



Original Article

Home-Based Modification Approaches for Children with Autism (3–18 Years): A Scoping Review

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ABSTRACT

Background: Creating a calm and supportive home environment is vital for children with Autism Spectrum Disorder (ASD) and their families. This scoping review aimed to examine the impact of personalized home-based modifications on the well-being and development of children with ASD.

Methods: Following the PRISMA-ScR guidelines, a comprehensive literature search was conducted across PubMed, Cochrane, ScienceDirect, and Scopus databases through June 2023. Emphasis was placed on key concepts related to home-based interventions for children aged 3 to 18 with ASD. From an initial pool of 6,022 articles, 23 relevant studies, including reviews, were selected for inclusion.

Results: Home-based modifications—including behavioral, sensory, and technological interventions—are prevalent and contribute to enhancing the quality of life for children with Autism Spectrum Disorder (ASD) while promoting their independence. This study underscores the importance of individualized living spaces and advocates for further research into integrating technology and architectural design within home environments. These findings provide valuable insights for healthcare professionals and caregivers.

Conclusion: Establishing a safe and supportive home environment for children with ASD is crucial. Tailored home modifications have been shown to improve their quality of life. Future research exploring architectural strategies, targeted interventions, and the integration of assistive technologies within home settings is recommended to further support children with ASD.

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Introduction

Autism Spectrum Disorder (ASD) is a lifelong neurological developmental disorder characterized by difficulties in social interaction, narrowly focused interests, and repetitive behavioral patterns [1]. ASD

developmental disorders worldwide [1]. Recent studies report variable prevalence estimates, ranging from 60 to 100 cases per 10,000 children [1]. Children with ASD—particularly those with below-average intellectual abilities—may display challenging behaviors that affect social integration, education, employment, and family relationships. These behaviors are often shaped by specific contextual factors [2].

Many families encounter significant challenges, revealing an often-overlooked need for appropriate home modifications. Home modification goes beyond physical alterations, encompassing behavioral adaptations and specialized equipment to promote comfort, autonomy, and

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encompasses a broad spectrum of manifestations and associated conditions, ranking among the most disabling

a sense of identity [2]. This need becomes even more critical given that most waking hours are spent at home [3]. Providing a safe and comfortable living environment is essential for individuals with autism [4].

Recognizing the pivotal role of the home environment involves prioritizing features such as security, tranquility, and accessibility in its design [2, 4]. This recognition highlights the home as a vital setting for healing and well-being in individuals with autism, reinforcing its importance in enhancing their overall quality of life [2, 4].

Children with ASD face several challenges within their home environments, including limited social interaction, sensory sensitivities, difficulties in generalizing experiences, safety concerns, and problematic behaviors [2]. Proposed home modifications address these issues by creating diverse, well-lit, sensory-friendly spaces, improving safety, reducing clutter, and enhancing overall comfort, emphasizing the benefits of houses over apartments [2].

Communication difficulties are a significant issue for children with ASD [5], prompting the use of supplementary and substitute interaction methods [6], with a growing emphasis on involving caregivers to enhance communication opportunities in natural settings [7]. Traditional therapies such as speech and language therapy, occupational therapy, and physiotherapy are frequently used to manage ASD symptoms [5], and are often parent-tailored [6] to suit various settings, including schools, clinics, and home-based programs [8].

Past studies and recent reviews in the field of ASD have commonly focused on intervention approaches, particularly in areas such as behavior and sensory processing [9]. However, this has resulted in a gap in comprehensive research that considers the multifaceted nature of ASD. Most recent studies have been intervention-oriented, often narrowing their focus to specific aspects such as behavioral or architectural modifications [6, 9]. While these approaches are valuable, they limit the exploration of the broader range of modifiable factors related to ASD. Consequently, a holistic examination of ASD—encompassing a wide array of contributing elements—remains largely underexplored.

Creating an inclusive environment for individuals with autism is essential [10]. This includes addressing their needs through family support, reducing societal biases, promoting understanding among peers, and advocating for genuine inclusion in educational, community, and professional contexts [6]. Additionally, environmental enrichment (EE) has shown promise in influencing outcomes in ASD; however, current treatment strategies still fall short in fully addressing the diverse and complex needs of individuals affected by the disorder [11].

Efforts to address the needs of children with ASD through current interventions have often proven insufficient. Environmental enrichment (EE) interventions have emerged as practical strategies, promoting sensory, neurological, and experiential adaptations in children with ASD [11]. There is growing interest in holistic approaches

such as EE to complement traditional therapies, due to their potential to induce neurobiological changes that are beneficial for individuals with ASD [11]. Tailoring home environments to meet the specific needs of children with ASD can significantly enhance their quality of life, independence, and safety [12]. This approach emphasizes the creation of enriched, organized, and comfortable living spaces, considering the complex neural circuits involved in ASD [12]. Therefore, comprehensive strategies that simultaneously consider the child, the environment, and caregivers are more likely to yield optimal outcomes [13]. These interventions improve functional performance [2], as home modifications can positively impact independent living and reduce reliance on caregivers [2].

Overall, existing reviews and meta-analyses on ASD interventions have been limited in scope, often focusing on specific aspects. There is an urgent need for a holistic and integrated approach that combines both therapeutic interventions and environmental modifications to enhance treatment effectiveness and create a supportive home environment for individuals with ASD and their families. This raises a critical question: What changes should be implemented at home to achieve these goals? This research aims to address this gap by adopting a comprehensive approach to home-based modifications and interventions, exploring various dimensions of the home environment. Ultimately, the findings can benefit individuals with autism, healthcare professionals, researchers, and the broader community by enhancing understanding and improving the well-being and quality of life of those living with ASD and their household members.

Methods

Review Methodology

This study, designed as a scoping review, follows the Arksey and O'Malley scoping review framework [14], employing the PRISMA framework adapted for Scoping Reviews (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) [15]. This approach facilitates a comprehensive examination of existing research, highlights gaps in current knowledge, and offers practical recommendations for improving home environments to enhance the quality of life for individuals with ASD and their families.

Eligibility Criteria

To be included in this review, publications were required to investigate, explore, theorize, or conceptualize home modifications and environmental adaptations for children with ASD, and to be authored by scholarly experts. The term “publication” was used broadly to encompass a wide range of review literature, including authors’ clinical and practice-based perspectives on home modifications, systematic reviews, and meta-analyses. The term “research study” was used explicitly when appropriate. As one of the primary goals of this scoping review was to provide a comprehensive overview of the

existing body of review literature on home modifications for children with ASD, no article was excluded based on quality. The methodological quality assessment was intentionally concise and did not include a formal quality appraisal [14].

Abstracts of publications were reviewed and selected based on the following criteria:

- (a) Publications providing details about home modifications, environmental adaptations, or therapeutic interventions for children with ASD;
- (b) A publication date post-1990, aligning with contemporary perspectives on ASD and its interventions;
- (c) Publications written in English.

The following exclusion criteria were applied:

- (a) Publications containing no information about home modifications or environmental adaptations for children with ASD;
- (b) Publications dated before 1990;
- (c) Publications composed in languages other than English.

This inclusive approach ensures a comprehensive mapping of the current review literature, helping identify knowledge gaps and fostering a more holistic understanding of how home environments can be optimized to support children with ASD and their families.

Literature Search Strategy

In June 2023, a comprehensive literature search was conducted across multiple online databases to identify

review articles on home-based modifications and environmental adaptations for children with ASD. PubMed, Cochrane, Scopus, and ScienceDirect were used for the online search to capture relevant literature published between January 1, 1990, and June 2023.

The search process involved using a combination of the following terms throughout the text:

- "Home-based" AND "Modification" AND "Strategy" AND "Autism"
- "Home-based" AND "Modification" AND "Approach" AND "Autism"
- "Home-based" AND "Strategy" AND "Autism"
- "Home-based" AND "Approach" AND "Autism"

This search strategy was designed to ensure a comprehensive retrieval of relevant review articles that discuss various aspects of home modifications and environmental adaptations that enhance the well-being of children with ASD and their caregivers.

Literature Selection

The initial search yielded 6022 unique records. After removing duplicates, 2649 articles remained. These articles were screened based on their titles and abstracts, resulting in the exclusion of 2571 (97%) articles. Subsequently, 78 full-text articles were evaluated for eligibility, leading to the exclusion of 55 (71%) articles. Ultimately, 23 publications met the inclusion criteria and were selected for this review, accounting for approximately 0.38% of the original 6022 records. Figure 1 depicts the selection process using the PRISMA-ScR flow diagram.

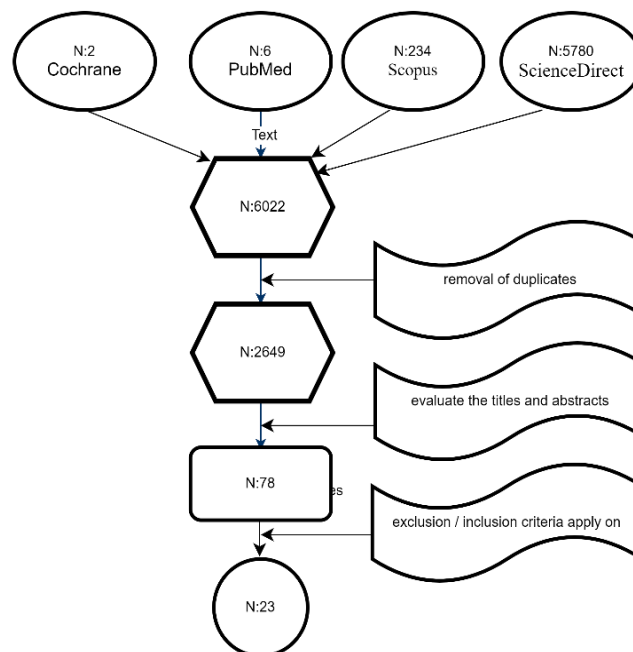


Figure 1: Flowchart of study selection process

Data charting

The primary author screened potential publications for inclusion based on their titles and abstracts, with full-text

reviews performed as needed. Subsequently, all co-authors independently verified that the selected publications met the eligibility criteria for inclusion in the study.

Information was collected and organized into Table 1 under the following headings: article title and publication year, authors, review types, modification approaches/strategies, aim, number of articles, and findings.

Synthesis of Results

In reviewing the literature, twelve modifications were identified to enhance home environments for children with ASD aged 3 to 18. These modifications included behavioral adaptations, technology-based interventions, sensory adjustments, family-focused strategies, and other approaches specifically designed to address the unique needs of children with ASD.

This research aims to bridge a critical gap in the current literature by adopting a holistic approach to home-based modifications for individuals with autism. It seeks to benefit individuals with ASD, healthcare professionals, researchers, and the broader community by deepening understanding and enhancing the quality of life for individuals with autism and their families.

Results

During this comprehensive scoping review, we systematically examined the available literature to investigate home-based modification strategies tailored to children diagnosed with ASD aged 3 to 18. Our initial search yielded a substantial pool of 6,022 references, which was subsequently refined to 2,649 after removing duplicate entries.

We then meticulously evaluated the titles and abstracts of these references following our inclusion criteria. In cases where key inclusion details were unclear or absent, full-text copies of the articles were retrieved and assessed. Following this rigorous screening process, we identified and included 23 articles that met the eligibility criteria, forming our final dataset, as presented in Table 1. These selected studies employed a variety of review methodologies, including scoping reviews, systematic reviews, literature reviews, trend analyses, and meta-analyses.

The scope of home environment modification extends beyond physical alterations to include behavioral adaptations and the integration of specialized equipment. This holistic approach aims to enhance physical comfort, the sense of control, and personal identity within the living space. Our study encompassed any type of modification generally feasible within a home setting.

Based on the modification approaches identified in the reviewed articles that met our inclusion criteria, we categorized them into 12 distinct types as follows:

1. Behavior-based Interventions: These interventions aim to modify behaviors using structured techniques:

- Studies by Fernandes and Amato [16], Ho et al. [17], Hayward et al. [18], Virues-Ortega [19], Makrygianni et al. [20], Peters-Scheffer et al. [21], and Scattone & Knighty [22].

2. Technology-based Interventions: These utilize technology to enhance cognitive processes and academic capabilities in children with ASD:

- Studies by Hong et al. [23], Mazon et al. [24], Xie et al. [25], and Wang & Koyama [26].

3. Sensory-based Interventions: These approaches address sensory processing issues commonly observed in children with ASD:

- Study by Lang et al. [27]

4. Parent Training-based Interventions: These involve training parents to implement therapeutic techniques at home.

- Study by Matson et al. [28]

5. Sibling-based Interventions: These interventions utilize neurotypical siblings to support children with ASD.

- Study by Lu et al. [29]

6. Relationship-based Interventions: These focus on developing social and emotional connections.

- Studies by Rodrigues et al. [30], Virues-Ortega et al. [31], and Divya et al. [32]

7. Schedule-based Interventions: These use structured schedules to foster independence and self-management skills.

- Study by Koyama & Wang [33]

8. Architecture-based Interventions: Modifying the physical environment to reduce challenging behaviors:

- Study by Roos et al. [34]

9. Friendship-based Interventions: These aim to improve social skills and facilitate the formation of friendships.

- Study by Chang & Dean [35]

10. Training and Collaboration-based Interventions: These emphasize professional development and interdisciplinary teamwork.

- Study by Swiezy et al. [36]

11. Self-Management-based Interventions: These teach individuals to regulate their behaviors independently.

- Study by Aljadeff-Abergel et al. [37]

12. Family-based Interventions: These approaches involve the entire family supporting the child with ASD.

- Study by Smith et al. [38]

Collectively, these studies aim to enhance the well-being of children diagnosed with ASD by adapting the home environment to meet their unique needs through a diverse range of targeted interventions.

Table 1: Home-based modification approaches for children with autism (3-18 years old)

Article title and publication year	Author/ authors	Review types	Modification approaches / strategies	Aim	Number of articles	Findings
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Article title and publication year	Author/ authors	Review types	Modification approaches / strategies	Aim	Number of articles	Findings
A scoping review of gamification for mental health in children: Uncovering its key features and impact (2022) [25]	Huiting Xie	Review types	Technology-based	The aim is to carry out a scoping review of studies to explore evidence on the effectiveness of gamification in enhancing mental health in children and adolescents.	215 articles -> 8 articles	Gamification improves mood and anxiety treatment in children and adolescents faster than traditional cognitive behavior therapy.
Effectiveness and Usability of Technology-based Interventions for Children and Adolescents with ASD: A Systematic Review of Reliability, Consistency, Generalization, and Durability Related to the Effects of Intervention (2018) [24]	Mazon, Cécile; Fage, Charles; Sauzéon, Hélène	Systematic review	Technology-based	The primary goal of this study is to review research on technology-based interventions aimed at improving cognitive processes and/or academic skills in children and adolescents with ASD, with a particular focus on TE and/or TU.	685 -> 31 studies	This review highlights methodological limitations in Technology-Based Interventions (TBI) for children and adolescents with ASD and recommends combining Therapeutic Effectiveness (TE) with Technological Usability (TU) to enhance research quality and promote interdisciplinary collaboration.
A meta-analysis of single-case research on the use of tablet-mediated interventions for persons with ASD ¹ (2017) [23]	Ee Rea Honga, , Li-yuan Gongga, , Jennifer Nincib, , Kristi Morinc John L. Davidd, Sawako Kawaminami a, , Yan-qiu Shia, , Fumiyuki Noro	Systematic review	Technology-based	This article conducts a quality review of single-case experimental studies and summarizes findings from research on tablet-mediated interventions for individuals with ASD.	757 studies ->36 articles	Additional single-case experimental studies in natural settings such as homes, communities, and workplaces are necessary to improve tablet-mediated interventions for individuals with ASD.
An analysis and review of the literature and a three-tier video Modeling Intervention Model (2014) [26]	Hui-Ting Wang, Takanori Koyama	Systematic literature review	Technology-based	The paper had two aims: first, to analyze literature on VM ² intervention characteristics and video components for practical and research use; second, to create a 3-tier VM intervention model based on delivery methods and resource allocation to address learner-influencing factors.	It is not mentioned in the article. -> 60 studies	Seven intervention features and seven video-related components were identified, along with future research implications for the 3-tier model.
Applied Behavior Analysis and Autism Spectrum Disorders: literature review (2013) [16]	Fernanda Dreux Miranda Fernandes Cibelle	Literature review	Behavioral-based Interventions	This systematic review is conducted to provide further study around Applied Behavior Analysis (ABA) ³	672 studies -> 52 studies	Insufficient evidence supports favoring ABA over other alternatives.

¹ Autism Spectrum Disorder (ASD)² Video Modeling (VM)³ Applied Behavior Analysis (ABA)

Article title and publication year	Author/ authors	Review types	Modification approaches / strategies	Aim	Number of articles	Findings
	Albuquerque de la Higuera Amato			focused on individuals with Autism Spectrum Disorders, aiming to contribute to a better evidence-based practice		
Cognitive-behavioral approaches for children with autism spectrum disorder: A trend analysis (2017) [17]	Betty P.V. Ho Jennifer Stephenson, Mark Carter	Trend analysis	Behavioral-based Interventions	This review is conducted to examine broad trends in Cognitive-behavioral approaches for children with autism spectrum disorders	729 -> 103 studies	More young children are participating in studies, but despite numerous experimental group studies, the anticipated rise in randomized controlled trials or sample sizes has not occurred.
Intensive behavioural intervention for young children with autism: A research-based service model (2009) [18]	Diane W. Hayward, Catherine M. Gale, Svein Eikeseth	Review	Behavioral-based Interventions	This paper aims to describe a research-based model around ABA, which is validated empirically.	It is not mentioned in the article.	An effective ABA program integrates treatment in natural settings, involves parents, employs intensive methods with skilled staff using advanced learning principles, ensures supervision by qualified supervisors, and provides research-based, quality-controlled services. The paper details integrating these elements into a service model.
Applied behavior analytic intervention for autism in early childhood: Meta-analysis, meta-regression and dose-response meta-analysis of multiple outcomes (2010) [19]	Javier Virués-Ortega	Systematic review	Behavioral-based Interventions	This study aims to evaluate the overall effectiveness of ABA interventions for autism, assess their impact across various outcome variables for a comprehensive analysis, and examine the influence of factors such as intervention duration, intensity, design, model, and delivery method on their effectiveness.	206 studies -> 22 studies	Comprehensive and extended ABA interventions substantially enhance intellectual abilities, language development, daily living skills, and social functioning in autistic children.
The effectiveness of applied behavior analytic interventions for children with Autism Spectrum Disorder: A meta-analytic study (2018) [20]	Maria K. Makrygianni , Angeliki Gena, Sofia Katoudi, Petros Galanis	Systematic review	Behavioral-based Interventions	This meta-analysis aimed to thoroughly evaluate ABA programs for children with ASD using advanced meta-analytic methods.	6949+6 studies -> 29 studies	This meta-analysis reinforces the effectiveness of ABA programs in multiple developmental areas, offering additional evidence of their efficacy in treating children with ASD.
A meta-analytic study on the effectiveness of comprehensive ABA-based early intervention programs for children with Autism Spectrum Disorders (2013) [21]	Nienke Peters-Scheffer , Robert Didden , Hubert Korzilius , Peter Sturmey	Systematic review	Behavioral-based Interventions	This meta-analysis aimed to evaluate the effectiveness of Early Intensive Behavioral Intervention (EIBI) ¹ based on applied behavior analysis for young children with ASD.	2130 studies -> 11 studies	The results strongly confirm the effectiveness of Early Intensive Behavioral Intervention (EIBI).
Current Trends in Behavioral Interventions for Children with Autism (2006) [22]	Dorothy Scattone and Kimberly R. Knighty	Review	Behavioral-based Interventions	This paper aims to review interventions centered on skill acquisition for children diagnosed with ASD.	It is not mentioned in the article.	Behavioral research is trending towards naturalistic teaching methods suitable for home and school settings.
Qigong in the treatment of children with autism	Jorge Magalhães Rodrigues,	Systematic review	Relationship-based Interventions	This systematic review aims to assess and categorize the literature	157+10 studies -> 10 studies	Qigong shows promise for children with autism spectrum disorder, warranting further research.

¹ Early Intensive Behavioral Intervention (EIBI)

Article title and publication year	Author/ authors	Review types	Modification approaches / strategies	Aim	Number of articles	Findings
spectrum disorder: a systematic review (2019) [30]	Mariana Mestre, Larry Ibarra Fredes			concerning the effectiveness of Qigong as a therapeutic approach for children with autism spectrum disorders		
The TEACCH ¹ program for children and adults with autism: A meta-analysis of intervention studies (2013) [31]	Javier Virues-Ortega, Flávia M. Julio, Roberto Pastor-Barriuso	Systematic review	Relationship-based Interventions	In this study, advanced meta-analytical techniques were employed to assess the combined clinical impacts of TEACCH across various outcomes	It is not mentioned in the article. - >13 studies	TEACCH showed small effects on cognitive and adaptive skills but moderate to significant improvements in social behavior and reductions in maladaptive behavior. Factors like intervention duration, intensity, and setting did not significantly influence outcomes, though more research is needed due to limited studies.
DIR ² /Floor Time in Engaging Autism: A Systematic Review (2023) [32]	Divya K Y, Farzana Begum, Sheeba Elizabeth John, Frincy Francis	Systematic review	Relationship-based Interventions	This systematic review was aimed at evaluating the effect of Floortime on children with Autism	45 studies -> 12 studies	Current studies provide limited support for Floortime's effectiveness compared to other interventions for ASD. More randomized controlled trials are needed to better understand its impact on developmental skills in children with autism. Floortime is seen as a cost-effective, child-centered approach for early intervention.
The effectiveness of self-management interventions for children with autism: A literature review (2015) [37]	Elian Aljadeff-Abergel, Yannick Schenk, Christopher Walmsley, Stephanie M. Peterson, Jessica E. Frieder, Nicholas Acker	Literature review	Self-management interventions	This review aims to evaluate the social validity of self-management interventions for those diagnosed with autism, to compare the extent to which these interventions have been carried out in a clinical setting, and to provide a second evaluation of the methodological quality of these studies.	111 studies -> 35 studies	Self-management interventions for children with autism are effective across various settings, but few studies have evaluated social validity formally. Future research should address methodological limitations.
How does architecture contribute to reducing behaviours that challenge? A scoping review (2022) [34]	Berit Ann Roos, Mark Mobach, Ann Heylighen	Scoping review	Architecture-based	This scoping review studies the effects of architecture on the QoL of individuals involved in such behaviours. It aims to spot possible gaps in the current literature, suggesting areas for future research.	655 articles -> 18 articles	No comprehensive study has yet combined architecture, quality of life, intellectual impairment, and challenging behaviors. Future research should explore how architecture impacts quality of life and compare the needs of this group with those of individuals with autism.
Sensory Integration Therapy for Autism Spectrum Disorders: A Systematic Review (2012) [27]	Russell Lang, Mark O'Reilly, Olive Healy, Mandy Rispoli, Helena Lydon, William Streusand, Tonya Davis, Soyeon Kang, Jeff	Systematic review	Sensory-based Interventions	This review aims to systematically examine and summarize research on using SIT ³ to educate and treat children with ASD.	57 studies + 3 ancestor studies -> 25 studies	The current review does not support using SIT in the education and treatment of children diagnosed with ASD

¹Treatment and Education of Autistic and Communication-handicapped Children (TEACCH)²Developmental, Individual-differences, Relationship-based (DIR)³Sensory Integration Therapy (SIT)

Article title and publication year	Author/ authors	Review types	Modification approaches / strategies	Aim	Number of articles	Findings
Use of an activity schedule to promote the independent performance of individuals with autism and other intellectual disabilities: A review (2011) [33]	Sigafoos, Giulio Lancioni, Robert Didden, Sanne Giesbers Takanori Koyama , Hui-Ting Wang	Literature review	Schedule-based	This study aimed to identify target groups for the effective use of activity schedules (e.g., age, diagnosis, intellectual functioning), determine appropriate symbols, activities, and contexts for integration, and predict significant behavioral changes resulting from these interventions.	It is not mentioned in the article. -> 23 studies	The study found that activity schedules improved independence and self-management skills in individuals with intellectual disabilities. Positive outcomes included increased engagement, on-task behavior, and better task initiation and scheduling.
Friendship interventions and measurements in children with ASD: A systematic review (2022) [35]	Ya-Chih Chang, Michelle Dean	Systematic review	Friendship-based	This systematic review aims to study how social skills and friendship interventions impact the friendship outcomes of individuals with ASD.	5005 studies -> 27 studies	The findings emphasize the advantages of friendship-building strategies in social interventions and underline the need for incorporating diverse perspectives in evaluating friendships.
The Family Context of Autism Spectrum Disorders: Influence on The Behavioral Phenotype and Quality of Life (2013) [38]	Leann E. Smith, Jan Greenberg, Marsha R. Mailick	Review	Family-based	It is aimed to pinpoint the family environment characteristics linked to the reduction or exacerbation of behavior problems over time	It is not mentioned in the article.	This research investigates how family environment influences autism traits and introduces a new psychoeducation program to support adolescents with autism and their families.
Parent training: A review of methods for children with autism spectrum disorders (2009) [28]	Michael L. Matson, Sara Mahan, Johnny L. Matson 10:57 AM	Review and status report	Parent training-based	Current trends around training parents as therapists and future directions are discussed.	It is not mentioned in the article.	This article reviews evidence-based methods to train parents as therapists for children with ASD.
Using neurotypical siblings as intervention agents to guide individuals with Autism Spectrum Disorders: A systematic review (2021) [29]	Yuemei Lu , Sarah N. Douglas , Atikah Bagawan , Janet L. Hauck	Systematic review	Sibling-based	This systematic review is a recap of existing interventions in which NT siblings are used as intervention agents for their siblings diagnosed with ASD.	1006 studies -> 16 studies	This review examines training approaches for neurotypical siblings as intervention facilitators for individuals with ASD and highlights findings on social validity.
Bridging for Success in Autism: Training and Collaboration Across Medical, Educational and Community Systems (2008) [36]	Naomi Swiezy, Melissa Stuart, Patricia Korzekwa	Review	Training and Collaboration-based	The purpose of this review is to establish a critical context and highlight the imperative for training and collaboration across the home, medical, educational, and community systems.	It is not mentioned in the article.	The HANDS ¹ in Autism program exemplifies effective immersive training through hands-on experiences and feedback, enhancing services and collaboration for individuals with ASD.

¹ Helping Answer Needs by Developing Specialists (HANDS)

Discussion

Building upon our scoping review, this study highlights the critical need for a comprehensive exploration of home-based modifications and their impact on the well-being of children with Autism Spectrum Disorder (ASD). Our research centers on the value of personalized home adjustments to foster inclusive, therapeutic, and supportive living environments. Nagib's study underscores the significance of designing therapeutic settings for children with autism, particularly through architectural and sensory modifications that promote well-being [2]. While aligning with these findings, our review extends the scope by addressing a broader range of challenges encountered by children with ASD in the home, including difficulties related to social interaction, sensory processing, and safety, thereby addressing a wider spectrum than Nagib's study.

• As Egilson et al. [39] provide insights into how specific home adaptations can enhance participation in daily activities, and Nguyen, d'Auria, and Heylighen [40] emphasize the role of customized home environments in supporting the autonomy of individuals with autism, our investigation focuses on Environmental Enrichment (EE). EE is defined as the intentional enhancement of living spaces to promote sensory, neurological, and experiential adaptations in children with ASD [9]. In presenting our findings, we categorized studies based on modification approaches that can be implemented within the home environment. Table 1 outlines these identified modification strategies, visually representing the diverse interventions. The observed trends indicate a notable prevalence of home-based modifications. The categorized types include:

- Technology-based Interventions
- Behavior-based Interventions
- Relationship-based Interventions
- Self-management-based Interventions
- Architecture-based Interventions
- Sensory-based Interventions
- Schedule-based Interventions
- Friendship-based Interventions
- Family-based Interventions
- Parent Training-based Interventions
- Sibling-based Interventions
- Training and Collaboration-based Interventions

Our findings illustrate how specific home modifications promote engagement and comfort, potentially stimulating cognitive development. This aligns with previous research on successful Environmental Enrichment (EE)

interventions, which demonstrate that enriched environments can significantly enhance the well-being of children with ASD. Despite these promising outcomes, our study recognizes the inherent challenges in synthesizing data from diverse sources. The broad range of modifications—spanning behavioral, sensory-based, and technology-driven interventions—highlights the pressing need for further research at the intersection of architectural design and quality of life for children with ASD.

The practical implications of our findings suggest that while technology-based interventions are beneficial, they must prioritize user-friendliness and be seamlessly integrated into real-world home settings. Beyond technological solutions, behavioral interventions show considerable promise. These strategies often require limited financial resources but demand consistent, deliberate implementation by caregivers. Sensory-based modifications—such as the incorporation of calming color palettes and controlled lighting—have also proven effective in creating more supportive environments for children with ASD.

In conclusion, our study contributes substantially to the growing knowledge on tailored home modifications for children with ASD. We offer valuable insights for caregivers, healthcare professionals, and researchers by emphasizing their transformative potential. Our findings advance the understanding of how home environments can be optimized to support individuals with ASD, laying a foundation for future research and real-world applications to improve their quality of life.

Conclusion

In addition to therapeutic interventions, creating a safe and nurturing home environment for all family members is essential. Home modifications are necessary to meet the unique needs of children diagnosed with autism. This scoping review highlights the critical role of designing appropriate and secure living spaces, revealing that environmental enhancements can substantially improve the quality of life for individuals with ASD. These modifications frequently include improvements to sensory environments, reducing environmental hazards, and creating calm, secure spaces that enhance overall household comfort. Equally important is the inclusion of appropriate facilities and opportunities for communication, especially given the central role that communication plays in the development of children with ASD.

Future research should explore the intersection of architecture, technology, and therapeutic interventions

within home settings. Such investigations can offer valuable insights and resources for healthcare providers, researchers, and caregivers, ultimately contributing to more effective support systems for children with ASD and their families.

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Ethical Considerations

Compliance with Ethical Guidelines: No ethical concerns applied to this study.

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Authors' contributions

All authors contributed equally to this manuscript's conception, design, and preparation.

Conflict of interest: The authors declare no conflict of interest.

References

- Hus Y, Segal O. Challenges surrounding the diagnosis of autism in children. *Neuropsychiatric disease and treatment*. 2021;3509-29.
- Nagib W. *Toward a Therapeutic and Autism-Friendly Home Environment* 2014.
- Marsh A. *Home sweet home?: the impact of poor housing on health*: Policy Press; 1999.
- Zaniboni L, Marzi A, Caniato M, Gasparella A, editors. *Comfortable and safe environments for people with autism: Preliminary analysis of risks and definition of priorities in the design phase*. *Journal of Physics: Conference Series*; 2021: IOP Publishing.
- Patten E, Baranek GT, Watson LR, Schultz B. Child and family characteristics influencing intervention choices in autism spectrum disorders. *Focus Autism Other Dev Disabl*. 2013;28(3):138-46.
- Lai M-C, Anagnostou E, Wiznitzer M, Allison C, Baron-Cohen S. Evidence-based support for autistic people across the lifespan: Maximising potential, minimising barriers, and optimising the person-environment fit. *The Lancet Neurology*. 2020;19(5):434-51.
- Hong ER, Ganz JB, Neely L, Gerow S, Ninci J. A review of the quality of primary caregiver-implemented communication intervention research for children with ASD. *Research in Autism Spectrum Disorders*. 2016;25:122-36.
- Baranek GT, Carlson M, Sideris J, Kirby AV, Watson LR, Williams KL, et al. Longitudinal assessment of stability of sensory features in children with autism spectrum disorder or other developmental disabilities. *Autism Res*. 2019;12(1):100-11.
- Zwaigenbaum L, Bauman ML, Choueiri R, Fein D, Kasari C, Pierce K, et al. Early identification and interventions for autism spectrum disorder: executive summary. *Pediatrics*. 2015;136(Supplement_1):S1-S9.
- Irani N, Bavar C, Mirzakhani N, Daryabor A, Pashmdarfard M, Khademi Kalantari S. Effect of Interior Architecture of Rehabilitation Centers on the Outcome of Occupational Therapy for Children With Autism Spectrum Disorders. *Archives of Rehabilitation*. 2024;24(4):602-15.
- Manosso LM, Broseghini LD, Campos JMB, Padilha APZ, Botelho MEM, da Costa MA, et al. Beneficial effects and neurobiological aspects of environmental enrichment associated to major depressive disorder and autism spectrum disorder. *Brain Research Bulletin*. 2022;190:152-67.
- Gaines K, Bourne A, Pearson M, Kleibrink M. *Designing for autism spectrum disorders*: Routledge; 2016.
- Boggs TL. *The Effects of Environmental Modifications and Visual Supports in the Home on Engagement and Challenging Behaviors in Children with Autism*: East Tennessee State University; 2016.
- Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *International journal of social research methodology*. 2005;8(1):19-32.
- Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Annals of internal medicine*. 2018;169(7):467-73.
- Fernandes FDM, Amato C, editors. *Applied behavior analysis and autism spectrum disorders: literature review*. CoDAS; 2013: Sociedade Brasileira de Fonoaudiologia.
- Ho BP, Stephenson J, Carter M. Cognitive-behavioral approaches for children with autism spectrum disorder: A trend analysis. *Research in Autism Spectrum Disorders*. 2018;45:27-41.
- Hayward DW, Gale CM, Eikeseth S. Intensive behavioural intervention for young children with autism: A research-based service model. *Research in Autism Spectrum Disorders*. 2009;3(3):571-80.
- Virués-Ortega J. Applied behavior analytic intervention for autism in early childhood: Meta-analysis, meta-regression and dose-response meta-analysis of multiple outcomes. *Clinical psychology review*. 2010;30(4):387-99.
- Makrygianni MK, Gena A, Katoudi S, Galanis P. The effectiveness of applied behavior analytic interventions for children with Autism Spectrum Disorder: A meta-analytic study. *Research in Autism Spectrum Disorders*. 2018;51:18-31.
- Peters-Scheffer N, Didden R, Korzilius H, Sturmey P. A meta-analytic study on the effectiveness of comprehensive ABA-based early intervention programs for children with autism spectrum disorders. *Research in Autism Spectrum Disorders*. 2011;5(1):60-9.
- Scattone D, Knight KR. Current trends in behavioral interventions for children with autism. *International Review of Neurobiology*. 2006;72:181-93.
- Hong ER, Gong L-y, Ninci J, Morin K, Davis JL, Kawaminami S, et al. A meta-analysis of single-case research on the use of tablet-mediated interventions for persons with ASD. *Research in developmental disabilities*. 2017;70:198-214.
- Mazon C, Fage C, Sauzéon H, editors. *Effectiveness and Usability of Technology-based Interventions with children and adolescents with ASD: a systematic review*. *EuroScience Open Forum (ESOF)* 2018; 2018.

25. Xie H. A scoping review of gamification for mental health in children: Uncovering its key features and impact. *Archives of Psychiatric Nursing*. 2022;41:132-43.
26. Wang H-T, Koyama T. An analysis and review of the literature and a three-tier video modeling intervention model. *Research in Autism Spectrum Disorders*. 2014;8(7):746-58.
27. Lang R, O'Reilly M, Healy O, Rispoli M, Lydon H, Streusand W, et al. Sensory integration therapy for autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders*. 2012;6(3):1004-18.
28. Matson ML, Mahan S, Matson JL. Parent training: A review of methods for children with autism spectrum disorders. *Research in Autism Spectrum Disorders*. 2009;3(4):868-75.
29. Lu Y, Douglas SN, Bagawan A, Hauck JL. Using neurotypical siblings as intervention agents to guide individuals with Autism Spectrum Disorders: A systematic review. *Research in Autism Spectrum Disorders*. 2021;89:101868.
30. Rodrigues JM, Mestre M, Fredes LI. Qigong in the treatment of children with autism spectrum disorder: A systematic review. *Journal of integrative medicine*. 2019;17(4):250-60.
31. Virues-Ortega J, Julio FM, Pastor-Barriuso R. The TEACCH program for children and adults with autism: A meta-analysis of intervention studies. *Clinical psychology review*. 2013;33(8):940-53.
32. Divya K, Begum F, John SE, Francis F. DIR/floor time in engaging autism: a systematic review. *Iranian journal of nursing and midwifery research*. 2023;28(2):132-8.
33. Koyama T, Wang H-T. Use of activity schedule to promote independent performance of individuals with autism and other intellectual disabilities: A review. *Research in developmental disabilities*. 2011;32(6):2235-42.
34. Roos BA, Mobach M, Heylighen A. How does architecture contribute to reducing behaviours that challenge? A scoping review. *Research in Developmental Disabilities*. 2022;127:104229.
35. Chang Y-C, Dean M. Friendship interventions and measurements in children with ASD: A systematic review. *Research in Autism Spectrum Disorders*. 2022;93:101947.
36. Swiezy N, Stuart M, Korzekwa P. Bridging for success in autism: Training and collaboration across medical, educational, and community systems. *Child and adolescent psychiatric clinics of North America*. 2008;17(4):907-22.
37. Aljadeff-Abergel E, Schenk Y, Walmsley C, Peterson SM, Frieder JE, Acker N. The effectiveness of self-management interventions for children with autism—A literature review. *Research in Autism Spectrum Disorders*. 2015;18:34-50.
38. Smith LE, Greenberg JS, Mailick MR. The family context of autism spectrum disorders: Influence on the behavioral phenotype and quality of life. *Child and Adolescent Psychiatric Clinics*. 2014;23(1):143-55.
39. Egilson ST, Jakobsdóttir G, Ólafsdóttir LB. Parent perspectives on home participation of high-functioning children with autism spectrum disorder compared with a matched group of children without autism spectrum disorder. *Autism*. 2018;22(5):560-70.
40. Nguyen LP, d'Auria V, Heylighen A. Home Tailoring: Independent Living on the Autism Spectrum. *Housing and Society*. 2023.