THE IMPACT OF THE E4MSR (EMBODIMENT FOR MOTOR SKILLS AND SOCIAL RECIPROCITY) INTERVENTION ON THE MOTOR AND SOCIAL RECIPROCITY SKILLS OF CHILDREN WITH AUTISM

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2025

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by

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Thesis submitted in fulfilment of the requirements

for the degree of

Master of Arts

June 2025

ACKNOWLEDGEMENT

First and foremost, I would like to thank my supervisor Associate Professor Dr. Low Hui Min and my former supervisor Professor Dr. Lee Lay Wah for their guidance, support and encouragement throughout the study. I am grateful for their patience and time given to me despite their busy schedule. This thesis could never have been possible without their help.

Special thanks to the organisation I am working with for allowing me to collect my data, especially to my coordinator who helped run the group sessions despite her busy schedule. I am grateful for her continuous support, guidance and encouragement throughout the study. Not forgetting my colleagues who had also assisted me in this study.

My sincere thanks to the participants and their parents in this study who had to make sacrifices through their participation which will always be remembered. Without their support, this study would not have been possible.

Last but not least, I would like to thank my family members for their sacrifices and support rendered to me throughout this study.

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LIST OF ABBREVIATIONS

APA	American Psychiatric Association
E4MSR	Embodiment for Motor skills and Social Reciprocity skills
EPR	Embodiment-projection-role
NGO	Non-government organisation
SPARK	Sports, Play and Active Recreation for Kids
PE	Physical education
PA	Physical activities
FMS	Fundamental motor skills
ToM	Theory of Mind
ASD	Autism Spectrum Disorder
PEP-3	Psychoeducational Profile-Third Edition
IEP	Individualized Education Plan
MIP	Motor Intervention Program

LIST OF APPENDICES

IMPAK INTERVENSI *E4MSR (EMBODIMENT FOR MOTOR SKILLS AND SOCIAL RECIPROCITY)* TERHADAP KEMAHIRAN MOTOR DAN KEMAHIRAN TIMBAL BALIK SOSIAL KANAK-KANAK AUTISME

ABSTRAK

Kanak-kanak autisme sering didapati mempunyai kemahiran motor yang lemah serta kekurangan kemahiran timbal balik sosial. Kajian kes ini bertujuan untuk mengenal pasti impak intervensi E4MSR terhadap kemahiran motor dan kemahiran timbal balik sosial kanak-kanak autisme yang berumur empat hingga lima tahun di sebuah pusat intervensi NGO di Pulau Pinang, Malaysia. E4MSR menggabungkan model "embodiment" oleh Sue Jenning (2015) dan model hierarki pergerakan motor oleh Gallahue et. al. (2012). Empat orang kanak-kanak autisme dengan kemahiran motor dan kemahiran timbal balik sosial yang lemah telah dipilih sebagai sampel kajian ini. Data kuantitatif dikumpul melalui sesi intervensi, termasuk penilaian kemahiran motor dan timbal balik sosial mereka dengan menggunakan PEP-3. Hasil kajian menunjukkan bahawa intervensi E4MSR berkesan untuk kanak-kanak autisme, terutamanya pada kemahiran motor halus, motor kasar dan motor visual mereka serta kemahiran timbal balik sosial mereka. Ia meningkatkan kemahiran motor dan timbal balik sosial kanak-kanak autisme. Perubahan dan peningkatan kedua-dua kemahiran motor dan timbal balik sosial bergerak ke arah yang sama, menunjukkan bahawa perubahan dalam kemahiran motor berkemungkinan berkaitan dengan perubahan dalam kemahiran timbal balik sosial berikutan intervensi E4MSR. Selain itu, kemahiran yang dipelajari selepas intervensi E4MSR masih dikekalkan selepas sebulan daripada intervensi. Kesimpulannya, intervensi E4MSR berkesan dan membantu meningkatkan kemahiran motor dan kemahiran timbal balik sosial kanak-kanak autisme.

THE IMPACT OF THE E4MSR (EMBODIMENT FOR MOTOR SKILLS AND SOCIAL RECIPROCITY) INTERVENTION ON THE MOTOR AND SOCIAL RECIPROCITY SKILLS OF CHILDREN WITH AUTISM

ABSTRACT

Children with autism are often found to have poor motor skills as well as lack of social reciprocity skills. This case study aimed to investigate the impact of the E4MSR intervention on the motor and social reciprocity skills of children with autism ages four to five years old at an NGO intervention centre in Penang, Malaysia. E4MSR intervention combines the embodiment model by Sue Jennings (2015) and the hierarchical model of motor movements by Gallahue et. al. (2012). Four children with autism with poor motor skills and social reciprocity skills were selected as the sample of this study. Quantitative data were collected during the intervention sessions, which involved assessing participants' motor skills and social reciprocity skills using the Psychoeducational Profile-Third Edition (PEP-3). Results showed that the E4MSR intervention was effective for children with autism, particularly on their fine motor, gross motor and visual motor imitation skills as well as their social reciprocity skills. It improves the motor skills and social reciprocity skills of the children with autism. The changes and improvement of both motor skills and social reciprocity skills are moving in the same direction, thus suggesting that the changes in motor skills are likely related to the changes in social reciprocity skills following the E4MSR intervention. Moreover, the skills learnt following the E4MSR intervention were maintained after a month from the intervention. In conclusion, embodiment techniques intervention, E4MSR was effective and helps to improve the motor skills and social reciprocity skills of children with autism.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Autism is a complex disorder that encompasses multiple areas of impairment (Tager-Flusberg, 2006). It is a developmental disorder that disrupts normal brain development and varies greatly in its severity. Diagnosis is determined by two main areas of difficulty: social communication and interaction, as well as restricted, repetitive behaviour, interests or activities (American Psychiatric Association [APA], 2013). The Centers for Disease Control and Prevention (CDC) reported in 2023 that, as of in 2020, one in 36 children in the U.S had been diagnosed with autism. In Malaysia, the number of children diagnosed with autism has been steadily rising and increased by 663% from 2013 to 2023 (Ova, 2024). There are three severity levels for autism wherein the individual "requiring support" in level one, "requiring substantial support" in level two and "requiring very substantial support" in level three (APA, 2013).

According to the DSM-5 (APA, 2013), autism is characterized by two main areas of impairment, which are difficulties in social communication and interaction, and the presence of restricted, repetitive behaviours, interests, or activities. Children with autism may struggle with social-emotional reciprocity, nonverbal communication, and forming relationships. They may also display repetitive movements or speech, a strong need for routines, intense interests, and unusual responses to sensory input.

Many children with autism, beyond the core impairments in social communication and restricted behaviours, often struggle with gross and fine motor skill development (Schopler, Reicher & Lansing, 1980; Mohd Nordin, Ismail,Kamal Nor, 2021; Miller,

2012). Gross motor difficulties may include running, throwing, low energy, weak muscles, poor balance, clumsiness and unsafe movement control (Schopler, Reicher & Lansing, 1980; Schenkman, 2020; Kaplanova, Siskava, Grznarova & Vanderka, 2023). Fine motor challenges affect hand coordination, such as grasping, pinching, and using both hands together (Schopler, Reicher & Lansing, 1980; Laurie, 2022; Schenkman, 2020). These children often lack curiosity and persistence, limiting their engagement with toys and materials that would help them build skills (Schopler, Reicher & Lansing, 1980; Ju, Kaur, Harris, Srinivasan & Bhat, 2012). As a result, structured support is essential.

Motor skills development is a dynamic, lifelong process. In early childhood, from ages three to five, children build key skills in balance, manipulation and locomotion through active play. This foundation is essential for later participation in structured sports and activities. During this stage, children also develop fine motor skills and visual motor imitation skills (Zaichkowsky & Larson, 1995; Man, Ragbir Singh, Zainuddin, Hashim & Ibrahim, 2006). Imitation requires attention, matching ability and coordinated movement to reflect what is observed (Schopler, Reicher & Lansing, 1980; Schenkman, 2020).

A key trait of children with autism is their struggle with social interaction and reciprocity skills (APA, 2013). Social reciprocity involves the two-way interactions between the child and others (Schopler, Lansing, Reichler & Marcus, 2005). Unlike typically developing children who acquire these skills naturally, children with autism often lack foundational abilities like imitation, joint attention and emotional recognition (Guivarch et al., 2017). As a result, they struggle with social communication, such as interpreting others' emotions, using verbal and non-verbal cues, initiating interactions, and forming appropriate peer relationships (APA, 2013).

Over the years, numerous treatments for children with autism have been developed, based on different approaches including behavioural, developmental, and cognitive-behavioural interventions. Evidence from numerous programs and studies indicates that early intervention, especially in the first few years of life, leads to better developmental outcomes and is more cost-effective for families and services (Corsello, 2005; Behavioral Innovations, 2023; Jacobson, Mulick & Green, 1998; Jacobson & Mulick, 2000). In particular, activities conducted in a group setting are believed to benefit children with autism to help them become more socially competent in interaction situations (Guivarch, 2017).

However, it is very rare to have an intervention program that is comprehensive enough to cover two aspects of difficulties faced by children with autism, namely motor skills and social skills. Many existing interventions only targeted specific skills. For example, for social skills there are some intervention programs called 'Talkabout for Children' (Kelly, 2017), 'Social Thinking and Me' (Garcia & Murphy, 2016), 'PECS®' (Bondy & Frost,1985), and 'DIR® Floortime' (Greenspan & Wieder, 1997), which merely focus on social skills. As for motor skills, the CHAMP intervention (Palmer, Chinn & Robinson, 2019), and RTI intervention program (Ohl et. al., 2013), which focus on motor skills. To the best of the researcher's knowledge, very few curriculum-based intervention programs focus on both social and motor skills intervention, in a single program.

Thus, the present study is set to investigate the impact of the E4MSR (Embodiment for Motor skills and Social Reciprocity skills) intervention on the motor and social reciprocity skills of children with autism, which includes movement-based activities that can help to improve movement and therefore improve 'motor skills'. The intervention was conducted in a group setting to provide more optimal opportunities

to improve ‘social reciprocity skills’. This made the E4MSR intervention unique as it covers both aspects of motor skills and social reciprocity skills, which many past research or studies on autism intervention rarely focused on together.

1.2 Background of Study

In the present study, the researcher aimed to develop an embodiment techniques intervention named ‘Embodiment for Motor skills and Social Reciprocity skills’ (E4MSR) and to see if this movement-based activities intervention improves the motor skills and social reciprocity skills among the participants, as the intervention was conducted in a group setting. For the background of the study, it is important to understand the embodiment techniques as it constituted the backbone of the E4MSR intervention.

As children grow, they acquire movement skills and increase physical competence, thus making the development of basic movement skills sensitive to them. Embodiment, including movement and physical contact (hand massage and light massage of back and shoulder), is extremely important, not only for physical development but also because it affects brain growth (Jennings, 2015). Embodiment refers to understanding how one’s own body functions and interacts in its everyday, contextual state (Raymond, 2005). Jennings’ (2015) model of Embodiment-Projection-Role (EPR) encompasses development from birth through seven years old. The embodiment stage usually begins with massage and movement. Apart from that, the embodiment stage also includes messy play, touch-communication, singing games, peek-a-boo, clapping and singing. As the child becomes more interested in the space and objects in the world beyond the body, a transition will be made (Jennings, 2015).

Embodiment techniques involve body-focused activities that are crucial for developing the 'body-self' (Jennings, 1998). As Jennings (1998) noted, we cannot form a body image until we have established a body-self. The child needs to be able to 'live' in their own body, starting from being securely part of the mother's body, transitioning from being closely attached to the mother, and eventually gaining gradual independence, while still having the opportunity to return to physical contact when needed or when feeling scared (Jennings, 1998). If these stages are followed, then the child will have greater spatial security and physical balance. Other than that, Jennings' (2015) model of EPR develops core competencies such as establishing healthy attachments, enabling the development of trust, creating confidence in the body-self, facilitating the growth of empathy, encouraging resilience and maintaining emotional literacy. EPR identifies the markers of life changes that are ritualized through play and drama as one progresses from one stage to the next (Jennings, 2015).

Based on Jennings' (2015) model of EPR, embodiment techniques include activities that involve gross body movements engaging the entire body such as running, jumping, skipping, hopping, walking, and leaping; fine body movements involve various body parts; sensory activities engaging textures, sound, taste, smell and sight; singing games; rhythmic movement and dance; rough and tumble play, including struggles and wrestling; imaginative movement ideas like pretending to be animals, giants, aliens and so on and lastly storytelling with sounds and movement (Jennings, 2015). Acquiring these skills would benefit children with autism to improve their gross and fine motor skills. This is because well-developed fine motor skills rely on functional sensory systems, postural stability, mobility, and good muscle tone (Delaney, 2009). The development of gross motor skills in a sequential order lays the groundwork for more intricate fine motor skills (Delaney, 2009).

Apart from that, these embodiment technique activities also help to develop visual motor imitation skills such as replicating fine and gross motor tasks and mimicking the correct use of objects. In order to imitate, children require several basic skills such as looking at or listening to another person, understanding the concept of matching, and then organizing his or her movements to make them match what he or she observed (Schopler, Reicher & Lansing, 1980; Schenkman, 2020). For some children, learning to imitate physical movements is easier than to imitate sounds (Schopler, Reicher & Lansing, 1980; Larisa, 2021).

Embodiment is crucial since grasping how we achieve motor control and movement coordination is essential to understanding our daily lives. Movement is integral to life, and everything we do, whether in work or play, involves movement (Gallahue, Ozmun & Goodway, 2012). These physical movement activities are important to the development of the children's awareness of their body and of its relation to their environment. Hence, understanding one's own body is important because it is the primary way we learn (Jennings, 1990; Koksal, 2020). Gaining the ability to move independently allows children to explore the wider world, while improving manual skills enables more complex interactions with objects and people. As motor skills develop throughout the body, children also create greater opportunities for social interaction. In turn, these advances in motor development can lead to significant growth in other areas such as perception and cognition, language and communication, emotional expression and regulation, physical growth and health and so on (Adolph & Hoch, 2020). Moreover, these movement activities also provide an excellent way of teaching verbal and nonverbal cognitive development. This could help children with autism to gain social reciprocity skills too because being aware of their own feelings and emotions allows them to develop the skill of 'reading' the

feelings of others (Waterhouse, 2000). Much of this is achieved through interpreting non-verbal communication, which is conveyed through the tone of voice, facial expressions or gesture. However, often children with autism were found to have the inability to do this (Waterhouse, 2000).

In the past, embodiment techniques were seen to be used in several research and studies in the work with adults and children. Most of the embodiment techniques were seen broadly used in music and dance (Sutela, Kivijarvi & Anttila, 2021), special music education (Kivijarvi, Sutera & Ahokas, 2017), puppetry or in therapeutic work (Dakroub, 2020; Kuppers, 2020; Tsaplina, 2020) but not many used embodiment techniques to improve motor skills and social skills. Thus, the researcher focuses on embodiment technique in the E4MSR intervention to evaluate whether these movement-based activities can improve the motor skills and as the intervention was conducted in a group setting, thus improving the social reciprocity skills among the participants.

1.3 Problem Statement

Although many researches were conducted on motor and social skills in children with autism, there are limited ones that focus on both motor and social skills together and this is important because motor development is the precursor for social skills. A review was done by Leonard and Hill (2014) on how motor development influences both typical and atypical social cognition and language. The search revealed 43 studies, many of which emphasized a strong connection between motor skills and the development of social cognition, language and social interactions. Thus, greater attention from researchers and practitioners is needed to develop more specialized intervention techniques for individuals at risk of motor, social and language difficulties (Leonard & Hill, 2014). Although there is evidence supporting the

effectiveness of exercise programs in improving social skills, there is limited research on the specific types of exercise interventions that are best suited to the unique needs of children with autism.

Most of the research was mostly conducted in Western countries compared to those in Asian countries. There have been only a few studies carried out on the topic of autism intervention in Malaysia (Ong, Wong, Tan & Roslan, 2018). Although there were studies done, only few of them focused on the relationship between motor skills and social skills. Other than that, most of the research showed that the skills learnt were not maintained. Therefore, in the present study, the researcher hopes to develop an embodiment techniques intervention named Embodiment for Motor Skills and Social Reciprocity Skills (E4MSR) that will improve on these two motor and social reciprocity skills and that could be conducted in Malaysia. This E4MSR intervention consists of a series of activities incorporating embodiment and motor movement activities that could be performed in a one-to-one setting or in a group setting. This E4MSR intervention could be easily conducted by parents and educators at home or in schools.

To have an embodiment techniques intervention that will improve motor and social reciprocity skills is important because embodiment includes movements and physical contact which is extremely important to everyone, as it not only helps to develop physically in terms of motor skills, it will also have effect on the growth of the brain (Jennings, 2015). As mentioned earlier, children with autism often experience greater difficulties in both motor skills and social skills. The E4MSR intervention (Embodiment for Motor Skills and Social Reciprocity Skills) includes movement-based activities such as sensory movement, rhythmic movement, dance, and gross and fine body movements (Jennings, 2015) are important for improving both

fine and gross motor skills. Besides, the E4MSR intervention was carried out in a group setting to create better opportunities for enhancing social reciprocity skills. Furthermore, past research strongly indicates motor skills are essential to human learning and significantly influence social behaviour starting from early infancy (Iverson, 2010). Therefore, an embodiment technique intervention is crucial for improving motor and social reciprocity skills in children with autism as the past research indicates that motor skills would influence social behaviours. The present research is needed because, as far as the researcher is aware, there is no existing research at present in Malaysia that focuses on embodiment techniques.

Moreover, the recent rise in the number of children diagnosed with autism suggests that autism spectrum disorder is becoming more prevalent and that its symptoms are increasingly recognized by parents and educators. With the knowledge acquired, children with autism are more prone to early detection and early diagnosis with referrals to appropriate services. However, some of the children with autism were not given the opportunity to access early intervention or other therapy services as there are limited programs that are affordable for parents because the fees for the services provided are quite high, especially in private centres.

In Malaysia, other than the hospitals or private centres, there are community-based non-government organisation (NGO) centres which provide early intervention services to children with autism and other challenges. In those centres, one-to-one intervention sessions were conducted based on the children's IEP plan and needs. Group activities aimed to improve the social skills of the children. However, group activities are normally designed by the teachers according to the needs of those children, but those activities are not evidence-based. So, to optimize the benefits of early intervention in community-based intervention centres, it is urgent to have more

activities which are evidence-based, theoretical driven, and curriculum-based. Moreover, the need to develop an evidence-based intervention that can be replicated in multiple early intervention environments such as at home, in centres or in schools, in the Malaysian setting, because as mentioned earlier, early intervention for children with autism is quite intensive and expensive, and not easily available except in bigger towns. Even though the accessibility to services is available, not often the children can get regular therapy sessions, due to the high demand and lack of therapists (Ong, Wong, Tan & Roslan, 2018). Hence, having a replicable program will allow more centres or schools, even parents throughout the country, to use and work with the children so that they benefit from this E4MSR intervention, which focuses on motor and social reciprocity skills.

Furthermore, this E4MSR intervention will be more easily accessible and can be implemented easily as it taps on everyday learning activities compared to other commercial programs such as Kindermusik since 1978 (Kindermusik International, Inc, 2022) which require special training, are expensive and not specifically designed for children with autism. Therefore, there is a need to investigate the impact of the E4MSR intervention on motor and social reciprocity skills of children with autism.

1.4 Aim

The present study aims to investigate the impact of the E4MSR (Embodiment for Motor skills and Social Reciprocity) intervention on the motor and social reciprocity skills of children with autism.

1.5 Objectives

i. To investigate the impact of the E4MSR intervention on the motor skills (Fine Motor , Gross Motor and Visual Motor Imitation) of children with autism after the implementation of E4MSR intervention.

ii. To investigate the impact of the E4MSR intervention on the social reciprocity skills of children with autism after the implementation of E4MSR intervention.

iii. To explore the changes in motor skills and social reciprocity skills following the E4MSR intervention and to examine the impact of these changes on one another.

iv. To investigate whether the impact of both motor and social reciprocity skills following the E4MSR intervention are maintained – a month after intervention.

1.6 Research Questions

i. What is the impact of the E4MSR intervention on the motor skills (Fine Motor, Gross Motor and Visual Motor Imitation) of children with autism, before (pre-test) and after (post-test) the implementation of intervention?

ii. What is the impact of the E4MSR intervention on the social reciprocity skills of children with autism, before (pre-test) and after (post-test) the implementation of the intervention?

iii. What are the changes in motor skills and social reciprocity skills following the E4MSR intervention, and how do these changes impact one another?

iv. Will the impact of the motor skills and social reciprocity skills following the E4MSR intervention be maintained after a month?

1.7 Significance of Study

With the findings from the present study, it is hoped that educators and parents acquire insights into the importance of intervention and incorporate it into their teaching. With the intervention, the children will learn in a creative and fun way, while improving on the skills needed in addition to developing the interaction with their peers.

In the Malaysian context, it is hoped that an intervention could be developed and can be replicated in multiple early intervention environments such as at home, in centers or in schools and is important, as intervention for children with autism is quite intensive and costly. Furthermore, it is not easily available in Malaysia. Therefore, having a replicable program will allow more centres or schools throughout the country to use and work with the children so that they benefit from this intervention.

As for the parents, it is hoped that the findings from the present study will motivate them to incorporate or work on the intervention at home. They are encouraged to play with their children using the activities in the intervention with the outcome of improving the skills needed, engaging in meaningful interactions with their children and also enjoying increased quality time together. It is hoped that the findings from this study will be beneficial for the children, leading to improvements in the skills they need and enhancing their quality of life, allowing them to enjoy a better future. It is also important to start intervention as early as possible since it would lead to a better educational and vocational outcome.

1.8 Limitation of Study

The present study involved a small number in sample size. Therefore, the results from the study cannot be used to make a generalization. The number of children that

participated is noticeably small. This small-scale research can be considered as a preliminary study for a larger-scale study in the future.

This study has a time limitation. It will only be conducted within a period of six to eight months. Children are required to be involved in the intervention during the schooling period. They only come for intervention for one hour per session weekly for ten sessions. Therefore, they can't be involved in the intervention session for a long period. The development of motor and social skills requires a longer time to attain the long-term effects. Thus, the results of the study might only reflect a part of the child's development. A longitudinal study is necessary to achieve the long-term effects on motor skills and social skills.

1.9 Operational definition

1.9.1 Embodiment

Embodiment refers to understanding how one's own body functions and interacts in its everyday, contextual state (Raymond, 2005). In the present study, the application of embodiment is through movement and dance as well as massage such as hand massage for 'warming up' or as a targeted activity. At this stage, children's early experiences are manifested through physical actions and sensory perceptions. These physical experiences are crucial for developing the 'body-self', as children cannot form a body image until they have a well-established 'body-self' (Jennings, 1998). The child needs to be comfortable 'live' in his or her body and to feel confident about moving through space and understanding their body's position within it (Jennings, 2015).

1.9.2 Motor skills

Motor skills refer to the body's ability to control and coordinate movement (Workplace testing.com, 2020). Motor skills are commonly divided into fine motor skills and gross motor skills. In the present study, the researcher looked into fine motor, gross motor and visual motor imitation skills.

Gross motor skills refer to the ability to control different parts of the body. This includes walking upstairs using alternating feet, drinking from a cup without spilling, transferring objects from one hand to another, and swinging beads on a string (Schopler, Lansing, Reichler & Marcus, 2005).

Fine motor skills refer to the coordination of different body parts. The activities include blowing bubbles, using a pincer grasp or a scissor grasp, removing beads from a string and colouring within lines (Schopler, Lansing, Reichler & Marcus, 2005).

Visual motor imitation skills refer to the ability to replicate visual and motor tasks. This includes the imitation of fine and gross motor tasks and the imitation of the correct usage of objects (Schopler, Lansing, Reichler & Marcus, 2005).

1.9.3 Social reciprocity skills

Social reciprocity skills refer to the social interactions between the child and others. This includes imitating social interactions with the examiner, engaging in joint attention to objects of mutual interest, cooperating with the examiner's requests, and making eye contact (Schopler, Lansing, Reichler & Marcus, 2005). In this study, the social reciprocity skills cover responding appropriately to the researcher and peers, making eye contact, listening and smiling, initiating repetition of social games and social interaction, taking turns, attempting to cooperate, seeking help, using

imagination playing with puppets and if the performance is affected by tangible rewards and social praise.

1.9.4 Early Intervention Program

Early intervention program refers to the blend of goal-oriented and therapeutic support services provided to children identified at a young age or those at risk of having special educational needs that could impact their motor and social development (Growin Sprouts, 2021). In this study, the intervention being investigated is the E4MSR (Embodiment for Motor skills and Social Reciprocity skills) intervention integrates group-based activity for children with autism and the intervention is based on embodiment techniques.

1.9.5 Group activity

Group activity refers to activities conducted with four to six same-age children, performing the same activities together and enjoying companionship. In this study, the group activities mentioned consist of activities including gross body movement, moving around in a group like an animal, taking turns and pretend play. The group activity addresses two key challenges faced by children with autism which are the motor skills and social reciprocity skills. In this study, all the activities planned in the group have elements of embodiment.

1.9.6 Children with autism

Children with autism refer to a group of children between the ages of four to five, diagnosed with autism spectrum disorder by a doctor or a clinician. In this study, children with autism refer to four- to five-year-old autistic children from an NGO centre in Penang.

1.10 Conclusion

This chapter introduced the background of the study, which is the embodiment and its importance. Following that, the problem statement, which includes the reasons for investigating the impact of E4MSR intervention on motor and social reciprocity skills of children with autism was explained. The research objectives and research questions were put forward. The significance of the study was mentioned, followed by the operational definitions. In the next chapter, the literature review of the study will be reported.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the past studies and related theories used in this study which eventually led to the theoretical framework and conceptual framework of the present study. It will also discuss the review of the past studies in this chapter too.

2.2 Autism Spectrum Disorder

Autism is one of the fastest-growing disorders. The prevalence of autism spectrum disorder is increasing globally. According to the reports from Centers for Disease Control and Prevention (2023), the rate in the US rose from one in 110 in 2006 to one in 36 in 2023. Autism is a complex developmental disorder of the brain that impairs a person's ability to communicate function effectively in society. Known as Autism Spectrum Disorder (ASD), it is a spectrum condition, meaning individuals with autism experience shared challenges but in varying degrees. It ranges from mild, where a person can function almost normally, to severe, where communication may be difficult or even impossible (Hong, 2015). Children with autism often experience difficulties in social and communication skills, engage in repetitive behaviours and face a variety of motor and sensory challenges (Najafabadi et. al, 2018).

According to the DSM-V (American Psychiatric Association [APA], 2013), there are two main areas of impairment, one of which involves difficulties in social communication and social interaction across various settings. Children with autism display challenges in social-emotional reciprocity, which can include unusual social approaches, difficulty in maintaining typical back-and-forth conversations, reduced sharing of interests, emotions, or feelings, and a lack of initiation or response to social

interactions (APA, 2013). Children with autism also experience difficulties in nonverbal communication used for social interaction, such as poorly coordinated verbal and nonverbal communication, unusual eye contact and body language, challenges in understanding and using gestures, and a complete absence of facial expressions and non-verbal cues. Besides that, children with autism struggle in developing, maintaining and understanding relationships. They may find it challenging to adjust their behaviour to fit different social situations, have difficulty engaging in imaginative play or making friends, and often show little to no interest in their peers (APA, 2013)

The second main area of impairment in children with autism is characterized by restricted, repetitive patterns of behaviour, interests or activities (APA, 2013). Children with autism exhibit stereotyped or repetitive motor movements, object use, or speech, such as lining up toys, flipping objects, repeating words or phrases (echolalia) (APA, 2013). Children with autism may insist on sameness, displaying an inflexible adherence to routines or ritualized patterns of verbal and nonverbal behaviour. For instance, they may experience intense distress over minor changes, struggle with transitions, have rigid thought patterns, engage in specific greeting rituals, and feel compelled to follow the same route or eat the same food daily. Besides that, they often have highly restricted, fixated interests that are unusual in intensity or focus. This can include a strong attachment to or preoccupation with unusual objects, as well as excessively narrow or persistent interests. Some children with autism exhibit either heightened or reduced sensitivity to sensory input or unusual fascination with sensory aspects of the environment. For instance, they may appear indifferent to pain or temperature, react negatively to certain sounds or textures, engage in excessive smelling or touching of objects, or show a strong visual interest in lights or movement.

As mentioned earlier, Autism Spectrum Disorder is a spectrum disorder and is categorized from mild to severe. According to the DSM-V (APA, 2013), there are three severity levels for autism wherein the individual "requiring support" in level one, "requiring substantial support" in level two and "requiring very substantial support" in level three (APA, 2013). At level one, a child categorized as "requiring support" has social communication deficits that lead to noticeable impairments when support is not provided. They struggle with initiating social interactions, and often demonstrate atypical or unsuccessful responses to others' social approaches. This may result in a noticeable reduction in their interest in social interactions. For instance, a person who can speak in full sentences and communicate but struggles with back-and-forth conversation and has odd, typically unsuccessful attempts at making friends falls into this category. For the restricted and repetitive behaviours, children at level one exhibit inflexibility that significantly disrupts their functioning in one or more areas. They struggle with transitioning between activities, and issues with organization and planning can hinder their independence.

Children categorized under level two, indicating they "requiring substantial support", display significant deficits in both verbal and nonverbal social communication skills. Their social impairment are evident even with support, with limited initiation of social interactions and reduced or atypical responses to social approaches from others. For instance, a person who uses simple sentences, has interactions focused on narrow special interests, and displays noticeably unusual nonverbal communication. For restricted and repetitive behaviours, individuals at this level show behavioral inflexibility, struggle with adapting to change, and exhibit other restricted or repetitive behaviours that are frequent and noticeable to casual observers.

These behaviours interfere with their functioning across various contexts and may lead to distress or challenges in shifting focus or actions (APA, 2013).

The child categorized under level three, “requiring very substantial support” typically has severe deficits in both verbal and nonverbal social communication skills, leading to significant impairments in functioning. They exhibit very limited initiation of social interactions and show minimal response to social approaches from others. For example, a person with limited intelligible speech rarely initiates interaction and typically makes unusual approaches solely to meet their needs. They respond only very direct social approaches. Regarding the restricted and repetitive behaviours, the individual shows significant behavioural inflexibility, extreme difficulty adapting to change, and other restricted and repetitive behaviours that severely interfere with functioning in all areas. They experience intense distress and struggle greatly with shifting focus or actions (APA, 2013).

2.3 Motor skills difficulties experienced by children with autism

Difficulties with motor skills may be one of the earliest detectable indicators of autism (Nayate et al., 2005; Gowen & Hamilton, 2013 as cited in Thomas et. al., 2021). Motor skills difficulties are a common feature of autism, affecting up to 87% of the autistic population (Zampella et al, 2021). Although motor skills difficulties are not officially considered a core feature of Autism Spectrum Disorder in the DSM-5 (APA, 2013), systematic reviews of the literature indicate that the majority of children with autism experience some form of motor difficulties (Fournier et al., 2010; Lum, et al., 2020). The DSM-5 highlights several motor difficulties like uneven gait, clumsy behaviour and walking on tiptoes as associated characteristics of the disorder (APA, 2013).

Several recent reviews and meta-analyses have emphasized the wide range of motor differences observed in autism, including variations in gait, manual dexterity, vestibular function, balance, postural control, motor learning, imitation, interpersonal coordination and neural motor systems (Zampella et. al., 2021), as well as delays in both gross and fine motor skills (Fournier et al., 2010; Jeste, 2011).

Gross motor difficulties in autism may include clumsiness (Downey & Rapport, 2012; Lyold et al., 2013 as cited in Dong et.al., 2021), challenges with locomotor skills (i.e., moving the body through space, such as running, jumping, and skipping) (Haywood & Getchell, 2005 as cited in Dong et.al., 2021) and fine motor difficulties, including issues with object control skills, for instance, manipulating and projecting objects, such as throwing and catching (Haywood & Getchell, 2005 as cited in Dong et.al., 2021). Past studies have found that children with autism with better motor skills in general also have lower autistic severity and better social communication skills (Leonard & Hill, 2014). This could be because motor ability can limit how children perceive, reason about, and interact with others and their environment, thereby affecting their opportunities for social interaction and learning (Leonard & Hill, 2014). In addition, many social communication behaviours such as gestures, facial expressions, social orienting depend fundamentally on movement, making motor function a crucial element in how individuals of all ages interact with and are perceived by others.

2.4 Social reciprocity difficulties experienced by children with autism

Based on DSM-5, social communication deficit is one of the primary areas of impairment of autism. The social skill deficits in individuals with autism may stem from their difficulty in learning these skills or from a lack of motivation, which

prevents them from using their abilities (Sivaraman & Fahmie, 2018). Moreover, the difficulties faced by individuals with autism are primary linked to difficulties in understanding others' behaviour, including the inability to interpret and respond to social and emotional cues like eye contact and facial expressions (Sowa & Meulenbroek, 2012).

Children with autism face significant challenges because they often lack or have not yet developed key prerequisites for social skills such as imitation, joint attention and emotion recognition. These difficulties are related to their deficiencies in central coherence and theory of mind (Guivarch, 2017). As a result, children with autism struggle with identifying emotions, categorizing facial expressions and prioritizing information (Guivarch, 2017). Their nonverbal communication is also affected, characterized by atypical gaze patterns, reduced facial expressions and less frequent spontaneous gestures (Guivarch, 2017).

Therefore, children with autism often have difficulty to respond to others' communication such as responding to name, initiating or responding to social interaction (Cable & Wiemer, 2018). Maintaining eye contact, taking turns, understanding gestures are also the limitations of children with autism. In addition, children with autism have difficulty telling narrative and using the correct pronouns too (Cable & Wiemer, 2018).

2.5 Individual vs. Group Intervention

Children with autism are often found to have difficulty developing their social interaction and communication skills as well as their motor skills. As a result, these children with autism struggle relating to the outside world, and it is hard for them to communicate with others (NASOM, 2022). Thus, interventions are very important for

children with autism as early intervention results in more favourable outcomes (Corsello, 2005). Over the years, numerous programs and interventions have been developed to support children with autism. However, most of these are conducted individually with only a limited number of group interventions available. Individual and group intervention programs have distinct characteristics, each with its own set of advantages and disadvantages. A key difference between the two types of interventions is that individual interventions are provided in a one-on-one setting, while group interventions are administered as a standardized program for a group of participants. (Tachibana et.al., 2018).

The one-on-one setting offers a significant advantage for individual interventions compared to group interventions, as it allows for customization tailored to each child's developmental stage and the specific needs of both the child and their parents (Tachibana et.al., 2018). In individual interventions, the child has more opportunities to interact with the therapist compared to group settings, which can be beneficial for improving the child's expressive language skills (Tachibana et.al., 2018). Individual interventions typically offer higher intensity in terms of frequency and duration compared to group sessions. However, the cost of providing such high-intensity individual sessions can be significant (Tachibana et.al., 2018).

On the other hand, group intervention also has its advantages and disadvantages. A major benefit of group intervention is that it allows children to interact with their peers in a group setting. Group intervention enables children to learn the rules of group dynamics and develop their social skills (Tachibana et.al., 2018). Furthermore, group sessions offer parents the chance to connect with one another, promoting peer support and facilitating the exchange of information and experiences. Group intervention offers children to learn adaptive behaviours through participation

in group activities (Tachibana et.al., 2018). It is also more efficient and cost-effective, as it allows multiple children to benefit from the same program simultaneously (Tachibana et.al., 2018). However, a challenge with group intervention is coordinating a schedule that works for all children and parents and ensuring full attendance consistently.

There are different group intervention approaches. In recent years, group interventions that integrate embodiment techniques have become commonplace. In this study, one of the advantages of this group intervention is the integration of both motor skills and social reciprocity skills in the intervention activities. Several studies have focused on the association between motor and language skills in children with autism. One study found a positive correlation between gross motor and social skills in children with autism (Pusponegoro et. al., 2016). Thus, a group intervention setting for children with autism that incorporates embodiment technique activities can be beneficial for enhancing both motor skills and social reciprocity skills in these children.

2.6 Embodiment

Embodiment refers to understanding how one's own body functions and interacts in its everyday, contextual state (Raymond, 2005). Embodiment is crucial because understanding how we develop motor control and movement coordination is fundamental to comprehending how we live. Movement is central to our existence, as all aspects of work and play involve movement (Gallahue, Ozmun & Goodway, 2012). In addition, understanding one's own body is important as it is the primary means of learning (Jennings, 1990).

Philosophically, embodiment represents an evolving and developing sense of self (Cook-Cottone, 2020). Merleau-Ponty (2013) argues that embodiment is