

THE EFFECT OF PARENT-MEDIATED INTERVENTION ON SOCIAL-EMOTIONAL SKILLS IN CHILDREN WITH AUTISM SPECTRUM DISORDER

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Abstract

Parent-Mediated Intervention (PMI) is a promising approach to improving children's social-emotional skills with Autism Spectrum Disorder (ASD). However, its implementation in Malaysia is still in its infancy. This study aimed to investigate the effectiveness of PMI in improving social-emotional skills in children with ASD using a quasi-experimental pre-post design. A total of 30 participants aged between 2.5 and 7 years diagnosed with ASD were recruited from Putrajaya and Sarawak Heart Centre. PMI was delivered bimonthly for the first three months and once monthly for the next three months along with a small parent support group based on Greenspan and Wieder's Developmental, Individual differences, and Relationship-based (DIR) theoretical framework. The Functional Emotional Assessment Scale (FEAS) was the primary outcome measure. Results showed a statistically significant mean difference with a large effect size in functional emotion ($F(1.613, 46.767) = 80.483, p < 0.001$), indicating that PMI improved the social-emotional skills of children with ASD. These findings highlight the potential benefits of parent partnership within occupational therapy and suggest a trend towards top-down approaches in promoting positive outcomes in children with ASD in Malaysia. This is a pilot study before a larger scale and controlled trial is undertaken in Malaysia. Overall, the results emphasise the importance of implementing evidence-based interventions, such as PMI, to improve the social-emotional skills of children with ASD.

Keywords: Autism Spectrum Disorder, Occupational Therapy, Relationship-based DIR, Parent-Mediated Intervention

Introduction

Autism Spectrum Disorder (ASD) is one of the most visible and widely discussed conditions. Its increased prevalence has brought it to society's attention in the United States, with worldwide recognition, including Malaysia (1). In the USA, the overall prevalence of ASD is one in thirty-six children aged eight years, and the prevalence shows an increasing trend over the years (2). Children with ASD are typically diagnosed before age three (3). Ideally, children with ASD should be managed by a multidisciplinary team. Literature suggests that Applied Behaviour Analysis (ABA), parent coaching, joint attention, and peer-mediated and social skills training have strong evidence as an ideal intervention for ASD and their parents (4). In recent years, there has been an increased focus on parent-mediated interventions for children with ASD.

There were 13% of occupational therapy interventions directed to parent partnership. Therefore, parent-delivered interventions were considered equally effective as therapist-delivered intervention (4). Malaysian Clinical Practice Guidelines for Management of Children and Adolescents with ASD suggest that parental training should be offered to parents of children with ASD (5). PMI engages parents to implement interventions with the child at home to substitute the role of the therapist (6). PMI involves three steps; (i) identifying potential interventions; (ii) teaching parents how to implement the intervention; and (iii) providing feedback to parents through a parent-partnership approach (7). This study introduced Parent-mediated Intervention (PMI) through direct coaching and engagement, adapted from the Developmental, Individual Differences, and Relationship (DIR Floortime) model.

Child-led interaction is critical, especially for children with ASD, as they lack social-emotional skills. Social-emotional Skills were closely associated with the DIR Floortime model, which provides playful interactions and close relationships with the carer, occupational therapist and child. It utilises the child's natural interests and emotions by following their desires, which later helps them master the stages of relating, communicating and thinking (8). Playing and interacting to help the child achieve crucial capacities and climb social-emotional milestones is the foundation of floortime principles (3). Research has shown that intensive early intervention and parent involvement can lead to positive outcomes for children with ASD (9). Therefore, approaches that help parents develop strategies for social-emotional are a promising route for early intervention in ASD.

The current intervention practice in Malaysia is very much child-oriented, so parents are often kept away from the intervention room. Only occasionally, parents are invited to be with the child but merely to comfort or handle the child's meltdown. Thus, it is often for the parents to find it challenging to carry out the intervention at home because they are not equipped with the necessary knowledge and proper professional coaching. This scenario may explain why the child does not progress as expected despite continuous intervention. While there has been a program incorporating the concept of PMI in Malaysia, it is not structurally and formally designed, and it is applied only by a group of occupational therapists. Currently, no evidence is available about the PMI implementation in Malaysia (10). Furthermore, PMI has never been studied regarding its efficacy and practicability. Therefore, this study aimed to examine the effect of PMI on social-emotional skills in children with ASD.

Materials and Methods

Design

A quasi-experimental pre-post study was conducted at the Occupational Therapy Unit, Hospital Putrajaya and Sarawak Heart Centre. Quasi-experiment was used to evaluate the benefits of PMI, and it allows immediate assessment of an intervention in terms of feasibility before a more extensive study and randomised controlled study is conducted (11). Patients were recruited for six months, from 1st April 2022 to 30th November 2022. There was only one group, i.e. intervention group (PMI), without any control.

Sample and sampling strategy

Purposive sampling was used to recruit participants from the Child Developmental Clinic, Hospital Putrajaya and Sarawak Heart Centre. The participants were 30 children with ASD and their parents. The sample size was calculated using the G*Power with the effect size d of 0.25, an error probability of 0.05, and a power of 80%; the total sample needed is 28. Considering the drop-out, an additional 10% was added; hence, the sample required is 30. A developmental paediatrician or paediatrician diagnosed

all participants. Thirty children aged between two years and a half and seven years old with a diagnosis of ASD who did not receive any early intervention program (based on occupational therapy records and parent interviews), children whose at least one parent committed to the PMI and children whose parents were able to give informed consent were included in this study. Parents (father or mother) aged between 18 and 60 years old who were able to read and write in English or Malay, staying with the children for at least six months, had undergone nine individual PMI sessions that were done bimonthly for the first three months, and once monthly for the subsequent three months were included. They also attended online parent talks and virtual meetings in small groups during the six-month of the study.

Children with other co-occurrences (e.g., hearing impairment, genetic disorders, attention deficit hyperactive disorder and severe medical conditions) already receiving an early intensive program of more than 20 hours per week through the therapist-client model of intervention, particularly from a private centre, children with any of their parent who had compliance issue to PMI and children whose parents were illiterate were excluded in this study. In addition, parents who had chronic medical conditions such as heart conditions, cognitive impairments, and chronic obstructive pulmonary diseases and were dependent on others in daily activities were also excluded from this study.

Data collection procedure

Once the screening process had been completed, the consent forms were distributed to eligible participants. Then, parents' consent was obtained before their children were involved in this study. After that, parents completed the demographics information about their children (age, gender, date of birth) and socio-economic background (order among siblings, household income, primary carer's age, relationship to the child, educational level, occupation, type of family, number of family members in the household and number of children in the household). Age of ASD diagnosis, duration of diagnosis in a year, and level of Social Communication and Interaction (SCI) and Restricted, Repetitive Behaviour (RRB) was completed by the therapist. The functional Emotional Assessment Scale (FEAS) was the primary outcome measure.

FEAS is a standard assessment developed as a criterion-referenced measure for children aged seven months to four years old. However, it can be used up to later childhood and early adolescence if there is a delay in social-emotional skills (12). It had been designed to assess emotional functioning in children with social-relationship and maturation-based problems. Therefore, it is suitable as a primary measure of the PMI intervention. The six milestones assessed in FEAS are; (i) self-regulation and interest in the world; (ii) forming relationships, attachment, and engagement; (iii) two-way, purposeful communication; (iv) behavioural organisation, problem-solving and internalisation; (v) representational capacity; and (vi) representational differentiation.

There are two scoring parts; one for the caregiver and another one for the child. This study only rated the child’s part and did not rate the caregiver’s behaviour. The scale may be used descriptively and also can be used quantitatively by rating each capacity on the 0-2 rating scale, and a higher score means a higher skill. The total child score was added to get the total scale range from Normal, At Risk and Deficient. Interpretative scores can be done separately, whether the researcher wants to score for the caregiver or child. Higher scores mean a larger developmental scale. The FEAS can also be administered reliably with live or videotaped observations. FEAS was measured repeatedly at baseline, midway (fifth session) and after program completion, which took approximately six months. The therapist completed all the measurements.

PMI procedure

The intervention procedure was adapted from DIR Floortime by applying three basic strategies; (i) following

the child’s lead, (ii) challenging play, and (iii) expanding interaction. Three types of play, sensory, object, and symbolic, were used according to the child’s preferences. There was no local data on PMI feasibility in Malaysia, with financial restrictions and a high commitment for parents to come to the study site. Therefore, the research team decided that the intervention protocol for PMI is twice a month for the first three months and will continue once a month for the subsequent three months at the study site. The intervention procedure took six months (24 weeks) to complete with face-to-face and virtual coaching programs. Table 1 shows the description of the intervention procedure for this study.

Data analysis

The data analysis was performed using the Statistical Package for Social Science Version 26 (SPSS Version 26). All the parameters were then analysed with a significance level of $p < 0.05$ (two-tailed) and a confidence interval of

Table 1: PMI procedure for six months

Week	Session	Description	Duration
1	Parent talk workshop *Baseline measurement	- Overview of Autism - Overview of PMI - PMI basic strategies - PMI Play - Q & A session	4 hours
2-6	1 st -3 rd parent-coaching	Individualised coaching is conducted based on current child performance. In addition, OTs provide parents with relevant homework as a guide towards specific goals agreed upon during the coaching session.	75-90 mins
7	Virtual support group 1	Parents were allowed to meet and help each other. OTs facilitated the session.	45-60 mins
8-13	4 th -6 th parent-coaching *Mid-way measurement (week 10)	Individualised coaching is conducted based on current child performance. In addition, OTs provide parents with relevant homework as a guide towards specific goals agreed upon during the coaching session.	75-90 mins
14	Virtual support group 2	Parents were allowed to meet and help each other. OTs facilitated the session.	45-60 mins
15-24	7 th -9 th parent-coaching	Individualised coaching is conducted based on current child performance. In addition, OTs provide parents with relevant homework as a guide towards specific goals agreed upon during the coaching session.	75-90 mins

*Measurement of outcome using FEAS

95%. First, repeated measure analysis of variance (ANOVA) was conducted. Then, time was set as the within-subject factor as FEAS were taken thrice (pre-intervention, mid-intervention and post-intervention). The effect size was calculated using the partial eta squared and was interpreted as having a small effect ($\eta^2 = 0.01$), medium effect ($\eta^2 = 0.06$) or large effect ($\eta^2 = 0.14$) (13). In addition, any significant interaction between the factors (children’s and parents’ characteristics) with the times was evaluated

to identify the factors that influence the outcome of the intervention.

Results

Participants’ demographic characteristics

Table 2 shows the demographic characteristics of the children and their primary caregivers involved in this

study. The majority of children were males (73.30%) aged between three and five years old (60%), the first child in their family (70%) and currently living in Putrajaya (66.7%). Most of them were diagnosed at the age of three years old and below (63.3%), with more than half of the children having level two for both SCI (56.7%) and RRB (66.7%). In addition, the majority of the primary caregiver aged

between 30 and 40 years (63.3%). Most of them were mothers (86.7%), married (100%), Malay (73.3%), had a tertiary level of education (90%) and had a high household income (70%). Furthermore, almost all primary caregivers were working (83.3%) and living in a nuclear family (90%), with a majority of them having a medium-sized family (56.7%) and two to three children in their household (50%).

Table 2: Demographic characteristics of the respondents (n = 30)

Child's Characteristics	n (%)	Caregiver's Characteristics	n (%)
Age group		Age group	
2.5- 5 years old	22 (73.3)	≤ 30 years	5 (16.7)
> 5 years, one month	8 (26.7)	> 40 years	6 (20.0)
Gender		Gender	
Female	8 (26.7)	Female	26 (86.7)
Male	22 (73.3)	Male	4 (13.3)
Order among siblings		Marital status	
1 st	21 (70.0)	Married	30(100.0)
2 nd	3 (10.0)	Ethnicity	
3 rd	5 (16.7)	Malay	22 (73.3)
4 th	1 (3.3)	Chinese	5 (16.7)
Age group during diagnosis		Others	3 (10.0)
≤ 3 years	19 (63.3)	Education level	
> 3 - 5 years	11 (36.7)	Secondary	3 (10.0)
Diagnosed as ASD		Tertiary	27 (90.0)
≤ 1 year	15 (50.0)	Monthly household income	
> 1 - 2 years	7 (23.3)	Low (below RM3000)	3 (10.0)
> 2 years	8 (26.7)	Middle (RM3000-5000)	6 (20.0)
Level of SCI*		High (Above RM5000)	21 (70.0)
Level 1	9 (30.0)	Work status	
Level 2	17 (56.7)	Homemaker	5 (16.7)
Level 3	4 (13.3)	Working	25 (83.3)
Level of RRB*		Type of family	
Level 1	7 (23.3)	Nuclear	27 (90.0)
Level 2	20 (66.7)	Extended	3 (10.0)
Level 3	3 (10.0)	Family members	
Location		Small (≤ 3)	9 (30.0)
Putrajaya	20 (66.7)	Medium (4 – 5)	17 (56.7)
Sarawak	10 (33.3)	Big (≥ 6)	4 (13.3)
		Children in household	
		1	12 (40.0)
		2-3	15 (50.0)
		≥ 4	3 (10.0)

SCI- Social Communication and Interaction, RRB- Restricted, Repetitive Behaviour

Table 3 shows children with ASD’s level of functional emotion. Almost all children with ASD had a deficit in all six subtests of FEAS. Nevertheless, throughout the intervention, more than half of the children with ASD achieved normal functional emotion in subtests one and two, while almost half achieved normal functional emotion

in subtests three and four. Only one-tenth of the children achieved normal functional emotion in subtest five, and no child achieved normal functional emotion in subtest six. For overall functional emotion, more than half of the children still have deficits in functional emotion (76.7%) following the six-month PMI.

Table 3: Assessment of functional emotion in children with ASD (n = 30)

FEAS*	Frequency (n), Percentage (%)		
	Pre-intervention	Mid-intervention	Post-intervention
Subtest 1			
Normal	1 (3.3)	11 (36.7)	19 (63.3)
At risk	0 (0.0)	2 (6.7)	2 (6.7)
Deficient	29 (96.7)	17 (56.7)	9 (30.0)
Subtest 2			
Normal	0 (0.0)	10 (33.3)	18 (60.0)
At risk	0 (0.0)	1 (3.3)	4 (13.3)
Deficient	30 (100.0)	19 (63.3)	8 (26.7)
Subtest 3			
Normal	0 (0.0)	6 (20.0)	14 (46.7)
At risk	0 (0.0)	2 (6.7)	10 (33.3)
Deficient	30 (100.0)	22 (73.3)	6 (20.0)
Subtest 4			
Normal	1 (3.3)	7 (23.3)	3 (10.0)
At risk	0 (0.0)	0 (0.0)	2 (6.7)
Deficient	29 (96.7)	23 (76.7)	25 (83.3)
Subtest 5			
Normal	0 (0.0)	3 (10.0)	3 (10.0)
At risk	0 (0.0)	2 (6.7)	2 (6.7)
Deficient	30 (100.0)	25 (83.3)	25 (83.3)
Subtest 6			
Normal	0 (0.0)	0 (0.0)	0 (0.0)
At risk	0 (0.0)	0 (0.0)	0 (0.0)
Deficient	30 (100.0)	30 (100.0)	30 (100.0)
Total Score			
Normal	0 (0.0)	2 (6.7)	2 (6.7)
At risk	0 (0.0)	3 (10.0)	5 (16.7)
Deficient	30 (100.0)	25 (83.3)	23 (76.7)

FEAS- Functional Emotional Assessment Scale

Repeated measure ANOVA showed the mean difference for FEAS was statistically significant ($F(1.613, 46.767) = 80.483, p < 0.001$) with a large effect size ranging from 0.202 to 0.735. As there was a significant mean difference in FEAS, the Bonferroni post hoc test was conducted to identify the specific pairwise mean differences. For functional emotion, there was a statistically significant mean difference from pre-intervention to mid-intervention ($p < 0.001$), pre-intervention to post-intervention ($p < 0.001$) and mid-intervention to post-intervention ($p = 0.001$). Hence, the functional emotion level was significantly increased throughout the intervention.

Table 4 shows the tests of within-subject effects with interaction with all factors in FEAS. For functional emotion,

the interaction effect between time and age group, duration of illness, location, level of ASD SCI, level of ASD RRB and primary caregiver education were statistically significant, suggesting these factors influence the outcome of the interventions.

Discussion

The study aimed to examine the effect of PMI on social-emotional skills in children with ASD. The results suggest that PMI significantly improved the social-emotional skills of children with ASD. Almost all of the children in this study have deficits in all six FEAS subtests; (i) self-regulation and interest in the world; (ii) forming relationships, attachment, and engagement; (iii) two-way, purposeful

Table 4: Tests of within-subject effects with interaction

Measure: FEAS, Correction Method: Huynh-Feldt						
Interacted with Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Age Group	1597.122	4.000	399.281	15.916	0.000	0.541
Gender	50.814	1.632	31.143	0.490	0.578	0.017
Order Among Siblings	387.610	5.069	76.471	1.310	0.277	0.131
Age Group During Diagnosis	14.741	1.664	8.858	0.141	0.832	0.005
Duration of ASD diagnosis	1766.213	4.000	441.553	20.111	0.000	0.598
Location of stay	902.344	1.750	515.519	12.328	0.000	0.306
Level of SCI	1293.675	4.000	323.419	10.532	0.000	0.438
Level of RRB	677.271	3.903	173.538	4.020	0.007	0.229
Primary Caregivers' Age Group	156.145	3.472	44.972	0.754	0.543	0.053
Gender of Primary Caregiver	70.524	1.621	43.498	0.685	0.480	0.024
Race of Primary Caregiver	241.818	3.312	73.022	1.205	0.320	0.082
Education of Primary Caregiver	554.684	1.833	302.660	6.479	0.004	0.188
Monthly Household Income	250.400	3.525	71.041	1.251	0.302	0.085
Work Status	38.698	1.654	23.391	0.372	0.652	0.013
Type of Family	187.030	1.700	110.026	1.894	0.167	0.063
Family Members	228.057	3.581	63.692	1.130	0.351	0.077

communication; (iv) behavioural organisation, problem-solving, and internalisation, (v) representational capacity; and (v) representational differentiation. The mid-point of measurement proved it at ten weeks of intervention; the score of social-emotional skills increased tremendously in FEAS subtests one, two and three. The result justified that PMI increased the child's social-emotional skills, reflected by increased Functional Emotional Assessment Scale (FEAS) scores. However, no improvement was seen in the mid-assessment for FEAS subtests four, five and six. Subtests four, five and six require a child's ability to reads and respond to a range of emotional signals flexibly and accurately, which are the most common problem in children with ASD (14).

Further time and intervention are required to enhance social responsiveness, as reflected in the post-intervention results. This study found a statistically significant association between the child's age (less than five years old) and their social-emotional skills. Specifically, 63% of the participants in this study were below three years old and demonstrated significant improvement in their social-emotional skills through PMI. This finding supports the notion that PMI is particularly beneficial for young children with ASD (15) and aligns with Greenspan's Theory of Development and the FEAS, which assesses social-emotional skills in children aged seven months to four years (16).

Regarding the implementation dosage, the application of nine individual parent coaching sessions resulted in a significant improvement in social-emotional skills and social responsiveness among children with ASD. The

intervention also increased parent competency within just ten weeks (midpoint) of the program. Moreover, parents were provided with relevant homework to support therapy at home that guided them towards specific goals discussed during the coaching sessions. Besides, parent talk sessions and a parent support group over six months allowed parents to meet and support one another. This study highlights the importance of consistent and persistent intervention in achieving better outcomes for children with ASD.

Additionally, this study implemented the DIR floortime model, which recommends that parents adhere to specific requirements for conducting daily sessions with their children with ASD. The recommended frequency is six sessions per day, with each session lasting 20-30 minutes, totaling at least 2 hours per day. This approach is supported by Clinical Practice Guidelines (5), stating that engaging children with ASD through play at their developmental level and building on their strengths using DIR/Floortime™ intervention for an average of 14.2 hours per week for a year significantly improve developmental skills and reduces autistic symptoms in 47% of children with ASD. However, it is crucial to critically evaluate the generalisability of these findings to the current study.

Moreover, previous literature suggests that parents should spend 10 to 15 hours per week or two to three hours daily engaging their children with ASD through shorter play sessions scattered throughout the day (17). Supported by a randomised controlled trial study (3), incorporating home-based DIR/Floortime™ intervention for an average

of 15.2 hours per week over three months led to significant improvements in the social-emotional skills of children with ASD. While these findings contribute to the existing knowledge, it is necessary to consider potential limitations, such as the study designs, sample characteristics, and intervention procedures.

Therefore, the study identified several factors that demonstrated a substantial effect on the outcomes of PMI, including age group, duration of diagnosis, and family background. Specifically, early intervention (1-2 years since illness onset) for young children (3-4 years old), tailored to each child's developmental profile, resulted in significant improvements in social-emotional skills. These findings align with the DIR/Floortime™ model, which emphasises the critical period of 18 to 36 months for developing social-emotional skills in children with ASD (9). However, it is crucial to acknowledge potential confounding variables and the need for further research to establish causal relationships.

Regarding the influence of duration of diagnosis, the study observed that children with a shorter duration of diagnosis (one year or less) exhibited higher functional emotion skills compared to those diagnosed for more than two years. This finding suggests that parents may initially prioritise addressing early skill deficits related to autism, such as joint attention, social responsiveness, and communication. However, as children grow older, parents may experience increased stress due to challenging behaviours (18), which can be difficult to manage and lead to social stigmatisation. These findings warrant further investigation to understand better the complex dynamics between illness duration, parental stress, and the child's social-emotional development.

The study also identified family background as a significant factor influencing the outcomes of PMI. Specifically, families with small sizes (four to five members) living in nuclear family structures with well-educated parents aged thirty to forty years and a household income above RM5000 demonstrated more favourable results. It is suggested that the demands of PMI, requiring patience and consistency (17), might be more manageable for parents in small families who have more time to dedicate to interventions at home. Additionally, the absence of extended family members residing together may facilitate the implementation of PMI strategies without interference from third parties. Furthermore, parents in this group tend to have better access to face-to-face or online coaching, higher awareness of their child's challenges, and more excellent knowledge due to residing in urban areas. However, it is essential to consider potential confounding variables and the need for further investigation to establish the causal role of family background in PMI outcomes.

The study has some limitations, including the unknown adherence of parents to the PMI procedure and the lack of monitoring strategies to examine the fidelity of the intervention. Parents' involvement in other interventions should also be considered, as it would influence the

treatment outcomes. Besides, the heterogeneous sample may lead to widely varying outcomes; hence, the conclusion must be made carefully. A large-scale randomised controlled trial (RCT) is needed to further examine and support the effectiveness of PMI in children with ASD. Given the duration of ASD diagnosis, age of children, location of stay, level of SCI, level of RRB and educational level of parents influenced the outcome of the intervention, these confounding factors need to be well controlled in future studies.

Conclusion

This study suggests that PMI is a promising intervention and equally effective as the therapist-delivered intervention in improving the social-emotional skills of children with ASD. This study further supports a growing trend towards top-down approaches in occupational therapy. Collaboration with parents is effective and worthwhile, portrays several functionalities that distinguish PMI from other parent training approaches and gives the capacity for more beneficial effects. In addition, PMI delivers another level of interaction not encountered in the bottom-up practice approach. Therefore, based on the results of this study, it is recommended to implement PMI as a preferred intervention method that acknowledges the child's active role as a learner and recognises the importance of the parent-child relationship as a critical component for success.

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Competing interests

The authors declare that they have no competing interests.

Ethical clearance

Approvals to conduct the study were obtained from the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (reference no: NMRR ID-21-02005-PS1(IIR) and The Research Ethics Committee of Universiti Teknologi MARA (FERC/FSK/MR/2022/0180).

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