and all four aggression subscales. The significant group × time interaction for each outcome indicates that the observed changes were not simply due to the passage of time or repeated measurement, but were associated with participation in the intervention. These findings are consistent with the broader literature on school-based SEL. Meta-analytic evidence has shown that SEL programs improve emotional and behavioral adjustment and reduce conduct-related difficulties (Durlak et al., 2011; Taylor et al., 2017). The present study extends this literature by suggesting that embedding SEL content within a digital art format may be particularly useful for young children. For second-grade students, digital art may make SEL concepts more concrete, engaging, and developmentally accessible than exclusively verbal instruction.

AITBSS
AI and Tech in Behavioral and Social Sciences
E-ISSN: 3041-9433

Several mechanisms may explain the intervention effect. First, digital art activities likely functioned as an emotionally expressive medium through which children could externalize feelings and gain distance from anger-provoking experiences. Art-based approaches have long been understood as supportive of affect expression and self-reflection (Malchiodi, 2012; Slayton et al., 2010). Second, the structured SEL content likely strengthened emotional labeling, impulse regulation, empathy, and constructive problem solving. These capacities are central to the prevention of aggressive behavior because difficulties in emotion regulation and social information processing are key contributors to childhood aggression (Crick & Dodge, 1994). Third, the digital format may have increased engagement and motivation, an important issue in school-based intervention delivery (Hollis et al., 2017).

The magnitude of change observed in the experimental group was clinically meaningful. The reduction in total aggression exceeded one-third of the baseline mean, and sizable improvements were also seen across physical aggression, verbal aggression, anger, and hostility. From a school practice perspective, this pattern suggests that the intervention may have influenced both overt behavioral expressions of aggression and the emotional-cognitive processes underlying aggressive responses. Such multidimensional change is important because hostility and anger can precede later interpersonal conflict even when overt aggression is not immediately visible.

The study also has practical implications. Schools often require interventions that are preventive, feasible, and acceptable to children. The current program was delivered within a relatively short time frame and used a format that can be adapted to contemporary educational technologies. If supported by future research, digital art-based SEL could represent a scalable school mental health strategy, particularly in contexts where children may be reluctant to engage with purely discussion-based or therapist-centered methods.

Several limitations should be considered. First, the sample size was modest and drawn from one province, which limits generalizability. Second, no follow-up assessment was reported; therefore, the durability of the intervention effect remains unknown. Third, the study relied on questionnaire-based assessment, and the use of self-report measures in very young children may be influenced by comprehension and response-style limitations, even when assistance is provided. Fourth, the absence of teacher-report, parent-report, or observational measures restricts the breadth of outcome evaluation. Future studies should use larger multi-site samples, longer follow-up periods, and multi-informant assessment strategies to determine whether the gains are sustained and replicated across settings.

Despite these limitations, the results provide preliminary evidence that combining digital art with SEL may be a promising approach for reducing aggression during the early school years. The intervention appears to have supported both emotional regulation and social functioning, which are core developmental targets for school mental health promotion.

5. Conclusion

In conclusion, the present intervention study indicates that a digital art-based SEL program can significantly reduce aggression in elementary school students. Relative to routine instruction, the program was associated with substantial decreases in total aggression, physical aggression, verbal aggression, anger, and hostility. The findings support the use of developmentally engaging, creativity-based SEL approaches in school settings. Additional controlled studies with broader samples and longer follow-up periods are needed to confirm effectiveness and inform implementation.

Authors' Contributions

All authors contributed substantially to the study and to manuscript development, and all approved the final version.

Declaration

Artificial intelligence was used only for language polishing and editorial support during manuscript preparation. No AI tool was used for data collection, statistical analysis, or generation of the study results. The authors reviewed, verified, and take full responsibility for the final content of the manuscript.

Transparency Statement

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

Acknowledgments

The author sincerely appreciates the participants' cooperation.

AITBSS
AI and Tech in Behavioral and Social Sciences
E-ISSN: 3041-9433

Declaration of Interest

The authors report no conflict of interest.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethics Considerations

This study was approved by the institutional ethics committee, and written informed consent was obtained from parents/guardians with assent from participating children. All procedures complied with the Declaration of Helsinki, ensuring voluntary participation, confidentiality, and the right to withdraw at any time.

References

Buss, A. H., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology*, *63*(3), 452-459. https://doi.org/10.1037/0022-3514.63.3.452

Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, *115*(1), 74-101. https://doi.org/10.1037/0033-2909.115.1.74

Denham, S. A. (2006). Social-emotional competence as support for school readiness: What is it and how do we assess it? *Early Education and Development*, *17*(1), 57-89. https://doi.org/10.1207/s15566935eed1701_4

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, *82*(1), 405-432. https://doi.org/10.1111/j.1467-8624.2010.01564.x

Garrido, S., Millington, C., Cheers, D., Boydell, K., Schubert, E., Meade, T., & Nguyen, Q. V. (2019). What works and what doesn't work? A systematic review of digital mental health interventions for depression and anxiety in young people. *Frontiers in Psychiatry*, *10*. https://doi.org/10.3389/fpsyt.2019.00759

Hollis, C., Falconer, C. J., Martin, J. L., Whittington, C., Stockton, S., Glazebrook, C., & Davies, E. B. (2017). Annual research review: Digital health interventions for children and young people with mental health problems-A systematic and meta-review. *Journal of Child Psychology and Psychiatry*, *58*(4), 474-503. https://doi.org/10.1111/jcpp.12663

Jones, D. E., Greenberg, M., & Crowley, M. (2015). Early social-emotional functioning and public health: The relationship between kindergarten social competence and future wellness. *American Journal of Public Health*, *105*(11), 2283-2290. https://doi.org/10.2105/AJPH.2015.302630

Kaimal, G., Ray, K., & Muniz, J. (2016). Reduction of cortisol levels and participants' responses following art making. *Art Therapy*, *33*(2), 74-80. https://doi.org/10.1080/07421656.2016.1166832

Malchiodi, C. A. (2012). *Handbook of art therapy* (2nd ed.). Guilford Press.

Samani, S. (2008). Study of reliability and validity of the Buss and Perry's aggression questionnaire. *Iranian Journal of Psychiatry and Clinical Psychology*, *13*(4), 359-365.

Slayton, S. C., D'Archer, J., & Kaplan, F. (2010). Outcome studies on the efficacy of art therapy: A review of findings. *Art Therapy*, *27*(3), 108-118. https://doi.org/10.1080/07421656.2010.10129660

Taylor, R. D., Oberle, E., Durlak, J. A., & Weissberg, R. P. (2017). Promoting Positive Youth Development through School-Based Social and Emotional Learning Interventions: A Meta-Analysis of Follow-Up Effects. *Child development*, *88*(4), 1156-1171. https://doi.org/10.1111/cdev.12864

AITBSS
E-ISSN: 3041-9433