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THE EFFECTS OF EARLY INTERVENTION PROGRAMS ON THE SOCIAL COMMUNICATION SKILLS OF YOUNG CHILDREN WITH AUTISM: A SYSTEMATIC REVIEW

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ABSTRACT*: Social communication deficient is one of the fundamental issues of individuals with Autism Spectrum Disorder (ASD). Therefore, several intervention approaches have been used to develop social communication skills for young children with ASD. The purpose of this paper is to analyze and reflect the literature about the effect of early intervention programs on the social communication skills of young children with ASD. The review analyzed the early intervention studies between 2009 and 2019. The researcher used digital format database research: Scopus, PubMed, and Eric journal, using the keywords: "Autism Spectrum Disorder", AND "early intervention", AND "children", AND communication skills", OR "social skills". The PRISMA criteria for reporting in systematic reviews were utilized. The inclusion criteria were; the use of training programs, targeting social communication skills, provided by professionals and teachers, young children with ASD. It was excluded studies outside the scope of the subject; that do not meet the inclusion criteria; randomized control trails studies; Studies about parents or professionals and incomplete articles without accessibility. The results of the search showed 140 publications, only 12 studies were analyzed according to the inclusion and exclusion criteria.*

KEYWORDS: autism spectrum disorder; early intervention; social skills; communication skills; children.

INTRODUCTION

Autism spectrum disorder is a developmental disorder characterized by two main symptoms; social communication deficient, and behavior issues. However, individuals with ASD might demonstrate language and cognitive impairment but they were not considered as key features of ASD (American Psychiatric Association, 2013). In the last 20 years, the number of individuals with ASD has increased dramatically (Rayan & Ahmad, 2018). Many Statistical studies demonstrated that the prevalence rate of ASD was 1 in 1000 children and this rate increased in 2014 to 1 in 88 children. The increasing rate of ASD can be as a result of social awareness or the development of assessment criteria (Crawford, 2016).

Lack of social communication skills was considered as a fundamental and common issue of individuals with ASD. Therefore, they demonstrate difficulties in verbal and non-verbal social communication skills includes lack of joint attention skills, initiating or maintain the conversation,

abnormal facial expression, turn-taking, and language impairment (Thomeer, McDonald, Rodgers, & Lopata, 2017). Besides, they have difficulties in responding or use gestures, difficulty in requesting skills, lack of making eye- contact, and difficulty in engaging vocally or visually with others during social interaction. Consequently, they have difficulties to maintain a relationship with others (Mundy & Crowson, 1997), and difficulties in developing friendship and playing skills (Ulke-kurkcuoglu, 2015). Overall, Social communication difficulties in ASD can impact students with ASD academic and social development and isolate them from their environments (Yeo & Teng, 2015).

The American Academy of Pediatrics revealed that all children with ASD can be identified and screened at two years of age, which provided strong evidence supporting the early intervention for ASD (Charman, 2014). Therefore, many early intervention programs appeared targeting mean deficient areas in ASD e.g., early intensive behavior analytic treatment which yielded positive outcomes in domains of social communication, behavior, cognitive, and language skills (Howard, Sparkman, Cohen, Green, & Stanislaw, 2005).

The National Research Council report (NRC) (2001) indicated that many studies conducted early intervention programs using different approaches to disclosure the effectiveness of early intervention for young children with ASD. They found three types of programs were used; Behavioral-based program e.g.; (Early Intensive Behavior Intervention and Pivotal Response Treatment) and developmental approach such as (Early Start Denver Model), and Eclectic methods like Division TEACCH. The results of these studies demonstrated that early intervention for young children with ASD could significantly promote their social communication, motor, and play skills (Volkmar & Reichow, 2014). Therefore, the early intervention programs have promising outcomes on the development of social communication, behavior and language skills of individuals with ASD (Divan et al., 2015).

METHODS

This article is a systematic literature review to identify the scientific studies that were published between 2009 and 2019 in international journals. In order to conduct the review, the researcher used digital format database research: Scopus, PubMed, and Eric journal, using the search terms “Autism spectrum disorders”, AND “social skills”, OR “communication skills”, AND “children”, AND “early intervention”. The results of the search demonstrated 140 publications. All obtained publications in Scopus, PubMed, and Eric were analyzed, 128 studies were excluded: 24 studies were about the parents, 14 randomized control trial, 15 without training program, 15 about other disabilities, 2 about the adults, 22 reviews, 19 about diagnosis and assessment of ASD, 8 about others skills, 3 unrelated studies, 3 studies with no access, 1 about professionals, 1 follow-up study, and 1 meta-analysis.

The studies' inclusion and exclusion criteria are described in Table1.

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The data of the systematic review was analyzed according to the PRISMA criteria (Moher, Liberati, Tetzlaff, Altman, & Grp, 2009). The obtained information was classified and analyzed according to the authors, year of publication, country, study aim, sample, and, methodology, results.

RESULTS

A total of 479 young children with ASD participated in the studies. The studies were conducted in the USA (50%), Italy (17%), Portugal (8.3%), Canada (8.3%), China (8.3%), and Israel (8.3%). Several instruments were utilized to measure the improvement of social communication skills and decrease the severity of Autism, such as The Autism Diagnostic Observation Schedule (ADOS) (15%), the Vineland Adaptive Behavior Scale (11%), The Autism Diagnosis Interview-Revised (ADl-R) (7%), the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) (5%), The Psychoeducational Profile, 3rd .ed. (PEP-3) (5%), The Bruininks- Oseretsky Test of Motor Proficiency, 2nd .ed. (BOT™-2) (2%), The Attention Network Test (ANT) (2%), The Wechsler Intelligence Scale for Children-Fourth Edition (2%), the Wechsler Preschool and Primary Scale of Intelligence—3rd (2%), the Kaufman Test of Educational Achievement-Second Edition (2%), the Asperger Syndrome Diagnostic Scale (2%), the Stanford Binet-Fifth Edition (2%), the Gilliam Autism Rating Scale-Second Edition (2%), the Adaptive Behavior Assessment System-Second Edition (2%), the Autism Social Skills Profile (ASSP) (3%), the Diagnostic and Statistical Manual of Mental Disorders (4th ed) (3%), the Mullen Scales of Early Learning (MSEL) (7%), the Griffiths Mental Development Scales (GMDS) (3%), the Clinical Global Impressions Scale (CGI) (2%), the Social Responsiveness Scale- second edition (SRS-2) (3%), the Differential Ability Scales-II (DAS-II) (2%), the Clinical Evaluation of Language Fundamentals-Preschool-2 (CELF-P-2) (2%), the Revised Version of the Strange Stories Test (2%), the Theory of Mind Inventory scale (2%), the Autism Spectrum Quotient: Child Version (2%), the Assessment Scale of Children with ASD (2%), the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP) (2%), the Early Social-Communication Scales (ESCS) (2%), the teacher-child play interactions (TCX) (2%), the Structured Play Assessment (SPA) (2%), the MacArthur Communication Developmental Inventories (CDI) (2%), the Questions About Behavior Change (QABF) questionnaires (2%), the Child Behavior Checklist (CBCL) (2%), the Early Communicative Index (ECI) (2%), and the Individual Growth and Development Indicator (IGDI) (2%).

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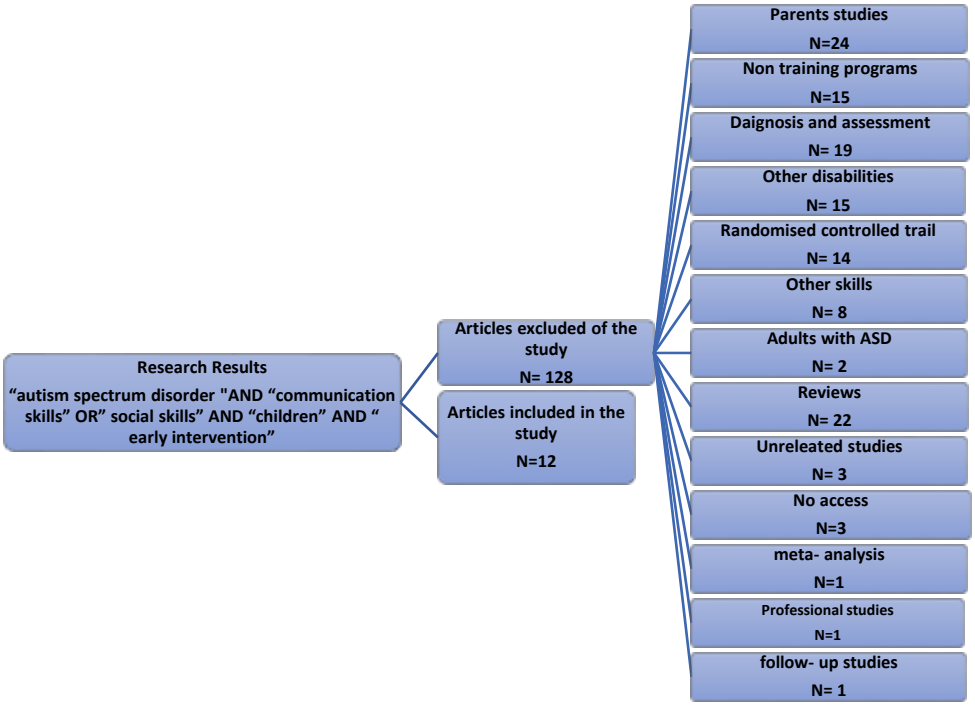

Figure 1. Flowchart- shows inclusion and exclusion criteria in research

Table 1. Inclusion and exclusion criteria of the research "social skills early intervention programs for young children with ASD".

Inclusion criteria	**Exclusion criteria**
The Use of Training program	Non-training program
Targeting social communication skills	Other skills
Young children with ASD	Adults with ASD
Provided by professionals and teachers	Provided by parents.
Last 10 years between 2009 and 2019	Before 2009
	Randomized control trial or follow up studies
Provided in schools or community services centers.	
	Incomplete studies/ without accessibility
	Studies about parents or professionals

Table 2. Summary of analyzed studies.

Study	**Aim**	**Sample**	**Procedures**	**Instruments**	**Findings**
So & colleagues 2018, China. (So, Wong, Lam, Cheng, Yang, Huang, &Lee, 2018).	To examine the effects of robot-based training in improving gestures skills.	N= 45, experimental group=15, and waitlist group=15, and typically	The training included imitating a social robot that produces 14 gestures and five stories 9 sessions,	The Autism Diagnostic Observation Schedule (ADOS), the Autism Diagnosis	The experimental group produced more accurate gestures and maintained the

		develop children= 15 Preschool children.	30 minutes a session.	Interview-Revised (ADl-R), and the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V), the Psychoeducational Profile, Third Edition (PEP-3), Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT™-2), the Attention Network Test (ANT),	skills after two weeks of the training compared to the waitlist group.
Radley & colleagues, 2015, USA. (Radley, Ford, McHugh, Dadakhodjaeva, O'Handley, Battaglia, & Lum, 2015).	To examine the effects of superhero social skills program to improve the accuracy of using conversation, non-verbal, requesting, and responding skills.	N= 2 Asperger´s syndrome and intellectual disability.	The program contained 10 sessions, 1.5h a session for 5 weeks, using animated videos with instruction, social stories, and Self-monitoring cards.	Wechsler Intelligence Scale for Children-Fourth Edition, the Kaufman Test of Educational Achievement-Second Edition, Asperger Syndrome Diagnostic Scale, the Stanford Binet-Fifth Edition, Gilliam Autism Rating Scale-Second Edition, Adaptive Behavior Assessment System-Second Edition, the Autism Social Skills Profile (ASSP).	Both participants demonstrated an increased level of the learned skills and improvement of skills accuracy and generalized the skills after the intervention implementation.
Radley & colleagues, 2017, USA. (Radley, McHugh, Taber, Battaglia, & Ford, 2017).	To evaluate the impact the Superhero Social Skills program in improving the accuracy and function of social skills.	N= 2 Preschool children.	The intervention program lasted for 11 weeks, 1h a session weekly, using The Superheroes social skills intervention	The Diagnostic and Statistical Manual of Mental Disorders (4^{th} ed) and (5^{th} ed), Autism Social Skills Profile (ASSP), Wechsler	Both participants achieved an increased level of the accuracy of the social skills and maintained the

			which based on animation videos with instruction, social stories, and Self-monitoring cards.	Preschool and Primary Scale of Intelligence—3rd ed., Vineland Adaptive Behavior Scale.	accuracy after one and a half months of the intervention implementation.
Vivanti & colleagues, 2014, USA. (Vivanti, Paynter, Duncan, Fothergill, Dissanayake, & Rogers, 2014).	To evaluate the impact of the Early Start Denver Model on the social, cognitive, and behavior skills of children with ASD.	N= 30, expermintal group= 27, control group =30, aged 1.5 to 5 years.	The intervention program lasted for 12 months, 15 to 25h weekly, using the ESDM model which based on behavioral and developmental strategies e.g., book activities or song- based routines, matching, counting, sharing materials, and play activities.	The Mullen Scales of Early Learning (MSEL), the Autism Diagnostic Observation Schedule (ADOS), the Vineland Adaptive Behavior Scales II.	Both groups showed improvement in the targeted skills, however, the ESDM group presented a higher level in the targeted skills compared to the control group.
Colombi et al., 2018, Italy. (Colombi, Narzisi, Ruta, Cigala, Gagliano, Pioggia,& Muratori, 2018).	To examine the impact of ESDM Intervention on social, cognitive, behavior skills of children with ASD.	N=92, ESDM group = 22, control group =70. Aged 1.5 to 4 years.	The ESDM group received three sessions weekly, 2h a session for 6 months, while the control group was receiving usual treatment 5.2 hours weekly for 6 months, using ESDM which based on applied behavior analysis principles.	The Autism Diagnostic Observation Schedule-2 (ADOS-2), Griffiths Mental Development Scales (GMDS), Vineland Adaptive Behavior Scales (VABS-II).	Both groups achieved improvement in social and cognitive skills, however, the ESDM group gained higher improvement in social, cognitive, and adaptive skills after 3 to 6 months of the ESDM implementation.
Ventola et al., 2014, USA. (Ventola Friedman, Anderson, Wolf, Oosting, Foss-Feig, & Pelphrey, 2014).	To evaluate the effects of Pivotal Response Treatment (PRT) on the adaptive and social skills of children with ASD.	N= 10 Preschool children. aged 4.5 to 6.11 years.	The duration of PRT treatment was 16 weeks 8h a week. The PRT treatment is based on behavioral principles in natural context included (child choice, child attending, clear opportunity,	The Clinical Global Impressions Scale (CGI), the Social Responsiveness Scale- second edition (SRS-2), Autism Diagnostic Observation Schedule Module 3 (ADOS), Vineland	All participants achieved over the implementation of the intervention a moderate to high improvements in the adaptive, and social

			contingent reinforcement, natural reinforcement, reinforcement of attempts, and interspersed maintenance/ acquisition tasks).	Adaptive Behavior Scales-second edition, the Autism Diagnostic Interview-Revised (ADI-R), Differential Ability Scales-II (DAS-II), Clinical Evaluation of Language Fundamentals-Preschool-2 (CELF-P-2).	communication skills domains.
Waugh & Peskin, 2015, Canada. (Waugh & Peskin, 2015).	To evaluate the effects of social skills and Theory of Mind (S.S.T.o.M) intervention in improving the social communication skills of high functioning children with ASD.	N= 49, S.S.T.o.M group= 19, Children Friendship Training group(CFT) =11, the Delayed Treatment Control group (DTC) =19. Aged 6 to 13 years.	The S.S.T.o.M intervention program lasted for 3 months ten sessions 1h a session, based on comic stories through visual supports and gameplay to teach the children with HFASD "how to think about other people, how other people think, and to predict others' behaviors".	The Social Responsiveness Scale—Second Edition (SRS-2); the Vineland Adaptive Behavior Scales—Second Edition (VABS-II), Revised Version of the Strange Stories Test, Theory of Mind Inventory scale, Autism Spectrum Quotient: Child Version.	All participants in CFT and S.S.T.o.M groups demonstrated improvements in social motivation and social communication skills compared to the DTC group.
Reis, Pereira, & Almeida, 2018, Portugal. (Reis, Pereira, & Almeida, 2018).	To examine the impact of the DIR / Floortime intervention model (The Developmental, Individual difference, Relationship-based Model) in developing the social communication skills of children with ASD.	N= 25 aged 3 to 6 years.	The DIR/ Floortime intervention program based on playing activities where the caregivers or parents play with the children on the floor to encourage them to communicate. The study last for 10 months, six to ten sessions a day, 20 to 30 minutes a session.	The Autism Diagnostic Observational Schedule (ADOS), Assessment Scale of Children with ASD.	The participants demonstrated improvement in social skills and sensory progress after the intervention implementation.

Zachor & Ben Itzchak, 2010, Israel. (Zachor & Ben Itzchak, 2010).	To evaluate the impact of tow intervention approaches Applied Behavioral Analysis (ABA) and Eclectic integration of several approaches on cognitive, social, communication, and adaptive skills of children with ASD.	N= 79, ABA group= 45, , Eclectic group= 34. aged 15 to 35 months.	ABA group was receiving 20h training sessions weekly for a year, using ABA principles. In contrast, the Eclectic group was receiving 19h sessions weekly for a year based on multi strategies design where each professional provide activities in his area which were coordinated by special education teachers.	The Autism Diagnosis Interview-Revised (ADI-R), DSM-IV, Autism Diagnosis Observation Schedule (ADOS), Vineland adaptive behavior scales, Mullen Scales of Early Learning (MSEL).	Both intervention groups achieved improvements in cognitive, social, communication and adaptive skills.
(Chang, Shire, Shih, Gelfand, & Kasari, 2016, USA. (Chang, Shire, Shih, Gelfand, & Kasari, 2016).	To evaluate the effects of JASPER (Joint Attention Symbolic Play Engagement and Regulation) intervention on the social communication skills of children with ASD.	N=66, interevention group= 38 waitlist group= 28, aged 3 to 5 years.	The intervention lasted for 3 months with a month follow-up. The programs targeted independent and symbolic play, communication, motor skills, using behavioral and developmental strategies e.g, modeling, imitating, language and play activities.	The Autism Diagnostic Observation Schedule-2 (ADOS-2), Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP), The Mullen Scales of Early Learning (MSEL), The Early Social-Communication Scales (ESCS), teacher-child play interactions (TCX), The Structured Play Assessment (SPA).	All participants in the intervention group demonstrated significant improvement in gestures and language joint attention and joint engagement over the waitlist group.
Fava et al., 2011, Italy. (Fava,Strauss, Valeri, D'Elia, Arima, & Vicari, 2011).	To compare the effects of two interventions approaches EIBI (Early Intensive Behavioral Intervention) and Eclectic in	N= 22, EIBI group= 12, Eclectic group= 10, aged 2.2 to 6.9 years with ASD.	The duration of the interventions was 6 months 26h a week), play routines, videos. positive reinforcement	The Autism Diagnostic Interview-Revised (ADI-R), the Autism Diagnostic Observation Schedule (ADOS), the Vineland	The EIBI group demonstrated a decrease in autism severity over the Eclectic group and achieved better outcomes

	reducing the severity of Autism.		and imitation. , Eclectic group was receiving 12h weekly of behavior and cognitive treatments included reinforcement, visual support, music and speech therapy.	Adaptive Behavior Scales, Interview Edition (VABS), the Griffith mental developmental scales for ages 2–8 (GMDS-ER 2–8), the MacArthur Communication Developmental Inventories (CDI), the Questions About Behavior Change (QABF) questionnaires, the Child Behavior Checklist (CBCL), DSMIV.	in language, communication, social interaction, and developmental skills. However, Both groups achieved significant improvement in adaptive behavior.
Barber, Saffo, Gilpin, Craft, & Goldstein, 2016, USA. (Barber, Saffo, Gilpin, Craft, & Goldstein, 2016).	To evaluate the effects of peer Mediated Intervention based on stay, play, talk strategies on the social communication skills of children with ASD.	N= 3. Clinical setting.	The study paired each one of three children with ASD with one of the typically developed children who were asked to stay, play, and talk with their peers. The intervention lasted for 1.5 months to two months, a 20 minutes session a week.	The Autism Diagnostic Observation Schedule (ADOS), The Early Communicative Index (ECI), Individual Growth and Development Indicator (IGDI), The Mullen Scales of Early Learning (MSEL).	All participants in both typically developed and ASD increased their level of social interactions, however, they did not maintain the improvement after two months of the intervention.

DISCUSSION

Most of the early intervention studies were based on behavioral or cognitive principles to evaluate and compare the effects of different forms of techniques on social communication skills of young children with ASD, besides, these studies demonstrated the effectiveness of early intervention programs in improving the social communication, language, behavior, and cognitive skills of children with ASD. Seven studies utilized training programs based on behavioral strategies, two of them compared the intervention based on behavioral strategies as Early Intensive Behavioral Intervention (EIBI) approach with Eclectic intervention approach The results demonstrated that (EIB) group achieved better outcomes in social, communication, and language skills and decreased level of autism severity over Eclectic group, however, both groups achieved significant

improvement in adaptive behavior domain (Fava et al., 2011), and Applied Behavioral Analysis (ABA) approach with Eclectic intervention approach which uses strategies based on multiple theories, the results of the study showed that there was no significant difference between both intervention groups on the post-test, and both of intervention groups achieved improvements in cognitive, social, communication and adaptive skills (Zachor & Ben Itzchak, 2010).

Both behavioral and developmental strategies were utilized together in three of these studies as Early Start Denver Model (ESDM) to improve social, cognitive, and behavioral skills for preschool children with ASD (Colombi et al., 2018; Vivanti et al., 2014), both studies showed that both groups demonstrated improvements in the targeted skills but ESDM groups achieved higher gains compared to control groups. Further, Joint Attention Symbolic Play Engagement and Regulation (JASPER) model were used to improve the social communication skills, and the study demonstrated significant improvement over the waitlist group in domains of gestures and language joint attention and joint engagement (Chang et al., 2016).

Social learning theory strategies were used in three studies, two of them utilized Superheroes social skills program based on video modeling, social stories, and Self-monitoring cards to improve social skills accuracy, both studies demonstrated that all participants with ASD showed an increased level of social skills accuracy and maintained the accuracy after one and half month of the intervention (Radley et al., 2015, 2017), and only one study used " stay, play, and talk" approach to improve social communication skills and the study showed that both participants of children with ASD and their typically developed peers increased their level of social interactions, however, the participants did not maintain the improvement after two months of the intervention (Barber et al., 2016).

Only one study was conducted to evaluate the effect of social skills theory of mind (S.S.T.o.M) intervention to improve the social communication skills of high functioning children with ASD. The study indicated that all children with HFASD in (S.S.T.o.M) group demonstrated significant improvements compared to two control groups: Children Friendship Training group (CFT), and delayed treatment control group (DTC) (Waugh & Peskin, 2015).

There was one study used the developmental theory principles solely to examine the impact of the DIR / Floortime intervention model (The Developmental, Individual difference, Relationship-based Model) in developing the social communication skills of children with ASD. The study demonstrated improvement in social skills and sensory progress after the implementation of the intervention program (Reis et al., 2018).

Robot-based training was utilized in one study to improve the gestures skills of preschool children with ASD by comparing the effects of this technique with two control groups: waitlist group and typically developed group. the study showed that the experimental group who received the intervention produced more accurate gestures and maintained the skills after two weeks of the training sessions compared to the waitlist group (So et al., 2018).

Methodological limitations

The inclusion and exclusion criteria that were used in the present study restricts the obtained results which can neglect several studies that can provide us with more information to understand the investigated topic.

There were limitations in the analyzed studies: some studies limited to one category of ASD or use small sample size (Barber et al., 2016; Radley et al., 2015, 2017; Ventola et al., 2014; Vivanti et al., 2014; Waugh & Peskin, 2015; Chang et al., 2016). Besides, some studies did not have a control group (Barber et al., 2016; Radley et al., 2015, 2017; Reis et al., 2018; Ventola et al., 2014; Fava et al., 2011; Colombi et al., 2018), or not randomly assigned (Zachor & Ben Itzchak, 2010; Waugh & Peskin, 2015). Furthermore, participants in some study were receiving other intervention or services besides the implementation of the intervention program (Reis et al., 2018), or the external factor e.g. preferred toys rather than peers interaction influence (Barber et al., 2016), which might impact the obtained results of the studies. Moreover, the limitations of assessment of generalization of the learned skills in other environments e.g. home (Radley et al., 2015, 2017), or lack of long term follow up data which affect the generalizability and maintenance of the learned skills (Radley et al., 2015; Ventola et al., 2014; So et al., 2018; Chang et al., 2016). unavailability of measures for the study sample (Fava et al., 2011), or the cost and the time of using some measures to confirm the results (Waugh & Peskin, 2015). Finally, the implementation of some programs occurred in a clinic setting instead of the natural setting as home or school (Barber et al., 2016).

CONCLUSION

The present systematic review showed that early intervention programs for children with ASD were effective in improving social communication skills and other deficient areas in ASD. Furthermore, the study highlighted the issues that should be addressed in future studies. Therefore, there is a need for more early intervention programs to address the social communication deficit and other deficits area in ASD as well as more studies and accurate assessment tools to evaluate the effects of early intervention programs for children with ASD.

Conflict of interest

The authors declare that they have no conflict of interest.

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