

Effect of MOHO-based occupational therapy techniques on stress, anxiety, depression, self-esteem, and occupational performance among mothers of children with autism spectrum disorder

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ABSTRACT

Background: Caring for a child with autism spectrum disorder (ASD) places mothers at heightened risk of stress, anxiety, depression, diminished self-esteem, and impaired occupational performance. The Model of Human Occupation (MOHO) offers a holistic, client-centered framework that promotes well-being through meaningful occupational engagement.

Objectives: This study evaluated the effectiveness of MOHO-based occupational therapy techniques in reducing stress, anxiety, and depression while improving self-esteem and occupational performance among mothers of children with ASD.

Materials and methods: In this randomized controlled trial, 107 mothers of children with ASD were recruited from six rehabilitation centers in Chennai after screening 246 candidates. Participants were randomly allocated to an experimental group (N=54) or control group (N=53). Outcomes were assessed using the Depression Anxiety Stress Scales (DASS-21), Model of Human Occupation Screening Tool (MOHOST), and Rosenberg Self-Esteem Scale (RSES) before and after the 12-week intervention. The experimental group received 36 sessions (three 45-minute sessions weekly) of structured MOHO-based techniques targeting volition, habituation, and performance capacity. The control group attended a parental education program. Data were analyzed with SPSS version 23.0 using paired and independent t-tests.

Results: Both groups showed significant within-group improvements; however, the experimental group showed markedly greater gains across all variables ($p < 0.001$). Between-group comparisons confirmed significantly superior post-intervention outcomes in the experimental group ($p < 0.001$).

Conclusion: MOHO-based interventions proved highly effective in enhancing occupational performance and self-esteem while reducing psychological distress. These findings support the integration of MOHO approaches into caregiver support programs for mothers of children with ASD

Introduction

The transition to parenthood constitutes a profound developmental milestone, accompanied by significant endocrine changes, neural adaptations, and restructuring of self-identity, interpersonal relationships, and daily behavioral routines. Although the arrival of a child often brings deep fulfillment, the early postpartum period is marked by heightened psychosocial demands and lifestyle changes, most notably persistent sleep disruption and reduced physical activity.¹

Mothers typically assume a broad array of familial responsibilities, serving as primary caregivers while simultaneously fulfilling roles in emotional attachment, educational support, household management, and ongoing motivational encouragement.² When raising a child with autism spectrum disorder (ASD), mothers encounter a unique and intensified set of challenges. These include obligations to other family members (such as siblings), providing lifelong support for the child with ASD, navigating barriers to specialized healthcare, therapeutic interventions, and educational resources, and managing widespread social and community-level impacts on the family unit.³ Recent investigations have reported elevated psychological distress and diminished self-esteem among mothers of children with ASD, attributing these outcomes to the multifaceted demands of caregiving.⁴

Mothers of children with ASD commonly face considerable emotional and practical hardships. The persistent demands of caregiving, including behavioral management, coordination of intervention regimens,

and mitigation of social isolation, frequently intensify experiences of stress, anxiety, and depression.^{5,6} Such affective burdens not only compromise maternal well-being and daily functioning but may also diminish the efficacy of child-focused interventions. Furthermore, these constraints often restrict engagement in meaningful occupations, disrupt family equilibrium, and hinder optimal developmental progress in the child.^{7,8}

Occupational therapy provides a comprehensive framework for enhancing maternal health and adaptive functioning. Among its core theoretical models, the Model of Human Occupation (MOHO), developed by Gary Kielhofner, is particularly relevant. MOHO explains the dynamic interplay among volition (motivational processes), habituation (patterned roles and routines), performance capacity (underlying abilities influenced by experience), and environmental factors, offering a client-centered perspective sensitive to the complex demands mothers of children with ASD experience.⁹ Interventions grounded in MOHO principles have demonstrated positive outcomes in improving functional status and quality of life across diverse populations, including those with mental health conditions, neurological impairments, and developmental differences.^{10,11}

Although several intervention programs, such as psychoeducation, behavioral parent training, Mindfulness-Based Stress Reduction (MBSR), and supportive counseling, have demonstrated benefits in reducing caregiver burden among mothers of children with ASD, many of these approaches primarily focus on symptom

management rather than improving occupational participation, role balance, and self-identity. Existing standard programs also provide limited integration of occupation-centered strategies that systematically address volition, habituation, and performance capacity within daily life contexts.¹² Furthermore, rigorous empirical evidence regarding interventions that simultaneously target depression, anxiety, stress, self-esteem, and occupational participation remains insufficient.¹³ Therefore, there is a need for a comprehensive, client-centered occupational therapy approach grounded in the Model of Human Occupation (MOHO) to address both psychological well-being and functional occupational engagement among mothers of children with ASD.

The present study seeks to address these gaps

in the evidence base by evaluating the effects of MOHO-guided occupational therapy on stress, anxiety, depression, self-esteem, and occupational performance among mothers of children with ASD.

Materials and methods

Study design

This randomized controlled trial evaluated MOHO-based occupational therapy techniques. Participants were randomly assigned to experimental or control groups using computer-generated simple randomization. A double-blind design ensured that neither participants nor investigators knew the group assignments or treatment allocations. This trial is reported according to the CONSORT 2025 guidelines, as shown in Figure 1.

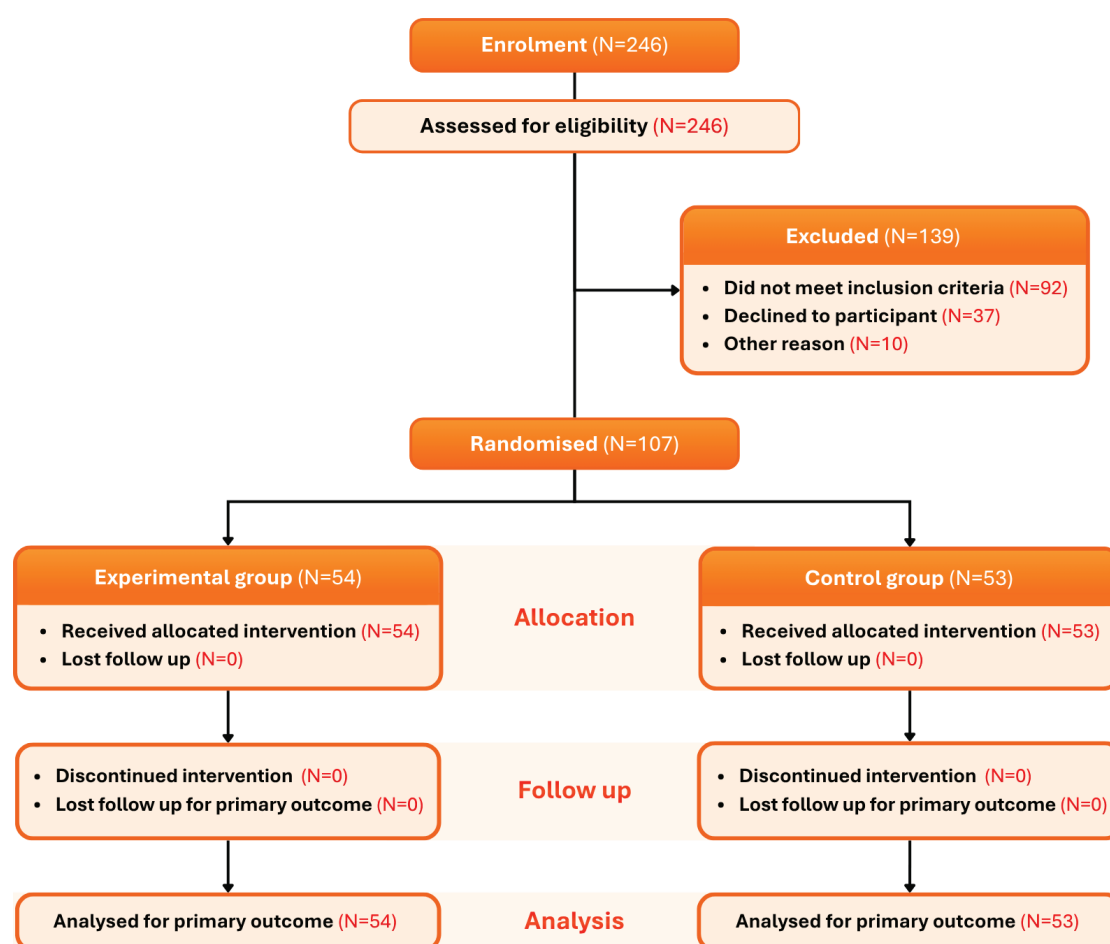


Figure 1. the CONSORT 2025 guidelines.

Participants

Ethical approval was obtained from the Institutional Ethics Committee of Saveetha Medical College Hospital (Ref. No. 004/06/2023/IEC/SMCH). From six rehabilitation centers and schools in Chennai, 246 mothers aged 30–50 years were screened. Inclusion criteria required mothers of children aged 3–9 years with confirmed ASD and primary communication in Tamil or English. Exclusion criteria included additional psychological or physical impairments. Written informed consent was secured. Ultimately, 107 eligible mothers were enrolled and randomized (experimental N=54; control N=53).

Eligible participants were randomly allocated into experimental and control groups using a computer-generated simple randomization method. Random numbers were generated using SPSS software by an independent researcher who was not involved in participant recruitment or assessment procedures. Allocation concealment was maintained using sealed opaque envelopes to minimize selection bias. Participants were assigned in a 1:1 ratio to either the experimental group (MOHO-based occupational therapy) or the control group (parental education program).

Outcome measures

A study proforma was designed to gather the demographic details of the mothers and their children with ASD.

Depression Anxiety Stress Scale (DASS-21)

Psychological symptoms were measured with the Depression Anxiety Stress Scale (DASS-21), a 21-item self-report instrument with three 7-item subscales (depression, anxiety, stress). Items are rated 0–3; subscale scores are doubled for interpretation. The tool demonstrates strong reliability (Cronbach's α 0.74–0.87) and validity.¹⁴ In addition, the Tamil language version of the Depression Anxiety Stress Scale (DASS-21) has demonstrated excellent psychometric properties among Tamil-speaking populations. A validation study conducted among Tamil-speaking participants reported strong reliability, validity, and factorial structure for the Tamil DASS-21, supporting its applicability in assessing depression, anxiety, and stress in Tamil populations.¹⁵

Model of Human Occupation Screening Tool (MOHOST)

The Model of Human Occupation Screening Tool (MOHOST) is a standardized assessment based on Gary Kielhofner's MOHO framework. It evaluates occupational participation across diverse clinical populations, including mental health, neurological, and developmental conditions. MOHOST covers six domains: motivation (volition), patterns of occupation (habituation), communication/interaction, process skills, motor skills, and environment. Each item is rated on a 4-point scale: Facilitates (F), Allows (A), Inhibits (I), or Restricts (R) participation. The tool provides both qualitative and quantitative insights into personal

and environmental influences on performance. It is particularly useful for identifying strengths and barriers and guiding intervention planning. The MOHOST assessment was conducted through direct observation, therapist-participant interaction, and semi-structured interviews during both individual and group intervention sessions. Observations specifically included mothers' motivation toward task participation, ability to maintain routines, communication and interaction skills, problem-solving abilities, emotional responses during activities, and environmental influences affecting occupational participation. These observations were recorded across home-management simulations, group discussions, relaxation sessions, and activity-based therapeutic tasks to ensure comprehensive evaluation of occupational performance within real-life contexts.¹⁶ MOHOST demonstrates strong inter-rater reliability and construct validity, making it effective for tracking progress over time.¹⁷

Rosenberg Self-Esteem Scale (RSES)

The Rosenberg Self-Esteem Scale (RSES), developed by Morris Rosenberg in 1965, is a widely used measure of global self-worth. It consists of 10 items rated on a 4-point Likert scale, with reverse scoring applied to negatively worded statements. Total scores range from 10 to 40, where higher scores indicate greater self-esteem. Cut-offs typically classify 15–25 as normal, below 15 as low, and above 25 as high self-esteem. Clinicians, educators, and researchers use the scale to assess self-perception and monitor changes over time. RSES demonstrates excellent internal consistency ($\alpha=0.85$ – 0.88) and strong cross-cultural validity.¹⁸ This instrument has been widely validated in Indian populations and demonstrates good internal consistency, construct validity, and cultural applicability. Previous Indian validation studies support its suitability for assessing self-esteem among adults in diverse linguistic and cultural settings, including South Indian populations.^{19,20}

Procedure

A true experimental study, a randomized controlled trial, was conducted to assess the effectiveness of MOHO-based occupational therapy in improving psychological and occupational outcomes among mothers of children with ASD. The selected 107 participants were randomly assigned to an experimental group (N=54) and a control group (N=53). Pre-tests and post-tests were measured using standardized tools: the Depression Anxiety Stress Scale (DASS-21), the Model of Human Occupation Screening Tool (MOHOST), and the Rosenberg Self-Esteem Scale (RSES). Over 12 weeks, participants in both groups attended 36 sessions, held thrice weekly for 45 minutes each. The experimental group received a structured intervention grounded in the Model of Human Occupation (MOHO), targeting volition, habituation, and performance capacity through five therapeutic dimensions: self-acceptance,

self-maintenance, self-efficacy, self-advancement, and self-esteem. The detailed explanation of the intervention for the experimental group is given in Table 1. Meanwhile, the control group received a traditional

parental education program focused on psychological wellness, ASD awareness, behavioral management, child development, and environmental stress management, which is explained in Table 1.

Table 1. Intervention programs.

Experimental group: MOHO-based occupational therapy techniques					
Week	MOHO component	Therapeutic goal	Intervention activities	Session focus	Expected outcome
Week 1	Volition	Build therapeutic rapport and identify personal occupational concerns	Initial counselling, self-reflection exercises, occupational history interview, emotional expression activities	Understanding caregiver challenges and personal goals	Improved insight into personal difficulties and increased motivation for participation
Week 2	Volition	Enhance self-awareness and emotional expression	Expressive writing, guided discussions, emotion identification tasks	Recognition of stressors and emotional experiences	Better emotional awareness and reduced emotional suppression
Week 3	Volition	Improve self-esteem and self-efficacy	Positive affirmation exercises, self-strength identification, motivational interviewing	Developing confidence and positive self-perception	Increased self-confidence and self-worth
Week 4	Habituation	Identify disrupted routines and occupational imbalance	Daily routine analysis, activity log maintenance, time-use diary	Understanding imbalance in occupational roles	Awareness of unhealthy routines and role overload
Week 5	Habituation	Develop healthy daily routines and role balance	Time scheduling, priority setting, role organization training	Structuring productive and balanced routines	Improved organization and routine management
Week 6	Habituation	Strengthen occupational role performance	Role-play, family role discussions, problem-solving activities	Managing caregiving and personal roles effectively	Better role adaptation and reduced caregiver burden
Week 7	Performance capacity	Improve stress management skills	Deep breathing exercises, progressive muscle relaxation, guided relaxation training	Managing physiological and emotional stress	Reduced stress symptoms and improved relaxation
Week 8	Performance capacity	Improve coping and emotional regulation	Coping strategy training, mindfulness-based activities, adaptive response practice	Handling anxiety and emotional challenges	Enhanced coping ability and emotional control

Table 1. Intervention programs. (continue)

Experimental group: MOHO-based occupational therapy techniques					
Week	MOHO component	Therapeutic goal	Intervention activities	Session focus	Expected outcome
Week 9	Performance capacity	Enhance problem-solving and adaptive functioning	Scenario-based discussions, stress management role-play, activity modification	Managing difficult caregiving situations	Improved decision-making and adaptive functioning
Week 10	Environment	Improve social participation and support utilization	Group interaction sessions, peer support discussions, communication skill activities	Enhancing interpersonal support systems	Increased social participation and perceived support
Week 11	Environment	Address environmental barriers affecting occupational participation	Environmental modification discussions, identifying support resources	Managing family and community barriers	Better adaptation to environmental stressors
Week 12	Occupational participation	Reinforce meaningful occupational engagement and long-term maintenance	Leisure exploration, meaningful activity planning, future goal setting, review sessions	Sustaining healthy occupational participation	Improved occupational performance, self-esteem, and psychological well-being
Control group: Traditional parental education program					
Week	Main focus	Activities conducted		Duration	
Weeks 1-3	Understanding ASD	Education regarding ASD symptoms, behavioural characteristics, and developmental concerns		3 sessions/week, 45 minutes/session	
Weeks 4-6	Child management strategies	Behavioural management techniques, communication strategies, home management guidance		3 sessions/week, 45 minutes/session	
Weeks 7-9	Psychological wellness	General stress education, emotional support discussions, coping awareness		3 sessions/week, 45 minutes/session	
Weeks 10-12	Family and environmental support	Parenting guidance, family adjustment, community resource awareness		3 sessions/week, 45 minutes/session	
Week 11 (31-33)	Self-esteem	Role-reversal problem-solving; feedback sessions		Group	
Week 12 (34-36)	Post-test	Post-test assessment		Individual	

Statistical analysis

Descriptive statistics, including means, standard deviations, frequencies, and percentages, summarized the demographic and baseline characteristics. Data normality was evaluated using the Kolmogorov-Smirnov test. Since the data followed a normal distribution, inferential statistics suitable for a randomized controlled trial design were applied. Participants were randomized to groups using a computer-generated simple random method. This study used a 95% confidence interval to estimate the precision of the observed effects. Paired t-tests were conducted to compare pre- and post-intervention scores within each group, while independent t-tests were used to examine differences between the groups. All statistical analyses were conducted using

a significance level of $p < 0.05$; results with $p < 0.05$ were considered statistically significant, and those with $p < 0.01$ were considered highly significant. Statistical analyses were performed using IBM SPSS version 23.0.

Results

Baseline (pre-test) comparisons between the experimental and control groups using independent t-tests revealed no statistically significant differences across all outcome measures, including occupational performance, depression, anxiety, stress, and self-esteem (all $p > 0.05$) (Table 1 and Table 2). This confirmed successful randomization and baseline equivalence between the two groups before the intervention.

Table 2. Comparison of pre-test scores between the control group and the experimental group.

Variable	Group	N	Mean	SD	t	df	p value
Occupational performance	Control	53	45.64	8.694	-0.071	105.0	0.944*
	Experimental	54	45.76	8.900			
Depression	Control	53	24.23	5.359	-0.799	104.0	0.426*
	Experimental	54	25.11	6.027			
Anxiety	Control	53	26.34	5.540	-1.292	100.6	0.199*
	Experimental	54	27.61	4.574			
Stress	Control	53	27.17	5.511	-1.067	104.9	0.288*
	Experimental	54	28.30	5.445			
Self-esteem	Control	53	22.55	3.549	0.357	98.3	0.722*
	Experimental	54	22.33	2.768			

Note: All p values exceed the 5% level (Independent t-test).

Table 3 shows the pre- and post-test comparison of occupational performance, depression, anxiety, stress, and self-esteem in the control group. Results revealed significant improvements in occupational performance ($p = 0.021$) and self-esteem ($p = 0.011$), as

well as significant reductions in depression ($p = 0.034$), anxiety ($p = 0.013$), and stress ($p = 0.019$). These findings suggest that parental education contributed to modest improvements in mothers' occupational performance and self-esteem.

Table 3. Pre-test and post-test scores comparison in the control group.

Variable	Test	N	Mean	SD	t	df	p value
Occupational performance	Pre	53	45.64	8.694	-2.375	52	0.021*
	Post	53	46.83	10.533			
Depression	Pre	53	24.23	5.359	2.179	52	0.034*
	Post	53	23.75	5.003			
Anxiety	Pre	53	26.34	5.540	2.581	52	0.013*
	Post	53	25.72	4.789			
Stress	Pre	53	27.17	5.511	2.421	52	0.019*
	Post	53	26.40	4.877			
Self-esteem	Pre	53	22.55	3.549	-2.648	52	0.011*
	Post	53	23.51	3.366			

Note: *Significant at the 5% level (paired t-test).

Table 4 shows the pre- and post-test comparison of outcome measures in the experimental group. Following MOHO-based interventions, occupational

performance ($p < 0.001$) and self-esteem ($p < 0.001$) improved significantly, along with significant reductions in depression, anxiety, and stress ($p < 0.001$ for all).

Table 4. Pre-test and post-test scores comparison in the experimental group.

Variable	Test	N	Mean	SD	t	df	p value
Occupational performance	Pre	54	45.76	8.900	-39.625	53	<0.001**
	Post	54	72.74	7.506			
Depression	Pre	54	25.11	6.027	22.635	53	<0.001**
	Post	54	11.30	3.810			
Anxiety	Pre	54	27.61	4.574	32.905	53	<0.001**
	Post	54	12.87	4.510			
Stress	Pre	54	28.30	5.445	30.085	53	<0.001**
	Post	54	12.91	4.631			
Self-esteem	Pre	54	22.33	2.768	-21.096	53	<0.001**
	Post	54	31.54	3.765			

Note: **Highly significant at the 1% level (paired t-test).

Table 5 compares post-test scores between the control and experimental groups. Results indicate that participants in the experimental group showed significantly greater improvements in occupational

performance and self-esteem, and significantly greater reductions in depression, anxiety, and stress, compared with the control group ($p < 0.001$ for all).

Table 5. Comparison of post-test scores between the control group and the experimental group.

Variable	Group	N	Mean	SD	t	df	p value
Occupational performance	Control	53	46.83	10.533	-14.675	105	<0.001**
	Experimental	54	72.74	7.506			
Depression	Control	53	23.75	5.003	14.508	105	<0.001**
	Experimental	54	11.30	3.810			
Anxiety	Control	53	25.72	4.789	14.287	105	<0.001**
	Experimental	54	12.87	4.510			
Stress	Control	53	26.40	4.877	14.674	105	<0.001**
	Experimental	54	12.91	4.631			
Self-esteem	Control	53	23.51	3.366	-11.619	105	<0.001**
	Experimental	54	31.54	3.765			

Note: **Highly significant at the 1% level (Independent t-test).

Discussion

The present study examined the effectiveness of MOHO-based interventions in improving self-esteem and occupational performance while reducing stress, anxiety, and depression among mothers of children with ASD. The findings demonstrated significant improvements across all domains in the experimental group compared with the control group.

The control group showed moderate but significant improvements in occupational performance, self-esteem, depression, anxiety, and stress following parental education, suggesting that psychoeducation and emotional support can positively influence maternal mental health and functioning. Similar findings were reported by Dykens *et al.*, Pohl AL *et al.*, and Hemdi and Daley, who highlighted the benefits of mindfulness, psychoeducation, peer support, and mobile-based interventions in reducing caregiver distress and improving coping among mothers of children with ASD.^{7,13,21}

The experimental group demonstrated highly significant improvements in occupational performance and self-esteem, along with substantial reductions in depression, anxiety, and stress following the MOHO-based intervention. These outcomes may be attributed to interventions targeting volition, habituation, performance capacity, coping strategies, routine restructuring, mindfulness, self-reflection, and meaningful occupational participation, which likely enhanced emotional well-being, occupational balance, confidence, and adaptive functioning. Shinohara *et al.* and Shahbazi and Esmaeili reported similar benefits of MOHO-based approaches, supporting the effectiveness of individualized, client-centered occupational interventions in improving psychosocial adjustment and functional performance.^{10,22}

Post-test comparisons revealed significantly greater improvements in the experimental group across all outcome measures ($p < 0.001$). These superior outcomes may reflect the occupation-centered, client-focused nature of MOHO interventions, which address both psychological and functional aspects of caregiving through role reconstruction, meaningful engagement, and adaptive coping. Supporting evidence further indicates that parenting approaches characterized by warmth, structure, and responsiveness align with MOHO constructs of volition, habituation, performance capacity, and environmental influences, emphasizing the value of individualized interventions for families of children with ASD.¹¹

The MOHO-based occupational therapy program significantly reduced depression, anxiety, and stress while improving self-esteem among mothers in the experimental group. These benefits may be attributed to interventions targeting volition, coping strategies, mindfulness, relaxation, self-reflection, routine restructuring, and meaningful occupational participation, which likely enhanced emotional well-being, confidence, and occupational balance.

Although the control group also showed modest improvements following parental education, the effects were comparatively smaller because the intervention mainly focused on information provision and emotional reassurance.

Significant improvements in occupational performance were also observed in the experimental group. Strategies such as time management, role organization, coping skill development, and meaningful activity engagement likely enhanced participants' ability to balance caregiving, self-care, and social roles. The superior outcomes in the experimental group highlight the effectiveness of the occupation-centered and client-focused MOHO approach in improving both psychological well-being and adaptive functioning.

Overall, the findings suggest that MOHO-based occupational therapy interventions are more effective than psychoeducation alone in reducing caregiver distress and improving self-esteem and occupational functioning among mothers of children with ASD.

Limitations

This study has several limitations. The sample was drawn exclusively from rehabilitation centers in Chennai, limiting generalizability to other regions and populations. Outcomes were based on self-reported measures (DASS-21 and RSES), which may be influenced by response and social desirability bias. The 12-week intervention period lacked long-term follow-up, preventing evaluation of the sustainability of effects.

Conclusion

MOHO-based occupational therapy significantly improved occupational performance and self-esteem while markedly reducing stress, anxiety, and depression among mothers of children with ASD. The findings advocate for the routine incorporation of MOHO approaches in family-centered interventions. Future investigations should assess the model's enduring impacts and longitudinal trajectories in larger, more diverse populations to further strengthen evidence-based caregiver support.

Ethical approval

Approved by the Institutional Ethics Committee of Saveetha Medical College Hospital (Ref. No. 004/06/2023/IEC/SMCH).

Declaration of generative AI and AI-assisted technologies

The author(s) used Gemini AI pro during the preparation of this manuscript strictly for language editing, spelling checks, and citation/text formatting. The tool was not used to generate novel concepts, analyze data, conduct literature retrieval, or draw scientific conclusions. All edits were critically evaluated, verified, and finalized by the author(s), who retain full accountability for the integrity and accuracy of the entire manuscript.

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Conflict of interest

The authors declare no conflict of interest.

CRediT authorship contribution statement

Punitha P: conceptualization, methodology, investigation, data curation, writing-original draft, review and editing; **Leonard Joseph:** supervision, writing-review and editing; **Shanthi Nambi:** supervision; **Raman K:** supervision; **Srinidhi DS:** data collection and data curation; **Inbadurai Palaniswami:** data curation, writing-review and editing.

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