

Effectiveness of family interventions on health outcomes of family and children with autism: An integrative review

Anh Thi Lan Mai^{*} Nujjaree Chaimongkol² Nguyen Manh Dung¹

¹Namdinh University of Nursing, Vietnam 257 Han Thuyen Street, Nam Dinh city, Nam Dinh, Vietnam.

²Faculty of Nursing, Burapha University 169 Longhard Bangsaen Road, Muang District, Chon Buri Province, Thailand.

ARTICLE INFO

Article history:

Received April 2021

Received in revised form June 2021

Accepted as revised August 2021

Available online August 2021

Keywords:

Autism, family, health outcomes, family/parent intervention, integrative review.

ABSTRACT

Background: Autism is a lifelong disability that affects a person's social interaction, both verbal and nonverbal communication, and is often characterized by restrictive and repetitive behaviors. Family of children with autism plays a critical role in child's ability to adapt and live daily life. From the extensive literature review, the research highlighted the importance of interventions for families and children with autism.

Objectives: To review and describe interventions for family and children with autism.

Materials and methods: The integrative review design adopted PRISMA protocol to select studies. This review searched within the healthcare journals with the experimental design or randomized control trial, full-text, and published from January 2013 to April 2020 using the keywords of "autism", "family", "family/parent interventions" and "health outcomes". The articles were searched in the databases of MEDLINE, PubMed, CINAHL and ScienceDirect.

Results: Nine articles were identified. The common interventions for family of children with autism were family education, psychological, and technology-related interventions. The family education intervention enhanced family quality of life, parent-child shared management, and decreased depressive symptoms. Psychological support intervention increased positive thinking and skills of the family. The technology-related intervention affected parents positively, increased confidence, and reduced parenting stress. However, some of these interventions were complicated and unstructured; therefore, the evaluation of their effectiveness remained unclear and possibly bias.

Discussion: The evidence of intervention for family of children with autism was limited. To improve health outcomes of family and children with autism, health care providers should pay more attention on developing and implementing an appropriate intervention to build strengthen of family of children with autism and improve their health outcomes.

Introduction

Autism is a lifelong disability that affects a person's social interaction, both verbal and nonverbal communication, and is often characterized by restrictive and repetitive behaviors. According to Center for Disease Control and

Prevention, the prevalence rates of autism in the United States are estimated at approximately one in 54 children aged 8 years.¹ Currently, exactly possible causal factors and specific treatment for the disorder are unavailable. However, the early behavioral, educational, and pharmacological interventions have been proved to be effective in improving the skills of children with autism as well as building considerably family strengthen related to autism across lifespan.² Families are the most important for a child's development, especially, family of children with autism play a critical role in their child's ability to adapt and live daily life. Families present their roles in diagnosis process as they are the first

* Corresponding author.

Author's Address: Namdinh University of Nursing, Vietnam
257 Han Thuyen Street, Nam Dinh city, Nam Dinh 420000,
Vietnam.

** E-mail address: lananh.ndun@gmail.com

doi:

E-ISSN: 2539-6056

people to recognize the behavior problem, therefore, they support physician in receiving a right diagnosis. Additionally, in intervention process, family cooperates with health care providers in developing and implementing appropriate intervention for their child.³ Family members typically are active partners in child's educational intervention at home and community setting to ensure the intervention process is working appropriately.⁴ By simultaneously shouldering multiple roles and responsibilities, families of children with autism often feel challenged and perplexed in their children daily activities and improvement of behavioral problems in the children.

Research indicated that there were various interventions available to families of children with autism. Intervention programs depended on the autism child's developmental level, the characteristics of the health care systems and the education level of family members.⁵⁻⁸ Study mentioned that education intervention is associated with an increased likelihood for the mental health related quality of life, family functioning and child outcomes as well.⁵ Family education intervention should be offered especially to family of children with chronic health conditions who lack of adequate support. The intervention can help family members manage children's problems and behavior more effectively.⁶ In addition, psychological interventions for parents of individuals with autism may lead to both decreased stress in parents, and improvements in child behavior.⁷ And technology-based intervention has been proved that families of children with autism would receive sufficient support in dealing with geographical distance or a variety of other logistical difficulties with health care service systems.⁸

Although, these interventions have been developed, implemented and researched, most families are not able to implement the interventions because some of the interventions remained controversial of the effectiveness of the intervention on family and children outcomes. In addition, some interventions even healthcare workers and families were not aware of its availability. Others unsure effectively implement these interventions, due to the complex and unclear steps of the intervention process, some interventions without a follow-up period for evaluation of intervention sustainability.⁹⁻¹² Moreover, most studies have not assessed the effectiveness of the interventions on both family and children outcomes. Therefore, the purpose of this review was to examine the clear literature on the effectiveness of family interventions on individuals with autism and their families. The focused question that framed this review was: "What is the evidence for the effectiveness of interventions for family of individuals with autism and their families?" as indicated. The results were the integrated review as evidence about effectiveness of interventions for family of children with autism. The interventions and their effectiveness discussed in this integrated literature review may support healthcare providers to apply the appropriate intervention in promoting family effectively during the intervention for their better outcomes. They would also facilitate family role of being responsible, knowledgeable, and helpful caretakers for their children with autism. Additionally, the integrated review may support healthcare institutions in developing and implementing the policy

related to interventions for children with autism not only focus on children but also their family.

Materials and methods

Search procedure and database

An integrative review approach was conducted and PRISMA were used to improve the rigorous. Search strategy: A priori search was conducted in Google Scholar and EBSCO to identify if there were any similar reviews that were in progress or already published. The results indicated that there were some systematic reviews however, no similar integrative review existed. The review included all healthcare and special education studies conducted using experimental designs that compared a group of families receiving a family intervention to a group of family with usual intervention. Then, the researchers conducted an extensive database search using MEDLINE, PubMed, CINAHL and ScienceDirect to search for relevant literature, using the keywords "autism", "family", "family/parent interventions" and "health outcomes".

Inclusion and exclusion criteria

The journal articles were defined by the following eligibility criteria: (1) population were family of children with autism; (2) interventions were interventions for family/parents, the elements of a intervention were examined; (3) The outcomes were purposes of the interventions (e.g. children/ family quality of life, family functioning, parent-child interaction, children behaviors, social-communication skill, and learning ability); (4) The most appropriate study designs were randomized control trials. The journal articles with population of families and children with mental health and serious comorbidity were excluded in the study.

Screening process

Two authors examined articles that utilized family intervention as a focus, however, concentrated on articles dealing with the population of family of children with autism. The peer-review journal articles published after 2013 were included in the study. Researcher then searching for studies cited in these collected studies. In addition, the researcher continued to examine of reference lists from key reviews to identify additional studies that had not been identified in the previous electronic search.

Data extraction

The two researchers performed the data extraction independently, based on certain criteria of differences in terms of variables such as study characteristics, population characteristics, intervention characteristics, study results and effectiveness.

Data analysis

From the included articles, we performed content analysis to find the themes regarding to interventions for family of children with autism.

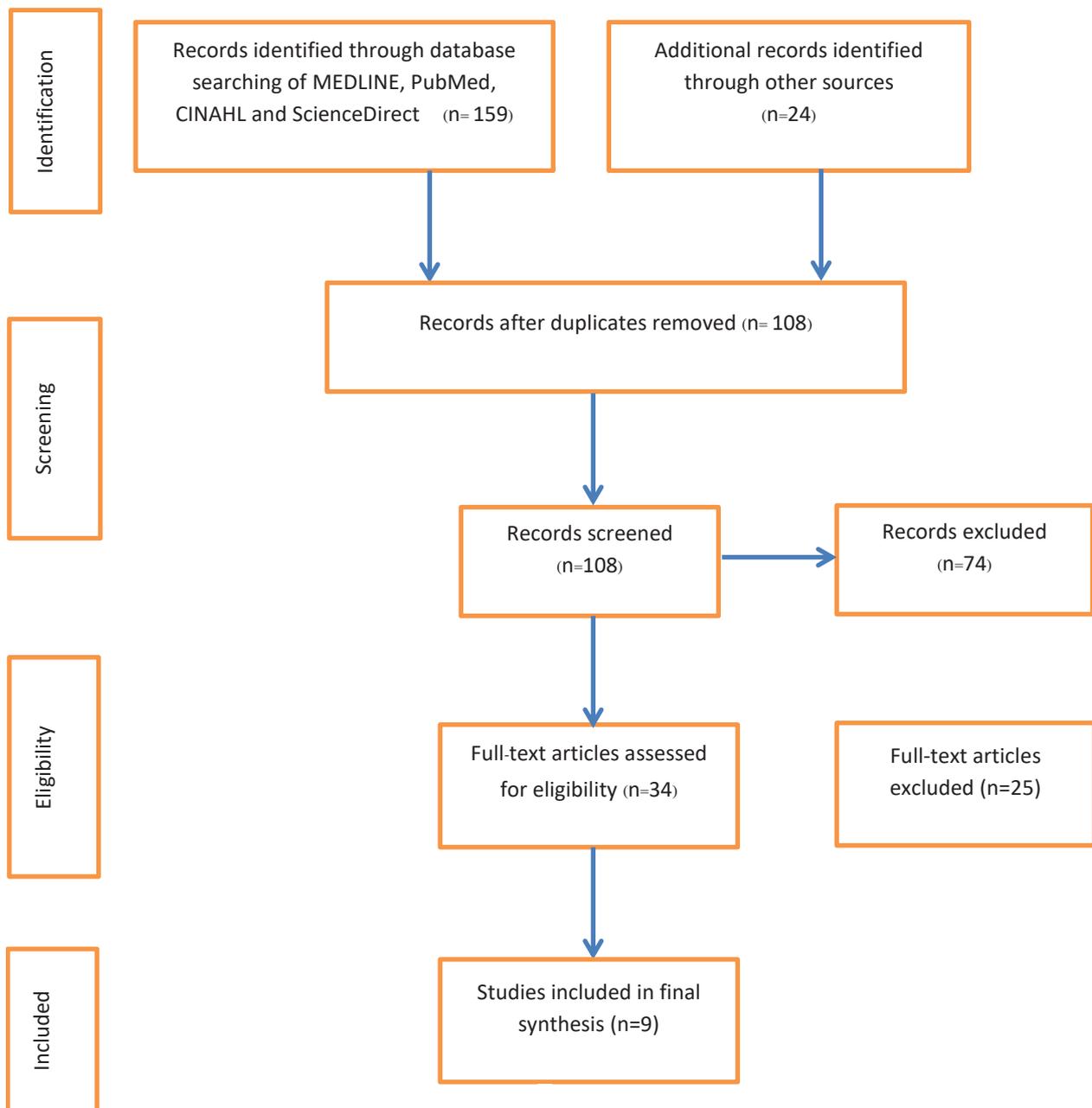


Figure 1. PRISMA flow diagram of study selection.

Results

During the search process by the database originally had 159 articles potentially relevant was found, and then adding 24 articles potentially relevant from reference lists of the original articles have been selected for review. After eliminating the duplication in excel, 108 potentially relevant articles were identified for inclusion in the evaluation. After conducting screening of the title and abstract of the articles, 34 articles were selected to be read in full. Finally, there were 9 articles were identified that fully met the inclusion criteria. These articles were summarized in the Table 1. Four articles are related to family education intervention program. Two articles demonstrated effectiveness of psychosocial support intervention for family members compared with usual interventions. Three articles revealed the effectiveness of technology-based interventions on family

members of children with autism. The findings found three interventions as the following,

Parent education intervention. Parent education is intervention that enhances or facilitates parents to support their children, with the ultimate goal of improving positive developmental outcomes on their children.¹³⁻¹⁴ In the educational interventions, multidisciplinary educational intervention had a positive impact on improving the quality of life, family function, and coping styles of parents of children with autism.⁵ The 8-week intervention program had group classes once a week, each session of about 90 minutes facilitated by a multidisciplinary team consisting of special educators, community nurses, psychologists and psychiatrist. In the 8-week classes, parents were provided with lectures, case reports, role-play and discussions related to autism and family knowledge such as autism, characteristics, and management

of the family problems while taking care of children in their everyday life. The results show that multidisciplinary education had a positive impact on caregiver's quality of life. Participants reported that they were highly satisfied with the multidisciplinary educational program and wished for more and longer intervention.⁵ The results of the study recommend that nurses and other health care providers actively apply the intervention program in routine care for children with autism and their families.

A research on education and behavior management intervention program for parents of children with autism indicated that parent educational intervention had a positive impact on children ability to manage their own behavior and autism symptoms.⁶ The entire education intervention process took twenty weeks, ten group sessions of 90 minutes and ten individual sessions of 60 minutes. In addition to the educational support of therapists, the intervention program provided opportunity for videotapes of content

review and intervention adherence by therapists. The intervention program with group and individual sessions gave parents the opportunity to discuss their response to receiving an autism diagnosis and to increase their knowledge of autism and its effects on their children. The program provided the parents how to manage difficult behaviors and supported the development of children's communication, social and plays skills. The individual sessions were with the participation of children to train skills and action orientation. Parents were provided with workbooks, videos, rehearsal, homework assignments and feedback. Researchers suggested that education and behavior management intervention program can help parents more effectively cope and manage their children's problems and behavior. The program showed a certain effect on families and children with autism. However, the educational programs developed were complex and unstructured. Therefore, the evaluation of the effectiveness of these programs was still unclear and biased.

Table 1 The interventions for family of children with autism.

Author, year	Participants, sample size, sampling methods	Measurements	Intervention program	Findings/ recommendations
Ho MH & Lin LY, 2020	24 dyad of children with autism and parents were randomly divided into the intervention group or the control group	<ul style="list-style-type: none"> - Functional Emotional Assessment Scale and the Vineland Adaptive Behavior Scales were used to assess Adaptive functioning - The Chinese version of Psychoeducational Profile-Third edition were used to measure the Parenting skills 	<p>The parent education intervention within 14 weeks:</p> <ul style="list-style-type: none"> • Group parent training intervention • Individual training approach • Parent – occupational therapist discussion on challenges of the intervention 	<ul style="list-style-type: none"> • Significant improvements in children's emotional development and parenting skills were found in participants attending the 14-week intervention. • The participants did not get improvement in other developments and adaptive functioning after participating in the intervention program. • Healthcare professionals should supplement a DIR-based home parent training program to support interventions for children with ASD and their families to enhance children' emotional development and parenting skills.
Bearss et al., 2015	180 pairs of children with autism (ages 3 to 7) and their parents participated in the study and were randomly assigned to training and education groups.	<p>The instruments for data collection were including:</p> <ul style="list-style-type: none"> • The parent-rated ABC-I • The per-item mean score on the parent-rated Home Situations Questionnaire–Autism Spectrum Disorder (HSQ-ASD) • The Improvement item of the clinician-rated CGI (CGI-I) 	<p>The parent education and training intervention program includes:</p> <ul style="list-style-type: none"> • Parent training on disruptive behavior management strategies (11 main sessions, 2 optional sessions; 2 phone reinforcement; 2 home visits) • Parental education about autism but no behavior management strategy (12 main sessions, 1 home visit). 	<ul style="list-style-type: none"> • Through the results of parent reports, the parent training intervention program on disruptive behavior management strategies indicated a superior effectiveness than the family education program on the managing of children's behavior. • Clinicians were more likely to appreciate the parent training intervention program than the family education program

Table 1 The interventions for family of children with autism. (continues)

Author, year	Participants, sample size, sampling methods	Measurements	Intervention program	Findings/ recommendations
Ji B, Sun M, Yi R, Tang S 2014	42 caregivers of children with ASD (randomly assigned to intervention and control group) A quasi-experimental study	<ul style="list-style-type: none"> • The Chinese version of the SF-36 • McMaster Family Assessment Device • Simplified Coping Style Questionnaire • Multidimensional Scale of Perceived Social Support • Caregiver Burden Index • Childhood Autism Rating Scale • The General Self-Efficacy Scale • Multidisciplinary Parent Education Evaluation Form 	The multidisciplinary parent education intervention: The caregivers in the intervention group were provided the multidisciplinary parent education program, which included 8-week sessions	<ul style="list-style-type: none"> • The research findings indicated that there were significant improvements in the mental HRQOL, family functioning, self-efficacy and positive coping style among the caregivers who received the intervention. • The multidisciplinary parent education program had significant positive effects on caregivers' mental health-related quality of life, however, the findings had little effect on their physical health-related quality of life
Tonge B, Brereton A, Kiomall M, Mackinnon A, Rinehart NJ, 2014	100 parents of children with autism were randomly assigned into the intervention group (n=70) and control group (n=35)	<ul style="list-style-type: none"> • The Vineland Adaptive Behavior Scales • The Developmental Behavior Checklist • The Psychoeducational Profile–Revised 	<p>The twenty weekly sessions of parent education and behavior management:</p> <ul style="list-style-type: none"> • The intervention was based on a variety of early intervention and cognitive behavioral techniques that assist in imparting effective coping skills to parents with a systematic and structure approach. <p>The parent education and counselling:</p> <ul style="list-style-type: none"> • The parents were provided a manual-based education program <p>The intervention program with 20 weeks of implementing was quite long which was likely to result in completing and withdrawal from the program of parents of children with autism.</p>	<ul style="list-style-type: none"> • The research findings showed that the participants who received the intervention of parent education and behavior management had higher scores of in adaptive behaviour and autism symptoms; and parent education and behavior management

Table 1 The interventions for family of children with autism. (continues)

Author, year	Participants, sample size, sampling methods	Measurements	Intervention program	Findings/ recommendations
Ridderinkhof A, de Bruin EI, Blom R, Bögels SM, 2018	45 dyad of children with autism and their parent were recruited in the study	<ul style="list-style-type: none"> • The 65-item Social Responsiveness Scale • The Achenbach System of Empirically Based Assessment • The 10-item Children's Acceptance and Mindfulness Measure • The 64-item SRS-Adult form • The Adult Self Report (ASR) of the ASEBA • The Parenting Stress Index • The Interpersonal Mindfulness in Parenting Scale 	<p>The MYmind intervention:</p> <ul style="list-style-type: none"> • The MYmind program was a mindfulness-based program • The 9-week MYmind Child Program was developed based on the MYmind protocol for youth with ADHD and mindfulness-based therapy for adults with ASD • The 9-week MYmind Parent Program was developed based on the Mindful Parenting manual 	<ul style="list-style-type: none"> • The children reported no significant change in mindful awareness, however, decreased social communication problems, and improved emotional and behavioral functioning after the intervention. • Parents reported all the improvements of their children immediately after the intervention and 1 year after the intervention. • Parents reported improved emotional and behavioral functioning, parenting, and mental awareness at all time points. • This study shows that children, and their parents can benefit from MYmind intervention program
Bekhet 2017	There were 73 caregivers participating in the study of which, finally, 64 participated in either an intervention or a control group	<ul style="list-style-type: none"> • Quantitative data collection tool: Positive Thinking Skills Scale (PTSS) includes 8 sections • Qualitative data collection tool is a caregiver's online weekly homework log 	<p>The positive thinking training intervention:</p> <ul style="list-style-type: none"> • The intervention program included PowerPoint presentations • The researcher sent the video to the caregiver online once a week 	<ul style="list-style-type: none"> • The intervention indicated the effectiveness in improving positive thinking skills among caregivers of children with autism. • The research findings provided evidence of effectiveness of positive thinking training intervention and the future further research of positive thinking training for the large scales to find the effectiveness of the intervention on caregivers' well-being
Ingersoll & Berger 2015	27 parents of children with autism participating in the study, randomly assigned to a self-directed or therapist-assisted version of ImPACT Online groups	<p>The research instruments were</p> <ul style="list-style-type: none"> • The modified version of the Computer-Email-Web Fluency Scale (CEWFS) • The Center for Epidemiological Studies-Depression Scale (CES-D) • The ImPACT Knowledge Quiz • Videotaped during a parent-child interaction • The ImPACT Online website's electronic tracking of user behavior 	<p>The telehealth-based parent-mediated intervention program:</p> <ul style="list-style-type: none"> • The self-directed group accessed the program of adapted Project ImPACT, which contained 12 self-directed weekly lessons of 80 minutes and supplemental material • Therapist-Assisted Group access to the ImPACT Online website with 12 twice weekly sessions of 30-minute remote coaching via Skype video conferencing 	<ul style="list-style-type: none"> • The study results revealed that parents of children with autism exhibited high interaction and satisfaction with ImPACT Online for both the self-directed and therapist assisted version of the programs. • Parents who received enough support better completing the program and improved outcomes in parents and children • The program increased parents' access to parent-mediated intervention for families of children with autism

Table 1 The interventions for family of children with autism. (continues)

Author, year	Participants, sample size, sampling methods	Measurements	Intervention program	Findings/ recommendations
Dai YG, Brennan L, Como A, Hughes-Lika J, Dumont-Mathieu T, Rathwell IC, Minxhozi O, Aliaj B, Fein DA, 2018	Thirty-eight children-parent dyads were randomly assigned to either the intervention or the control group.	<ul style="list-style-type: none"> • The treatment Evaluation Inventory Short Form • The 31-item parents quiz • The Early Intervention Parenting Self-efficacy Scale 	<p>The video program: parents were trained through six weekly DVD modules and six weekly chapters of written material:</p> <ul style="list-style-type: none"> • The videos included illustrative clips of ABA-based interventions. • The Guidelines for teaching and evidence-based behavior management. • Parents can access the DVD at least a few times per week. • Therapist supported parents by the phone in carrying out the instructions in the modules 	<ul style="list-style-type: none"> • The results indicated that the intervention was effective on the outcomes of parents and children with autism. Specifically, the intervention improved parent self-efficacy and teaching knowledge for their children with autism, therefore, improved their behavior problems • The health care providers should consider to provide intervention to the parents at their first concern of their child problems to enhance positive change in the parent outcomes
Ingersoll B, Shannon K, Berger N, Pickard K, Holtz B, 2017	Twenty parents of children with autism were randomly assigned to a self-directed or therapist-assisted group	<ul style="list-style-type: none"> • The Computer-Email-Web Fluency Scale • ImPACT Online's electronic tracking of user behavior • The ImPACT Knowledge Quiz • The Behavioral Intervention Rating Scale 	<p>The ImPACT Online program:</p> <ul style="list-style-type: none"> • The intervention was adapted from Project ImPACT, to provide to parents within 12 weekly sessions of 75 minutes. • The parents were provided supplemental material including video library, forum and information resources. • Parents receive emails with tips for implementing the intervention. 	<ul style="list-style-type: none"> • The intervention with incorporation of parent education and video library and various resources indicated the positive results on participants: • Parents who received the intervention program increased intervention knowledge • The parents who were in open access trial provided positive feedback on the program

Psychological support intervention. While studies focus greatly on the treatment and intervention for behavioral problems in children with autism, very rare studies have been done to develop and evaluate the effectiveness of interventions on the psychological problem of parents and families of children with. In fact, in health-care facilities, services to the psychological needs of the parents were rarely approached, if any, incomplete and inadequate interventions, which did not improve the psychological problem of parents with autism, especially, the first diagnosis of autism. A study indicated that positive thinking support caregivers in improving the positive thinking skills and in turn improving the behavior problems of their children with autism.⁷ In the positive thinking training intervention program, parents were participated in six sessions, in which each session the researcher provided a PowerPoint presentation and videos related to knowledge and practice of positive thinking. At the end of each session, participants were assigned a group assignment, in which caregivers relied on

the videos viewed to come up with a positive thinking training strategy to address their life situations. The purpose of the intervention program was to focus on developing eight positive thinking abilities to assist caregivers with autism in many aspects of their lives, especially their daily psychological problems. The researcher recommended that health care workers, especially psychological nurses should provide positive thinking interventions that improve positive thinking skills for caregivers of children with autism. However, to do this, the nurse needs training the intervention process for the effective outcomes. This intervention can also be done online for caregivers who do not have access to a live intervention program. However, the nurse should be in mind that, providing only PowerPoint presentation may not help the caregiver get detailed information, the researcher should provide additional printed or written materials as well as provide more specific examples. In addition, the researcher proposed a future study applying the intervention program on a web platform, which created forums for caregivers

to interact and discuss their life situations. Ridderinkhof and colleagues in their research on MYmind program for parents and children with autism indicated that mindfulness intervention improved their emotional and behavioral functioning, parenting, and mental awareness; and the intervention decreased social communication problems, and improved emotional and behavioral functioning in children with autism. Research suggested that mental health nurses can effectively implement MYmind intervention program to enhance autistic children and parents' outcomes.¹⁵

Technology-based intervention. Some researchers have attempted to address the limitations of traditional parent training programs. In order to make parent training more accessible, researchers have utilized technology to provide services to parents in remote locations. Ingersoll and Berger conducted a study on 27 pairs of parents and children with autism to compare the effectiveness of the self-directed or therapist-assisted ImPACT Online intervention programs.¹⁶ The both groups of participants were provided ImPACT Online access, where the self-directed group was engaged in 12 self-directed weekly lessons with 80 minutes per week, the therapist-assisted group was coached via Skype video conferencing in 12 weeks, 2 lessons per week within 30 minutes. The study results revealed that parents of children with autism in both groups were satisfied with the ImPACT Online program and showed great interaction on these two programs. However, the therapist-assisted group had better completion of the program and improved outcomes of parents and children with autism. The author of the study recommended that health care providers should use the intervention program to strengthen parents' access to parent-mediated intervention for families of children with autism.

Dai and her colleagues conducted a study involving home training for parents of children with autism. Research indicated that parents using technology effectively enhanced their knowledge and confidence in their ability of providing care to their children with autism.¹⁷ The technologies applied in the study included video program, mail feedback and telephone support under three conditions. In the first condition, parents were trained knowledge on evidence-based teaching and behavior management techniques. Accordingly, the parents applied the gained knowledge to behavior management for their children with autism. On the process, the parents provided their feedback on the valuable of the training material after each module by mail. Finally, parents were supported weekly by the treatment group using phone calls. The process lasted for 14 to 16 weeks, each parent being able to access the video twice a week. The mail feedback process was conducted uniquely regarding each parent's specific needs and issues. Researchers suggested that training program is comprehensible and valuable for parents of children with autism in low-resource settings.¹⁷

In addition, research suggested internet-based interventions to train parents in implement interventions at home in a feasible way.⁸ Another study used video feedback to confirm the effectiveness of technology-based interventions on parents of children with autism. Research indicated that through the intervention, parents of children with autism

improved the knowledge of autism intervention and reduced parent depressive symptoms.¹⁸ Technology-based interventions indicated their effectiveness in many studies, however, the approach is a new area of research, and more studies are needed to further evaluate the effectiveness of the interventions. Moreover, technology-based interventions collected data through video record multiple times during the intervention to compare the improvement of the parents and children over time. This makes the approach become a limitation of the intervention, especially, for families with technology difficulties.

Discussion

The research results indicated that there were three kinds of interventions for family of children with autism, including, family education intervention, psychosocial support intervention and technology-based interventions. The evidence suggested that all these family interventions have in common the involvement of the family in the intervention. However, these interventions have their own strengths and limitations. Therefore, the education intervention programs should be simplified and structured with certain sessions, therefore family member would be able to follow their autistic children through all sessions. The psychological support intervention indicated their effectiveness on supporting the psychological needs of parents of individuals with autism; however, sessions with only PowerPoint presentation may not be enough for caregivers understanding all the contents, they should be provided more written material as well as concrete examples to improve caregiver's knowledge and skills. The technology-based intervention with videotaped data is reasonable strategy of characteristics' autistic children and their families. The technologies enable health care workers and researchers to observe or follow in detail the daily behaviors of autistic children and their families during the intervention. The thing is that the intervention program with collections of videotaped data over numerous sessions also becoming the limitation of the intervention. Therefore, programs developed need to be more structured and feasibility. These interventions need to provide enough follow-up support by simply technology method for the long-term effects of intervention programs. Researchers suggested that future studies should develop a family-management intervention with phone call support. The program would build the strengths of families in supporting for children with autism. The intervention could help improve the quality of life and burden for families with autistic children and in turn, improve outcomes in autistic children.

This integrative review included information about intervention studies for families of children with autism and its effectiveness on families and children outcomes. Family interventions and outcomes for families and autistic children are a broad area in which many disciplines implemented. Meanwhile, the results of only 9 studies were analyzed and synthesized made the weakness of the results. A future study with a systematic review design should be conducted to reflect the picture of interventions that have been implemented to improve problems in parents and children with autism.

Conclusion

In summary, this review intended to answer question "What is the evidence for the effectiveness of interventions for family of individuals with autism?". The results of this review suggested that the most common intervention programs utilized was education, psychology and technology. These are not common research that focuses on all family members, but parents, caregivers or fathers, mothers only. Considering these results, there is a clear need to validate the effectiveness of family intervention of children with autism, especially, family education intervention, which found the most effective on family and children with autism compared to psychological support and technology-based intervention. However, the education programs developed need to be structured and feasibility. These interventions should provide enough follow-up support for the long-term effects of education programs. Researchers are therefore interested in developing an education intervention that will develop the strengths of families in supporting for children with autism. Education intervention programs will be Internet based and videotape tools. The intervention could help improve the quality of life for families of children with autism and improve children outcome.

Conflict of interest

The authors declare that they have no conflict of interest.

Funding Statement

This study was funded by Vietnam Ministry of Education and Training, Nam Dinh University of Nursing, Vietnam and Graduate school, Burapha University, Thailand.

References

- 1] Matthew J, Kelly A, Baio J, Wiggins L, Christensen DL, Maenner MJ, et al. Prevalence of autism spectrum disorder among children aged 8 years - autism and developmental disabilities monitoring network, 11 sites, United States, 2016. *MMWR Surveill Summ.* 2020; 69(4): 1-12. doi: <http://dx.doi.org/10.15585/mmwr.mm6916a4>
- [2] Johnson NL, Burkett K, Reinhold J, Bultas MW. Translating Research to Practice for Children With Autism Spectrum Disorder: Part I: Definition, Associated Behaviors, Prevalence, Diagnostic Process, and Interventions. *J Pediatr Health Care.* 2016; 30(1): 15-26. doi: 10.1016/j.pedhc.2015.09.008. Epub 2015 Oct 31. PMID: 26530271.
- [3] Bultas MW, Johnson NL, Burkett K, Reinhold J. Translating Research to Practice for Children With Autism Spectrum Disorder: Part 2: Behavior Management in Home and Health Care Settings. *J Pediatr Health Care.* 2016; 30(1): 27-37. doi: 10.1016/j.pedhc.2015.09.009. Epub 2015 Oct 30. PMID: 26525946.
- [4] Kang-Yi CD, Grinker RR, Mandell DS. Korean culture and autism spectrum disorders. *J Autism Dev Disord.* 2013; 43(3): 503-20. doi: 10.1007/s10803-012-1570-4. PMID: 22723126..
- [5] Ji B, Sun M, Yi R, Tang S. Multidisciplinary parent education for caregivers of children with autism spectrum disorders. *Arch Psychiatr Nurs.* 2014; 28(5): 319-26. doi: 10.1016/j.apnu.2014.06.003. Epub 2014 Jul 11. PMID: 25439973.
- [6] Tonge B, Brereton A, Kiomall M, Mackinnon A, Rinehart NJ. A randomised group comparison controlled trial of 'preschoolers with autism': a parent education and skills training intervention for young children with autistic disorder. *Autism.* 2014 Feb;18(2):166-77. doi: 10.1177/1362361312458186.
- [7] Bekhet AK. Positive Thinking Training Intervention for Caregivers of Persons with Autism: Establishing Fidelity. *Arch Psychiatr Nurs.* 2017; 31(3): 306-10. doi: 10.1016/j.apnu.2017.02.006. Epub 2017 Feb 16. PMID: 28499573.
- [8] Hedda M & Marcus ED. Internet-based intervention training for parents of young children with disabilities: a promising service-delivery model. *Early Child Development and Care.* 2015; 185: 1, 155-69, DOI: 10.1080/03004430.2014.908866.
- [9] Goepfert E, Mulé C, von Hahn E, Visco Z, Siegel M. Family System Interventions for Families of Children with Autism Spectrum Disorder. *Child Adolesc Psychiatr Clin N Am.* 2015; 24(3): 571-83. doi: 10.1016/j.chc.2015.02.009. PMID: 26092740.
- [10] Tanner K, Hand BN, O'Toole G, Lane AE. Effectiveness of Interventions to Improve Social Participation, Play, Leisure, and Restricted and Repetitive Behaviors in People With Autism Spectrum Disorder: A Systematic Review. *Am J Occup Ther.* 2015; 69(5): 6905180010p1-12. doi: 10.5014/ajot.2015.017806. PMID: 26356653.
- [11] Kuhaneck HM, Madonna S, Novak A, Pearson E. Effectiveness of Interventions for Children With Autism Spectrum Disorder and Their Parents: A Systematic Review of Family Outcomes. *Am J Occup Ther.* 2015; 69(5): 6905180040p1-14. doi: 10.5014/ajot.2015.017855. PMID: 26356656.
- [12] Kuravackel GM, Ruble LA, Reese RJ, Ables AP, Rodgers AD, Toland MD. COMPASS for Hope: Evaluating the Effectiveness of a Parent Training and Support Program for Children with ASD. *J Autism Dev Disord.* 2018; 48(2): 404-16. doi: 10.1007/s10803-017-3333-8. PMID: 29022130.
- [13] Bearss K, Johnson C, Smith T, Lecavalier L, Swiezy N, Aman M, et al. Effect of parent training vs parent education on behavioral problems in children with autism spectrum disorder: a randomized clinical trial. *JAMA.* 2015; 313(15): 1524-33. doi: 10.1001/jama.2015.3150. Erratum in: *JAMA.* 2016 Jul 19;316(3):350. Erratum in: *JAMA.* 2016 Jul 19;316(3):350. PMID: 25898050.

- [14] Ho MH & Lin LY. Efficacy of parent-training programs for preschool children with autism spectrum disorder: A randomized controlled trial. *Research in Autism Spectrum Disorders*. 2020; 71(2): 96-104. doi:10.1016/j.rasd.2019.101495.
- [15] Ridderinkhof A, de Bruin EI, Blom R, Bögels SM. Mindfulness-Based Program for Children with Autism Spectrum Disorder and Their Parents: Direct and Long-Term Improvements. *Mindfulness (N Y)*. 2018; 9(3): 773-91. doi: 10.1007/s12671-017-0815-x. Epub 2017 Oct 6. PMID: 29875881; PMCID: PMC5968048.
- [16] Ingersoll B, Berger NI. Parent Engagement With a Telehealth-Based Parent-Mediated Intervention Program for Children With Autism Spectrum Disorders: Predictors of Program Use and Parent Outcomes. *J Med Internet Res*. 2015; 17(10): e227. doi: 10.2196/jmir.4913. Erratum in: *J Med Internet Res*. 2015; 17(11): e239. Erratum in: *J Med Internet Res*. 2015; 17(11): e257. PMID: 26443557; PMCID: PMC4642401.
- [17] Dai YG, Brennan L, Como A, Hughes-Lika J, Dumont-Mathieu T, Rathwell IC, Minxhozi O, Aliaj B, Fein DA. A Video Parent-Training Program for Families of Children with Autism Spectrum Disorder in Albania. *Res Autism Spectr Disord*. 2018; 56: 36-49. doi: 10.1016/j.rasd.2018.08.008. Epub 2018 Sep 10. PMID: 31275428; PMCID: PMC6605780.
- [18] Ingersoll B, Shannon K, Berger N, Pickard K, Holtz B. Self-Directed Telehealth Parent-Mediated Intervention for Children With Autism Spectrum Disorder: Examination of the Potential Reach and Utilization in Community Settings. *J Med Internet Res*. 2017; 19(7): e248. doi: 10.2196/jmir.7484. PMID: 28701294; PMCID: PMC5529736.