Review Article

DIR/Floor Time in Engaging Autism: A Systematic Review

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Abstract

Background: Autism Spectrum Disorder (ASD) is a pervasive developmental disorder, which affects various multiple areas of a child's development. The objective of this study was to systematically review the available literature and appraise the effect of floortime in engaging autism disorder among children. **Materials and Methods:** A systematic review was performed using PubMed, PsycINFO, Science Direct, Scopus, Google Scholar, and Medline. The search terms used were DIR/floor time, ASD, floortime and autism, relationship therapy and autism, floortime, and ASDs. The studies, which described floortime in engaging children with ASD, full-text available in English, the sample had no comorbid psychiatric diagnosis, and the articles published in English from 2010 to 2020 were included in the review. Twelve studies meeting the inclusion criteria were included in the review. **Results:** The results showed substantial progress in different levels of functioning of autistic children with floortime. Home-based floortime improved emotive functioning, communication, and daily living skills, the parent-child interactions were improved as expressed by mothers, and also certain demographic factors of the parents have significantly influenced the floortime outcome. There were no adverse events to children or parents during floortime. **Conclusions:** In general, we concluded that floortime is a cost-effective, completely child-led approach, which could be initiated as early as possible. If started early by healthcare professionals, it can be vital in improving social and emotional development among children.

Keywords: *Autism spectrum disorder, children, DIR-floortime, systematic review*

Introduction

Autism Spectrum Disorder (ASD) is a complex developmental condition ensuing a considerable encumbrance for people, their relatives, and the community.[1,2] This disorder includes repeated and limited patterns of behavior. ASD begins in early childhood and ultimately causes problems functioning at schools and the workplace. The impairment of functions may range from mild to moderate to severe in children with ASD.[3] The prevalence of ASDs appears to be increasing globally over the past 50 years.[4] The worldwide prevalence of ASD is 1 in 160.1 The possible increase in number could be due to increased awareness among the public regarding autism, clarity of diagnostic guidelines, improved diagnostic tools, and improved reporting.[4] Among children of Oman, the prevalence of ASD has a 15-fold increase from 2011 estimates. The overall prevalence has increased from 20.35 per 10,000 children in 2012 to 36.51 in 10,000 by 2019. ASD among boys was 3.4-fold higher than among girls, that is, 31.23/10000 and 9.07/10000, respectively.[5] As the number of cases of autism is increasing, there arises a need for an increased number of trained professionals and facilities.[6] Though the primary view of autism is as a childhood disorder, it is a lifelong illness that necessitates support for people on the spectrum across their lifespan. Early identification, building a solid foundation from childhood through adolescence and providing support that enhances the highest possible quality of life and independence are the three areas autistic people need services.[7]

Currently, no cure is available for ASD. Still, several interventions have been tried among children and improved cognitive ability, daily living skills, communication, and relationship skills. People with ASD are often unique in their strengths and disabilities; hence the treatment options should be multidisciplinary and may involve parent-mediated, therapist-mediated, or child-targeted interventions. The treatment

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modalities generally include modification of communication and behavior, dietary modifications, pharmacotherapy, and alternative systems of medicine.[8] Developmental approaches to ASD help children form optimistic and significant associations with others. Developmental approaches include the developmental social pragmatic model, DIR (developmental, individual difference, relationship-based)/floortime, relationship expansion, and responsive teaching.[9] Stanley–Greenspan introduced DIR/floor time in 1989. It provides an outline to know the functional and emotional development distinctive of each child. It also gives a guide to making emotionally effective communications that promote children's developmental capabilities with ASD.[10] DIR intervention program effectively increases interpersonal relationships and communication and adaptive patterns of behavior among offspring with ASDs.[11] There is a development of nerve cell networks and neural pathways in the child's brain happening during parent–child interaction of floortime.[12]

Play is the main living of children and has been found to bring significant modifications in children's emotional functioning, communication, and adaptive behavior.[13] Hence, play could be utilized therapeutically for children with ASDs, as in the case of many other childhood behavioral disorders. DIR model provides the framework for implementing daily floortime sessions, which enhances advanced order thinking, constant problem solving, reality-based rational conversations, and reflections.[14] DIR/floortime is a combined model of human development, which includes an interface with the environment, parents, and the child's emotional and/or developmental capacities. It centers on relations, social abilities, meaningful, and spontaneous use of communication.[15] Floortime is a play therapy, which helps children to shape emotive acquaintances and communication skills. Nurses can act as a liaison between autistic children, their families, and therapist by observing the children-led play activities in the unit and educating the parents on various ways of engaging children along with other forms of therapy. Nurses can use play therapy during their routine care for children who are hospitalized to improve their communication and friendship bonds. The use of therapeutic play will help the children and families to convert their traumatic hospital journey into pleasant learning for their adaptation to life later on[13,15]. This review aims to systematically review the available literature and appraise the effect of floortime in engaging ASD among children.

Materials and Methods

A systematic literature review was performed using PubMed, PsycINFO, ScienceDirect, Scopus, Google Scholar, and Medline from 2010 until January 2021. The review was started in January 2020 and completed in January 2021. The search terms used were DIR/floortime, ASD, floortime, autism, relationship therapy, ASDs, and children with ASD. Moreover, recognizing the missing studies was performed by reviewing the reference list of the primarily identified studies. The peer-reviewed literature, which described floortime in engaging children with ASD was included in the review.

The inclusion criteria were quantitative research studies done among children with ASD, a sample having no comorbid psychiatric diagnosis, articles published in English from 2010 to 2020, and full articles available for free download in the health sciences library where the researchers work. The textbook chapters, comments to the editor, articles published in languages other than English, full articles not available, and literature reviews were excluded from the search.

A review protocol was prepared in identifying the relevant publications, and it is registered in PROSPERO (CRD42020177731). PRISMA 2009 is used for reporting the findings. Two reviewers ran an independent search in the beginning and compared the results to remove the duplicates. Two reviewers performed the title and abstract screening, and a debate amongst the reviewers resolved the disputes. The third and fourth reviewers who were not involved in the primary screening ensured accuracy. The search strategy is displayed in the PRISMA diagram. Figure 1. PRISMA 2009 depicting the search strategy.

Data were individually mined and organized into a Microsoft Excel sheet by the two reviewers. The data were then matched and arrived at a common consensus. The third and fourth reviewers ensured accuracy. Data items extracted included study ID, type of study, the country where the analysis was performed, sample size, age group of the children under investigation, duration of treatment, treatment method, and the outcomes. With the help of McMaster's basic review form for quantitative studies, a critical analysis of the article was performed, which accommodates analysis of different study designs.[16] All items in the tool were discussed by the reviewers before the appraisal to ensure consistent interpretation. A total score of 14 was given, where yes = one, not applicable/no/and not stated = zero. The studies scored from 7–14, suggesting a moderate quality level for studies included in the review. Management of inconsistencies was ensured by discussion among the two reviewers and considering evidence from the analyses.

Ethical considerations

As this systematic review does not involve human respondents, ethical approval was not obtained from the Academic Research Committee. However, the researchers tried unbiased ways to analyze the retrieved data from the articles. The authors avoided plagiarism in any form while reporting the findings in this manuscript. Also, the results that were not significant were also reported and discussed without bias. The researchers avoided any data fabrication and falsification while drafting this manuscript.

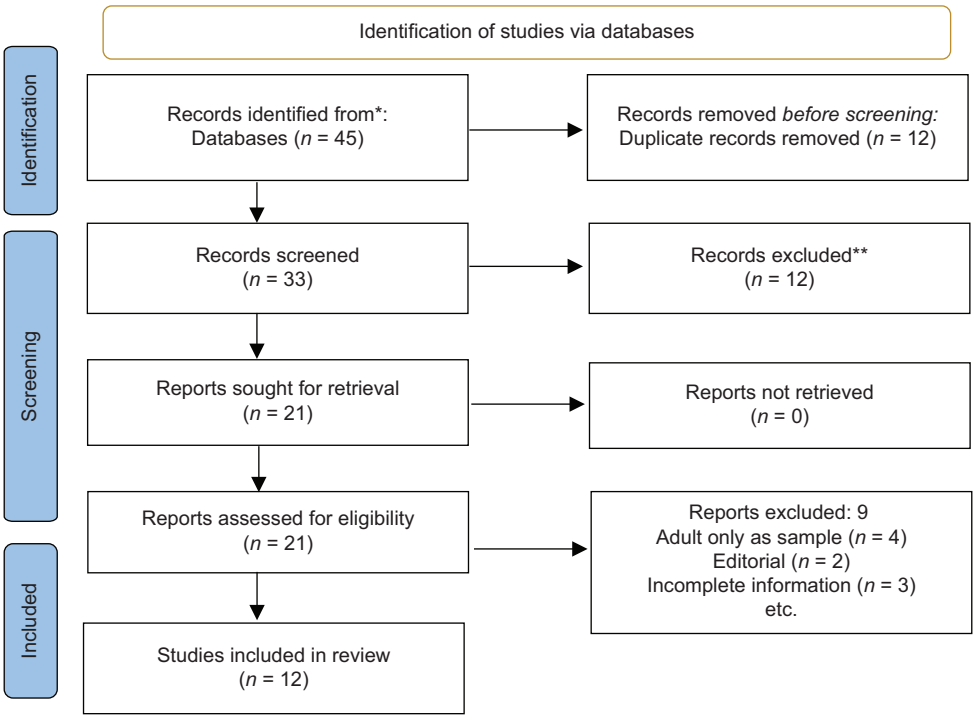

Figure 1: Flow diagram showing the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) adopted from Systematic Reviews (OPEN ACCESS) Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, *et al*. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. Systematic Reviews 2021;10:89

Results

The research designs and outcome measures varied across the studies; hence a narrative description of the results is presented. Figure 1 shows the studies selected and excluded at each stage of the literature search. The initial search strategy identified 40 articles with an additional 5 in the second search. After 12 replicas were uninvolved, 33 articles proceeded to the abstract and title screening. Twenty-one articles progressed for full-text screening. Nine articles were excluded for incomplete information, samples that did not match, and full text available in languages other than English. Finally, 12 articles were included in this narrative description of the results.

The main characteristics of the included studies are presented in Table 1. Data items extracted included study ID, type of study, the country where the analysis was performed, sample size, age group of the children under investigation, duration of treatment, treatment method, and the outcome. The 12 studies analyzed in this review are published from 2010 to 2021. The included studies were a prospective follow-up study (2), RCT (1), cross-sectional study (1), correlational study (1), case study (2), a quasi-experimental study (1), mixed-method (1), longitudinal evaluation research (1). single subject study (1), and pretest–posttest control group experimental design (1). The studies were performed in Taiwan. (1), US (3), India (2), Canada (1), Iran (2), Turkey (1), Egypt (1), and the place of study was not mentioned in one of the studies. A total of 312 children were included in the studies with ages ranging from 2 to 19 years. All samples had ASD or pervasive developmental disorder not otherwise specified diagnosed. Symptom severity ranged from minor to modest and severe across all 12 studies. The sample size varied from 1 subject to 128 subjects.

As there was a tangible dearth of studies on DIR/floortime as an intervention in engaging autism, all the available studies were considered for the review. Some studies have used DIR/floortime as the intervention, whereas some others used DIR/floortime principles-based activities such as music therapy, art therapy, use of Indian ragas in floortime, parental training on floortime activities for children with autism. This made the exact comparison difficult. The duration of the intervention varied from 5 weeks to 1 year, and the hours of treatment given on a specified day also varied in time from 2 to 5 h per day. The number of sessions in which the activity is practiced is not mentioned in all studies. Across the various studies considered for review, the effect of drug interventions along with DIR/floortime was not mentioned.

Parental involvement and training were mentioned in most studies, whereas the impact of living conditions along the side of parents or care centers was not highlighted in the studies. The participation of parents, their education, and their perception of the disease burden has influenced their participation in the treatment plan. Across the studies, various outcome measures were used to determine the effectiveness of DIR/floortime. Most studies were focused on functional and emotional development rather than all areas of development.

The more the parent engaged during floortime, the better the child's improvement in various functioning.[11,15,17] The

Table 1: Main characteristics of the reviewed studies

Study ID	Research method	Country	Sample size	Duration of study	Method	Outcome
Liao, *et al.* (2014)	Prospective follow-up study	Taiwan.	11 children (2-4 yrs) and their mothers	10 weeks	Home-based floortime intervention program, undergoing an average of 109.7 h of intervention	There was a substantial variation in mean scores for the emotional functioning, communication, and daily living skills of the children, and a positive change in their parent-child interactions was perceived by the mothers of children with Autism Spectrum Disorder(ASD)
Solomon, *et al.* (2014)	RCT	US	*n*=128, (2 years 8 months to 5 years 11 months)	12 months	Videotaped play consultants coached caregivers.	Children improved on the autism diagnostic observation schedule (ADOS). There was a significant variation in parent-child interaction without increasing parents' stress/ depression
Praphatthanakun wong, *et al.* 2018	Cross-sectional study	US	*n*=42 (parents with children aged 2-12 years)	(20-30 min/time and 6-10 times/day	Parental engagement in DIR/Floortime	The more the parent engaged during floortime, the better the child's improvement in various levels of functioning. Parental demographics such as marital status, income, knowledge of principles, attitude toward ASD and techniques, the severity of ASD, and duration of treatment had a significant impact on the outcome of floortime.
Pajareya *et al.*, 2011	prospective follow-up	not mentioned	*n*=34, 2-6 yr old children	14.2 h/week for 1 yr	Home based DIR/ Floortime	A change in functional and emotional development (47% good, 23% fair progression, and 29% poor progression) were observed among children with ASD:
Salaman (2016)	correlational study	Egypt	*n*=7 kindergarten students (2-11 yrs)	1 yr	Floortime-based program with speech therapy	DIR/Floortime encouraged sheltered attachment behaviors and was effective to release autism in autistic children across mild to severity levels.
Kars *et al.*	case study	Turkey	*n*=1 (4 yrs)	1 yr (2 sessions/week)	Floortime	Significant development in adaptive behavior and sensory processing patterns.
Alizadeh *et al.* (2015)	A quasi-experimental study	Iran	10 cases and 10 control (2.5-4 yrs-old)	6 months	Floortime	Communicative, emotional, imaginative, and play skills in the children with ASD were improved with floor time.
Abazari *et al.* (2017)	mixed method	Iran	10 Floortimeand 10 ABA (3-6 yr old)	23 sessions of 2 h each/ once a week	Floortime vs ABA	No substantial discrepancy was observed between the floortime and ABA groups in communication skills and social compatibility but the floortime group had a better relationship score.
Thayer 2016	longitudinal evaluation research	US	21 (5-19 yrs)	45 min once a week for 6 months	DIR-based music or art therapy	Children who participated in a DIR®-based creative arts therapies program experienced increased and improved social/emotional skills.
Dionne *et al.* 2011	Single subject study	Canada	1 (3 yr 6 months)	weekdays 10 min/ session and weekends 45 min/session each (28 sessions over 7 week)	Floortime Play	The number of circles of communication was different in the intervention phase as compared to the observation phase.
Lal *et al.* 2013	pre test post test control group experimental design	India	13 experimental and 13 control (3-6 yrs)	20 sessions, 30 min each	Floortime intervention for the experimental group and regular intervention for the control group	Floortime group improved social interaction and communication as compared to the control group.
Panda *et al.* (2019)	case study	India	1 (3 yrs)	6 weeks 24 sessions (4 sessions/week)	Floortime with Indian Ragas	Integration of Indian Ragas to floortime has resulted in positive improvement in autism.

mean scores for emotional functioning, communication, and daily living skills of the children with ASD showed a change with floortime. Their mothers perceived a significant change in their interaction; child to mother and vice versa.[11,15]

Parental demographics such as marital status, earnings of the parents, knowledge, and approach toward ASD and floortime, the extent of the illness, and duration of floortime had a significant impact on the outcome of floortime.[17] Parents who were divorced or separated spent less time with their children during floortime as compared to parents who live with their partner, and parents who earned more during a month spent less time with children during floortime as compared to parents who earn less. It was also found that parents with adequate knowledge of DIR/floortime, participants with excellent attitudes toward autism and its treatment, and parents having children with a severe level of autistic features have more parent engagement quality during floortime. The children improved on the Autism Diagnostic Observation Schedule (ADOS) with a considerable improvement in mother–child communication with no additional stress to the parents.[18]

DIR/floortime helps improve a child's attachment to significant others and effectively eases autism in severely autistic to mildly moderately autistic children.[19] Floortime demonstrated significant development in adaptive behavior and sensory processing patterns. There was a significant improvement in social/emotional skills such as increased relationship and social interaction, and for children who took part in DIR-based creative art therapies.[20-23] Home-based training programs on DIR/floortime may benefit children for their emotional development and parents for their parenting skills.[20] Floortime has augmented social interaction and communication in children.[10,22,24,25]

Discussion

We undertook this systematic review with the purpose of systematically reviewing the available literature and appraising the effect of floortime in engaging autism disorder among children. The studies, which described floortime in engaging children with ASD, full text available in English, a sample having no comorbid psychiatric diagnosis, and articles published in English from 2010 to 2020 were included in the review. A total of 12 studies meeting the inclusion criteria were included in the review.

Though the studies varied in outcome measures, all included studies showed an increase in children's social and emotional development.[11,13] The more the parent engaged during floortime, the better the child's improvement in various functioning.[11,13,15,17] The severity of ASD, duration of treatment, parental marital status, parental earnings, familiarity with DIR, approach to ASD, and parental engagement in floortime are certain demographic factors that had a significant impact on the outcome of floortime.[14]

Many studies have shown that parental involvement can be an influential factor in the outcome of floortime due to more involvement of one parent in the activity or the parent's dedication more compared to other parents, and the parent might have supplemented other activities.[26] There should be more studies focusing on minimizing the treatment variables such as the type of floortime activity, duration, number of sessions, and parental involvement.

In most studies reviewed, floortime is practiced at home by trained parents; duration, involvement, and use of other activities were assessed as feedback from the parent, and there was no direct observation by the researcher. The probable effect of additional parent interaction, care, and added time spent might have influenced the outcome of floortime in children with ASD.

There were no adverse events reported to children or parents during floortime activities. Indirect harm can result from improper usage of floortime and rejection of other effective treatments for ASD.[26] Studies focusing on all developmental levels were minor, and most studies included here did not include parents from all socioeconomic backgrounds. The number of samples included in the studies was very minimal and varied in the duration of the floortime session. The studies were from multiple countries, and hence the findings cannot be generalized. More studies involving intervention and control groups with a large sample size using similar outcome measures are essential to understand the exact effect of DIR/floortime for children with ASD.

Children with ASD are known to have a self-care deficit in various daily living skills. Because nurses assist people to gain their self-care skills, the application of Orem's self-care theory can be utilized in assessing and implementing effective therapeutic measures. The supportive educative role of nurses will help parents in strengthening their skills in carefully assisting and engaging children during play time to achieve therapeutic benefits.[27]

This review had a few limitations. Although the reviewers performed an extensive literature search, certain relevant articles might have been missed. The review did not include articles published in languages other than English and studies published before 2010. No similar intervention was used for an equal duration in all studies together with floortime; thus, there was no absolute comparison used, and the studies were from multiple countries, samples were from different age groups, and hence the findings cannot be generalized. There are very few RCTs performed on this topic, and the socioeconomic diversity among samples was not included in the analysis of included studies. Every child is unique, and every child's developmental stage and needs are different from each other. Hence, the kind of interventions required to help them develop specific skills may also vary from child to child. Floortime accommodates the clinician, parents, and therapist to choose child-led play interventions tailored to the development and

challenges of each child. Although providing care to children with ASDs nurses can educate parents on various aspects of floortime such as what to observe during floor time, how to encourage child-directed play, and the various methods of effective child engagement to improve their communication and daily living skills. The primary focus of nursing care for children with autism is tailoring patient care based on sensory sensitivity and patients' ability to communicate. Interventions such as dimming the bright light, allowing room for repetitive movements when it does not hinter the care, and using a weighted blanket can soothe a person with ASD. As there could be no specific fixed guidelines on how the floortime will progress, the person working with the child should have patience, dedication, and careful observation of the child's progress. Floortime at home regularly with adequate parent/sibling involvement in the activity can bring maximum benefits to children with ASD. Floortime cannot be a standalone therapy for ASD as it could be used with other interventions such as psychotherapy or medications to use most of its benefits.

Conclusion

In general, we concluded that the existing studies have given fragile support on the efficacy of floortime and effectiveness compared to other interventions in children with ASD. Hence, more RCTs are needed to identify the actual effect of floortime activities on various developmental skills of children with autism. Every child with autism is different and every family has its unique make. Floortime is a cost-effective, completely child-led approach, which could be initiated as early as possible in improving social and emotional development among children.

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Conflicts of interest

Nothing to declare.

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