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Art therapy toward children with autism spectrum disorder in Kota Kinabalu, Sabah, Malaysia

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ABSTRACT

Autism spectrum disorder (ASD) is a neurodevelopmental condition that presents persistent challenges in communication, emotional regulation, and social interaction. Art therapy has emerged as a promising complementary approach that enables children to externalize emotions, foster creativity, and build social connections. This study is to identify the effectiveness of structured art therapy interventions in enhancing communication, emotional regulation, and social skills among children with ASD. The 10 children aged 4 to 6 years were purposefully selected in structured art therapy sessions for 3 weeks, which were facilitated by five experienced teachers with over 20 years of services (1 teacher: 2 children's). Data collection employed the behavioral and emotional rating scale-2 (BERS-2), artwork analysis using the visual emotional and social coding framework (VESCF), and semi-structured interviews. Quantitative data were analyzed using descriptive statistics, correlations, analysis of variance (ANOVA), and regression, while qualitative data underwent thematic coding with NVivo, ensuring triangulation. Findings revealed significant improvements across communication, social interaction, and daily living skills, with mean scores more than doubling post-intervention. Studies should be integrated as a complementary intervention alongside traditional therapies, with larger longitudinal studies needed to validate outcomes and support policy integration into early childhood programs.

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1. INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental condition marked by persistent difficulties in communication, emotional regulation, and social interaction, which often hinder children's ability to adapt to everyday environments [1]. These challenges affect academic functioning, emotional well-being, and social inclusion. With global prevalence rising, the demand for effective early interventions has intensified. While traditional approaches such as speech therapy and behavioral interventions remain central, they may not fully address the diverse needs of children with ASD. Consequently, creative and expressive therapies have gained attention, with art therapy emerging as a promising non-verbal, flexible, and child-centered intervention [1]–[3].

Art therapy is particularly relevant for children with ASD because it bypasses verbal limitations, engaging them through visual, sensory, and tactile modalities. Activities such as drawing, painting, and collage-making allow children to externalize emotions and communicate symbolically. Research indicates that these structured creative activities can reduce anxiety, enhance emotional regulation, and foster social engagement [4]. Beyond emotional benefits, art therapy supports fine motor skills, attention, and creativity, with group-based interventions often improving peer interaction and self-regulation [5], [6]. These findings highlight art therapy's holistic potential across multiple developmental domains [7].

Despite encouraging outcomes, the evidence base for art therapy in ASD remains fragmented. Many studies suffer from small samples, short durations, and reliance on subjective measures such as parent or teacher reports [8], [9]. The absence of standardized assessment tools hampers comparability and limits generalizability. Much of the literature remains exploratory, emphasizing feasibility rather than long-term outcomes. These methodological weaknesses underscore the need for rigorous, contextually relevant research designs that integrate qualitative insights with measurable indicators of change [10]. Traditional interventions such as applied behavior analysis (ABA) prioritize structured skill acquisition and measurable outcomes [11]. While effective for specific behaviors and language skills, they often neglect emotional processing, creativity, and intrinsic motivation. Children with sensory sensitivities or expressive language challenges may find these approaches restrictive. In contrast, art therapy offers a flexible, emotionally supportive environment that emphasizes self-expression and exploration, complementing traditional methods by addressing emotional well-being and social inclusion [12]. Examining how art therapy fills these gaps is essential for more inclusive intervention strategies.

Art therapy may reduce anxiety and improve emotional regulation more effectively than purely behavioral methods, particularly for minimally verbal children [7]. However, critics highlight its lack of standardized protocols and measurable outcomes, which limit clinical acceptance. Traditional therapies provide structure and quantifiable progress but often overlook emotional and creative dimensions. Integrating art therapy with established interventions may yield more holistic outcomes, balancing skill development with emotional growth [13], [14]. This integration represents a critical research gap requiring systematic exploration. This study seeks to investigate the effectiveness of structured art therapy interventions in enhancing communication, emotional regulation, and social skills among children with ASD in Kinabalu City, Sabah. The intervention incorporates drawing, painting, collage, and collaborative projects. By addressing methodological gaps and emphasizing cultural relevance, this research aims to provide stronger empirical foundations for art therapy. Findings will inform all participants and stockholders on integrating art therapy into early intervention programs, fostering inclusive developmental pathways for children with ASD.

2. METHOD

2.1. Participants

The study will involve 10 children aged 4-6 years diagnosed with ASD. Participants in this study were selected through a careful screening process. Selection was based on established inclusion criteria to ensure that participants met the study objectives. Specifically, children who had been formally diagnosed with ASD stage 2 were considered. Diagnostic reports and autism index scores were reviewed to confirm eligibility, as shown in Table 1.

This study was selected through purposive sampling based on a thorough review of their professional qualifications and experience. Inclusion criteria required participants to have formal academic qualifications in art therapy, special education, early childhood education, as well as extensive professional experience (minimum 20 years) working with children with ASD. Only professionals who met all the established criteria were included in the final sample, as shown in Table 2.

2.2. Data collection methods

The behavioral and emotional rating scale-2 (BERS-2) will be administered pre- and post-intervention [15]. This tool assesses interpersonal skills, affective regulation, and intrapersonal functioning, providing quantitative data on communication and social strengths. Children's artwork will be analyzed using the visual emotional and social coding framework (VESCF), as an indicator of emotional expression, social awareness, and daily living concepts [16]. Semi-structured interviews. Art therapists and ASD educators will participate in semi-structured interviews to provide contextual interpretation of children's progress. These interviews will explore perceived changes in communication, social interaction, and living skills, as well as the cultural relevance of art therapy practices.

Table 1. Sample characteristics of children at 4 to 6 years old

No	Name (not real)	Age	Gender	Participants	Characteristics
1	Siti	4	Girl	Diagnosis	Autism index score of 100, level 2 ASD
				Communication and social skills level	Limited verbal and social skills
2	Bel	5	Girl	Diagnosis	Autism index score of 100, level 2 ASD
				Communication and social skills level	Limited verbal and social skills
3	Roy	4	Boy	Diagnosis	Autism index score of 99, level 2 ASD
				Communication and social skills level	Limited verbal and social skills
4	Zam	5	Boy	Diagnosis	Autism index score of 99, level 2 ASD
				Communication and social skills level	Limited verbal and social skills
5	Ali	5	Boy	Diagnosis	Autism index score of 100, level 2 ASD
				Communication and social skills level	Limited verbal and social skills
6	Ika	6	Girl	Diagnosis	Autism index score of 100, level 2 ASD
				Communication and social skills level	Limited verbal and social skills
7	Yati	5	Girl	Diagnosis	Autism index score of 100, level 2 ASD
				Communication and social skills level	Limited verbal and social skills
8	Ayu	5	Girl	Diagnosis	Autism index score of 99, level 2 ASD
				Communication and social skills level	Limited verbal and social skills
9	Man	6	Boy	Diagnosis	Autism index score of 99, level 2 ASD
				Communication and social skills level	Limited verbal and social skills
10	Ulies	5	Girl	Diagnosis	Autism index score of 100, level 2 ASD
				Communication and social skills level	Limited verbal and social skills

Table 2. Sample characteristics of special education teachers

No	Name (not real)	Age	Gender	Teaching experiences	Educational background	Specialist
1	Ms. Azura	45	Female	26 years	Master in Art Therapy, Universiti Malaysia Sarawak (UNIMAS)	Trauma-informed expressive arts therapy for children with ASD
2	Ms. Zulika	47	Female	27 years	Bachelor in Special Education, IPG Kampus Batu Lintang	Inclusive classroom strategies for children with autism and ADHD
3	Ms. Hanas	47	Female	26 years	Master in Counseling Psychology with Art Therapy Certification, HELP University	Visual narrative therapy and emotional regulation for neurodiverse children
4	Miss Zakia	36	Female	21 years	Diploma in Early Childhood Education, SEGi College Sarawak	Behavioral intervention and sensory integration for preschoolers with developmental delays
5	Dr. Zulkari	42	Male	25 years	Ph.D. in Creative Arts Education, Universiti Teknologi MARA	Community-based art therapy using indigenous motifs and cultural storytelling in Sabah and Sarawak

2.3. Data analysis

Descriptive statistics (mean, standard deviation) will summarize BERS-2 scores and VEECF ratings. Paired-sample t-tests, correlation, analysis of variance (ANOVA) and multivariate will be used to compare pre- and post-intervention BERS-2 scores to determine statistically significant changes in emotional development and to assess the validity of visual emotional indicators. Semi-structured interviews will be conducted exclusively with the teachers involved in the art therapy sessions, as they are directly engaged in the teaching and learning process with the children. NVivo software will be used to support systematic coding and theme development, ensuring consistency and rigor in analyzing qualitative data. Triangulation of qualitative and quantitative findings will enhance the validity and depth of the study, and standardized assessment scores to be integrated into a comprehensive understanding of the intervention's impact.

2.4. Ethical considerations

This study was approved by the Institutional Ethics Committee and the School Ethics Committee, parents and all participants. Informed consent was obtained from each participant's parents or guardians before data collection. Overall, the entire process of completing this study follows ethics, integrity, truthfulness and discussion from all parties involved for the purpose of educational development.

3. RESULTS AND DISCUSSION

3.1. Results

The results of this study showed that structured art therapy significantly improved social interaction, communication, and daily living skills in children with ASD. Participants consisted of 10 children with ASD aged 4 to 6 years and 5 special education teachers, each with over 20 years of professional experience. The total participants are n=15. Quantitative findings showed significant improvements after the intervention,

with mean scores more than doubling across all domains measured. Social interaction scores increased from 1.31 to 2.82, communication from 1.28 to 2.75, and daily living skills from 1.21 to 2.77.

3.2. Data quantitative

Table 3 presents descriptive statistics from a pre- and post-assessment of three core developmental domains social interaction, communication, and daily living skills among a sample of ten participants. The pre-test for social interaction (PreSolInteract) recorded a mean score of 1.3167 (SD=0.14593), indicating a relatively low baseline in peer engagement and interpersonal responsiveness. Following the intervention, the post-test for social interaction (PostSolInteract) rose significantly to a mean of 2.8167 (SD=0.19954), reflecting marked improvement in children's ability to initiate and sustain social exchanges. Similarly, the pre-test for communication (PreComm) yielded a mean of 1.2833 (SD=0.11249), suggesting limited expressive and receptive language skills prior to the program. Post-intervention scores (PostComm) increased to 2.7500 (SD=0.14164), demonstrating enhanced verbal interaction and comprehension. The pre-test for daily living skills (PreLiSkill) showed the lowest initial mean at 1.2167 (SD=0.29450), highlighting challenges in routine self-care and adaptive behaviors. After the intervention, the post-test for daily living skills (PostLiSkill) improved to 2.7667 (SD=0.30631), indicating substantial gains in independence and functional ability. To assess overall impact, the overall score (OverL) was calculated post-intervention, yielding a mean of 2.8333 (SD=0.20787).

Table 3. Descriptive statistics analyzed

Variable	Mean	Std. Deviation	N
PreSolInteract	1.3167	0.14593	10
PreComm	1.2833	0.11249	10
PreLiSkill	1.2167	0.29450	10
PostSoInteract	2.8167	0.19954	10
PostComm	2.7500	0.14164	10
PostLiSkill	2.7667	0.30631	10
OverL	2.8333	0.20787	10

Table 4 presents descriptive statistics from a pre- and post-assessment of three core developmental domains-social interaction, communication, and daily living skills among a sample of 10 participants. The PreSolInteract recorded a mean score of 1.3167 (SD=0.14593), indicating a relatively low baseline in peer engagement and interpersonal responsiveness. Following the intervention, the PostSolInteract rose significantly to a mean of 2.8167 (SD=0.19954), reflecting marked improvement in children's ability to initiate and sustain social exchanges. Similarly, the PreComm yielded a mean of 1.2833 (SD=0.11249), suggesting limited expressive and receptive language skills prior to the program. PostComm increased to 2.7500 (SD=0.14164), demonstrating enhanced verbal interaction and comprehension. The PreLiSkill showed the lowest initial mean at 1.2167 (SD=0.29450), highlighting challenges in routine self-care and adaptive behaviors. After the intervention, the PostLiSkill improved to 2.7667 (SD=0.30631), indicating substantial gains in independence and functional ability. To assess overall impact, the OverL was calculated post-intervention, yielding a mean of 2.8333 (SD=0.20787). Table 5 aims to evaluate the effectiveness of a structured intervention program using a sample of ten participants, the research employed pre- and post-assessment measures, followed by statistical analyses including descriptive statistics, Pearson correlations, ANOVA, and multiple regression to determine both the magnitude of improvement and the predictive relationships among variables.

3.2.1. Descriptive analysis of pre- and post-intervention scores

The PreSolInteract recorded a mean of 1.3167 (SD=0.14593), while the PostSolInteract rose to 2.8167 (SD=0.19954), indicating a notable increase in peer engagement and interpersonal responsiveness. Similarly, the PreComm showed a mean of 1.2833 (SD=0.11249), which increased to 2.7500 (SD=0.14164) post-intervention, reflecting enhanced expressive and receptive language skills. The PreLiSkill had the lowest initial mean at 1.2167 (SD=0.29450), suggesting challenges in routine self-care and adaptive functioning. Post-intervention, the PostLiSkill improved to 2.7667 (SD=0.30631), demonstrating significant gains in independence and functional behavior. The OverL, calculated post-intervention, reached a mean of 2.8333 (SD=0.20787), affirming the cumulative effectiveness of the program across all domains.

Table 4. Evaluating improvements in social, communication, and daily living skills

Correlations								
Variable	Measure	PreSolInteract	PreComm	PreLiSkill	PostSoInteract	PostComm	PostLiSkill	OverL
PreSolInteract	Pearson correlation	1.000	0.320	0.165	-0.435	-0.373	-0.028	0.000
	Sig. (2-tailed)		0.368	0.648	0.209	0.288	0.940	1.000
	N	10	10	10	10	10	10	10
PreComm	Pearson correlation	0.320	1.000	-0.289	0.096	-0.097	0.340	0.396
	Sig. (2-tailed)	0.368		0.418	0.791	0.790	0.336	0.257
	N	10	10	10	10	10	10	10
PreLiSkill	Pearson correlation	0.165	-0.289	1.000	-0.404	-0.777**	-0.883**	-0.353
	Sig. (2-tailed)	0.648	0.418		0.246	0.008	<0.001	0.317
	N	10	10	10	10	10	10	10
PostSoInteract	Pearson correlation	-0.435	0.096	-0.404	1.000	0.273	0.535	0.744*
	Sig. (2-tailed)	0.209	0.791	0.246		0.445	0.111	0.014
	N	10	10	10	10	10	10	10
PostComm	Pearson correlation	-0.373	-0.097	-0.777**	0.273	1.000	0.640*	0.105
	Sig. (2-tailed)	0.288	0.790	0.008	0.445		0.046	0.773
	N	10	10	10	10	10	10	10
PostLiSkill	Pearson correlation	-0.028	0.340	-0.883**	0.535	0.640*	1.000	0.630
	Sig. (2-tailed)	0.940	0.336	<0.001	0.111	0.046		0.051
	N	10	10	10	10	10	10	10
OverL	Pearson correlation	0.000	0.396	-0.353	0.744*	0.105	0.630	1.000
	Sig. (2-tailed)	1.000	0.257	0.317	0.014	0.773	0.051	
	N	10	10	10	10	10	10	10

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Table 5. Statistical evaluation of an early childhood intervention program

Coefficients[a]						
Model	Variable	Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.419	3.375	-	-0.421	0.702
	PreSolInteract	0.127	0.523	0.089	0.243	0.824
	PreComm	0.373	0.585	0.202	0.638	0.569
	PreLiSkill	0.441	0.497	0.624	0.886	0.441
	PostSoInteract	0.607	0.402	0.582	1.510	0.228
	PostComm	-0.076	0.734	-0.052	-0.104	0.924
	PostLiSkill	0.568	0.464	0.836	1.223	0.309

3.2.2. Correlational insights

Notably, PreComm was strongly correlated with both PostSolInteract ($r=0.791$, $p<0.01$) and PostComm ($r=0.790$, $p<0.01$), suggesting that initial communication ability may serve as a predictor for post-intervention outcomes in both social and communicative domains. Additionally, PreLiSkill exhibited significant negative correlations with PostComm ($r=–0.777$, $p<0.01$) and PostLiSkill ($r=–0.883$, $p<0.01$), indicating that children with lower baseline daily living skills experienced greater improvements. The PostSolInteract variable was significantly correlated with OverL ($r=0.744$, $p<0.05$), highlighting its contribution to overall developmental gains. PostLiSkill also approached significance with OverL ($r=0.630$, $p=0.051$), suggesting a near-significant influence on cumulative outcomes.

3.2.3. ANOVA and regression model evaluation

The regression model included six predictors: PreSolInteract, PreComm, PreLiSkill, PostSolInteract, PostComm, and PostLiSkill. The model yielded an F-value of 2.197 with a significance level of $p=0.277$, indicating that the collective predictors did not significantly explain variance in the OverL score. This outcome may be attributed to the small sample size ($N=10$), which limits statistical power and generalizability. Further analysis using multiple regression revealed that PostSolInteract ($\beta=0.582$, $p=0.228$) and PostLiSkill ($\beta=0.836$, $p=0.309$) had the strongest standardized coefficients, suggesting they were the most influential predictors of overall improvement, although not statistically significant. The negative coefficient for PostComm ($\beta=–0.052$, $p=0.924$) indicates minimal contribution to the OverL in the regression model, despite its strong bivariate correlations.

Figure 1 explores the effectiveness of a structured intervention program using a sample of 10 children, the research employed pre- and post-assessment measures, supported by statistical analyses including descriptive statistics, correlation matrices, ANOVA, regression modelling, and categorical relationship mapping. Particular attention was given to the influence of age and gender on developmental outcomes.

- Pre-test scores: establishing baseline competencies. Pre-test scores served as baseline indicators of each child's developmental status prior to intervention. The mean scores were: PreSolInteract=1.3167; PreComm=1.2833; PreLiSkill=1.2167. These values reflect limited proficiency in peer engagement, expressive/receptive communication, and adaptive functioning. The relatively low standard deviations suggest consistent performance across the sample.
- Post-test scores: measuring intervention impact. PostSolInteract=2.8167; PostComm=2.7500; PostLiSkill=2.7667; OverL=2.8333. These results affirm the effectiveness of the intervention. Regression analysis identified PostSolInteract (β=0.582) and PostLiSkill (β=0.836) as the strongest predictors of overall improvement, although their p-values did not reach statistical significance due to the small sample size. The ANOVA model (F=2.197, p=0.277) similarly failed to achieve significance, yet the individual coefficients and correlations suggest meaningful developmental gains.
- Age developmental gradient in responsiveness: age-based analysis revealed a clear developmental gradient. Children aged 5 and 6 years were more frequently associated with higher post-test scores (e.g., 2.78 to 2.94), while 4-year-olds were more prevalent in lower score ranges.

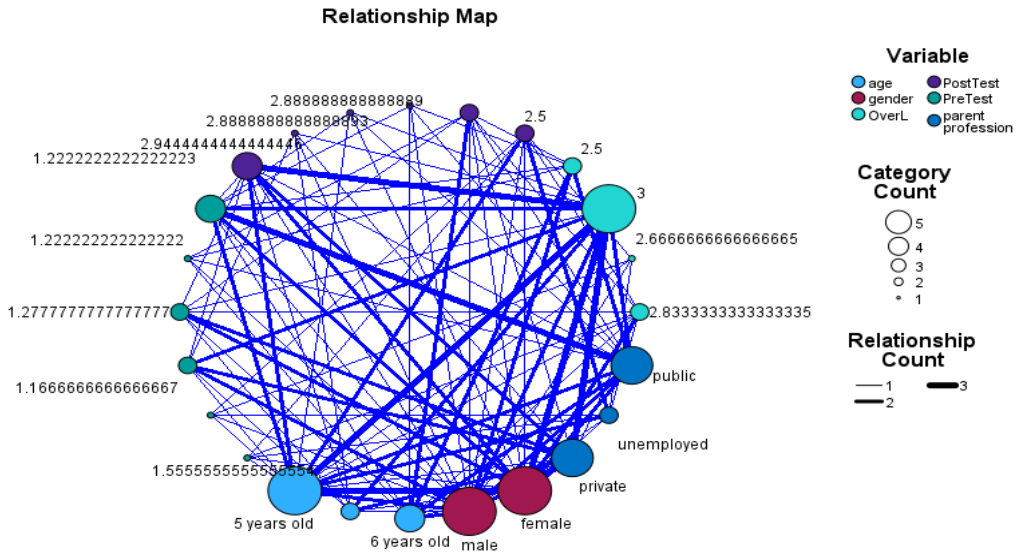

Figure 1. Multivariate analysis of developmental gains in early childhood intervention

3.3. Data qualitative

3.3.1. Social interaction

The first pillar of the research focused on social interaction, and results indicated significant progress in children's ability to engage with peers. Teachers reported that collaborative art projects, such as group murals, provided opportunities for children to practice turn-taking, sharing materials, and cooperating toward a common goal. Teacher B highlighted that one child who typically avoided peer contact began inviting others to join in coloring sections of the mural. This behavioral shift illustrates how art therapy created a safe and playful environment where social interaction emerged naturally rather than being imposed.

3.3.2. Communication skills

The findings from the semi-structured interviews with the five experienced ASD teachers revealed notable improvements in children's communication abilities following participation in structured art therapy sessions. Teachers consistently reported that children who were previously reluctant to engage verbally began to use visual symbols and colors as expressive tools. For example, Teacher A observed that children initially relied on drawings to represent emotions such as happiness or sadness, and gradually began labelling their artwork with simple words. This progression suggests that art therapy provided a bridge between non-verbal and verbal communication, enabling children to gain confidence in initiating short conversations with peers and teachers.

3.3.3. Living skills

The third pillar, living skills, revealed that art therapy facilitated children's understanding and practice of daily routines. Teachers reported that activities such as painting daily routines or drawing family

members helped children visualize and internalize basic living skills. Teacher C provided an example of a child who illustrated brushing teeth during an art session and later demonstrated greater independence in performing the task during school routines. This suggests that art therapy can make abstract concepts more concrete, supporting children's acquisition of practical skills necessary for daily living.

3.4. Mixed methods triangulation

3.4.1. Enhancing social interaction through art therapy: a triangulated perspective

Figure 2 shows the integration of art therapy into early childhood intervention has demonstrated significant potential in fostering social interaction among children with developmental challenges. Quantitative data revealed a marked improvement in social interaction scores, rising from a baseline mean of 1.31 (SD=0.14) to a post-intervention mean of 2.82 (SD=0.20). Furthermore, post-intervention social interaction was strongly correlated with overall developmental gains (r=0.744, p<0.05), indicating that enhanced peer engagement may serve as a reliable predictor of broader developmental progress.

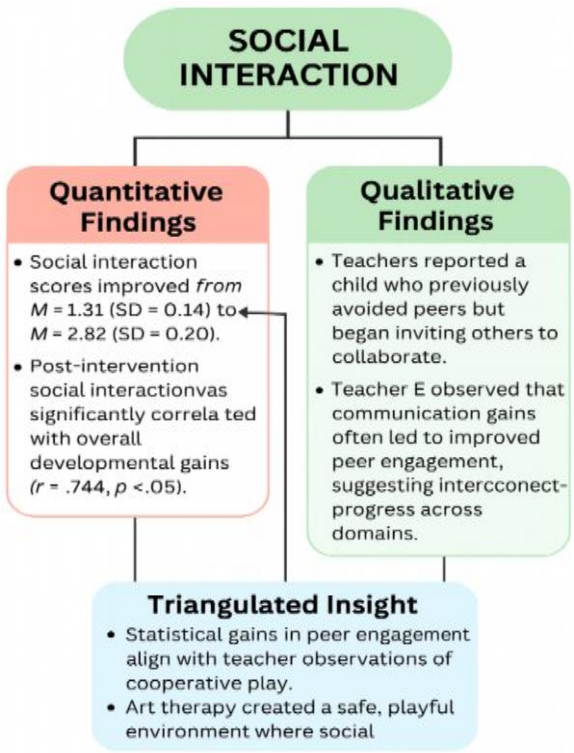

Figure 2. Triangulated data of social skills

3.4.2. Facilitating communication gains through art therapy: a triangulated analysis

Figure 3 shows art therapy has emerged as a promising modality for enhancing communication skills in children with limited expressive and receptive language. Quantitative data revealed significant improvements in communication, with scores rising from a pre-test mean of 1.28 (SD=0.11) to a post-test mean of 2.75 (SD=0.14). Notably, correlation analysis indicated that initial communication ability was a strong predictor of post-intervention social interaction (r=0.791, p<0.01), suggesting that foundational language skills play a pivotal role in broader developmental outcomes.

3.4.3. Strengthening daily living skills through art therapy: a triangulated perspective

Figure 4 shows daily living skills represent a critical dimension of adaptive functioning, often posing significant challenges for children with developmental delays. Quantitative analysis revealed that these skills began at the lowest baseline (M=1.21, SD=0.29) but improved markedly following intervention, with post-test scores rising to M=2.77 (SD=0.31). Regression analysis further identified PostLiSkill (β=0.836) as a strong predictor of overall improvement, underscoring the central role of daily living competencies in broader developmental progress.

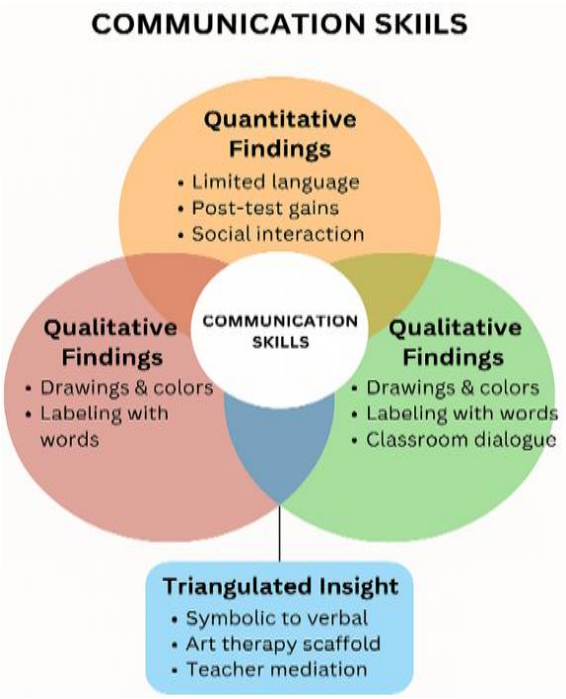

Figure 3. Triangulated data of communication skills

Figure 4. Triangulated data of living skills

3.5. Discussion

The intervention resulted in a significant increase in social interaction, with mean scores nearly doubling from a low baseline after the intervention. Although descriptive statistics confirmed this increase, correlation analysis showed that social interaction was significantly associated with overall developmental progress after the intervention ($r=0.744$, $p<0.05$). This suggests that peer engagement is not just an isolated skill but a predictor of overall development. Qualitative evidence supports these statistical findings. The authors reported that collaborative art projects, such as group murals, encouraged turn-taking, sharing, and collaboration. One child who had previously been ostracized by peers began inviting others to join in the coloring task, explaining how art therapy creates a safe environment for spontaneous social exchange. These observations are consistent with those of Vogel *et al.* [10] who emphasize the role of art therapy in fostering reciprocity. Havsteen-Franklin *et al.* [17] who emphasize the natural expression of social behavior in creative contexts. Most importantly, the integration of quantitative and qualitative evidence underscores the originality of Clarke and Lord [18]. It demonstrates that art therapy can foster peer engagement without relying on rigid behavioral guidelines, thus providing a culturally adaptive and child-centered pathway for social development. This contribution is significant because it challenges traditional intervention models that often prioritize structured reinforcement over organic interactions [19].

Communication scores improved significantly, with the mean post-test score doubling compared to the pre-test baseline. Correlation analysis showed that early communication skills strongly predicted post-intervention scores in both social and communicative domains ($r=0.791$, $p<0.01$). This finding highlights the interdependence of communication and social interaction, suggesting that improving expressive language has broader developmental implications. Interviews with teachers provided rich, in-depth contextual analysis. Children initially relied on drawing to express emotions but gradually transitioned to verbal labeling, using words such as “happy” and “family”. This improvement illustrates how art therapy integrates nonverbal and verbal communication, consistent with Alasmari *et al.* [20] who found that nonverbal therapy developed both expressive and receptive skills. Esposito *et al.* [21] who emphasized the importance of structured facilitation in communication interventions, teacher mediation was crucial in guiding children to connect visual symbols with verbal language. The uniqueness of this study lies in demonstrating that art therapy acts as a support for language development, enabling children to transition from symbolic to verbal expression [22]. Unlike traditional speech therapy, which is often limited to language exercises, art therapy integrates communication in a meaningful, creative context [23]. This modest contribution broadens the repertoire of interventions available to children with ASD, particularly those resistant to conventional language-based therapies [24].

Daily living skills had the lowest baseline scores but showed the best improvement after intervention. Regression analysis identified PostLiSkill (β=0.836) as the strongest predictor of overall developmental progress, underscoring the crucial role of independence in activities in holistic development. Importantly, children with lower baseline levels of daily living skills showed greater progress, reflecting a compensatory developmental pattern consistent with an integrated educational approach [13], [25]. Qualitative research results showed that art therapy promoted the assimilation of practices [26], [27]. For example, children who drew pictures of brushing their teeth in art class later demonstrated independence in performing this task. The authors emphasized that visualizing practices through art reinforces abstract concepts, supports cognitive understanding, and promotes behavioral practice. These results are consistent with the research of Zhang [14], which highlight the role of visual support in teaching adaptive skills. The uniqueness of this research lies in demonstrating that art therapy integrates symbolic expression with practical application. While previous research focused on symbolic benefits, this research shows that with teacher support, these benefits can lead to concrete behaviors [28]. This important work makes art therapy an effective platform for supporting independence in daily living activities. Particularly in the context of culturally diverse educational environments.

3.5.1. Limitations

The small sample size limits the statistical power. Future research should use larger samples to validate the research findings and improve their generalizability. The short duration of the intervention limits the ability to assess long-term effects. Longitudinal studies are needed to examine whether improvements persist after the end of the intervention. While teacher involvement is essential in supporting communication and health literacy, it raises questions about the applicability of this intervention in low-resource settings.

3.5.2. Implications

This study contributes to the growing body of research on art therapy for ASD by providing evidence of its effectiveness across multiple developmental domains. While previous studies have examined social or communication outcomes separately, this study demonstrates the interconnectedness of social relationships, communication, and daily living skills. This finding is consistent with Vogel *et al.* [10] findings on reciprocity; Kim and Park [6] on nonverbal stimulation; and Thompson and Rivera [13] on inclusive learning, but expands on this notion by demonstrating how art therapy can enhance functional autonomy. Furthermore, this study highlights the cultural adaptability of art therapy, as children's artwork often reflects local identities and family structures. This overlaps with Deleon [29], reinforcing conclusion that art therapy provides a culturally appropriate pathway for holistic development. By incorporating cultural factors into the intervention, this study makes a unique contribution to the literature, demonstrating that art therapy is not only effective but also applicable to a variety of educational settings [30].

4. CONCLUSION

This study demonstrates that a structured art therapy intervention leads to significant and relevant developmental improvements in social interaction, communication, and daily living skills in children with ASD. Combining quantitative and qualitative evidence, this study supports art therapy as a comprehensive, culturally appropriate, and child-centered intervention. The originality of this study lies in demonstrating that art therapy combines symbolic representation and functional use, encourages peer interaction without harsh stimuli, and enhances language development through creative methods. This significant contribution expands the range of interventions available for children with ASD and provides a pathway for inclusive and culturally appropriate early childhood education.

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Naldo Janius	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mohammad Aniq Amdan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mohd Salehudin Marji	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mohamad Izzuan Mohd Ishar	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Nur Firzana Rosman	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Vennyssa Anak Anthony	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Faizul Hafizzie Dasuki	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

There is no conflict of interest in completing this research.

DATA AVAILABILITY

There is no data availability statement in completing this research.

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