

Dancing is Thinking for Children: Working Memory, Inhibition, and Mental Flexibility

Erie Siti Syarah^a, Mohamad Syarif Sumantri^b, Yuli Rahmawati^c,
Fasli Jalal^d, Elindra Yetti^e

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^a**Corresponding Author:** Erie Siti Syarah, Universitas Negeri Jakarta, Jakarta, Indonesia.
E-mail: ErieSitiSyarah_9920919003@mhs.unj.ac.id
ORCID: <https://orcid.org/0000-0001-7629-7806>

^bMohamad Syarif Sumantri, Universitas Negeri Jakarta, Jakarta, Indonesia.
E-mail: msyarifsumantri@unj.ac.id
ORCID: <https://orcid.org/0000-0002-7354-4477>

^cYuli Rahmawati, Universitas Negeri Jakarta, Jakarta, Indonesia
E-mail: yrahmawati@unj.ac.id
ORCID: <https://orcid.org/0000-0002-1603-3320>

^dFasli Jalal, YARSI University, Jakarta, Indonesia
E-mail: faslijalal@yahoo.com
ORCID: <https://orcid.org/0000-0001-9914-7595>

^eElindra Yetti, Universitas Negeri Jakarta, Jakarta, Indonesia
E-mail: elindrayetti@unj.ac.id
ORCID: <https://orcid.org/0000-0002-3232-5438>

Abstract

Sharpening working memory skills, inhibition, and mental flexibility of children in many studies have proven school readiness and long-term academic success. The aim of this research is to determine the impact of dancing and listening to music on children's executive functions using the interpretive paradigm with a qualitative case study method. The respondents were seven parents of children aged between 7-8 years. This study used online interviews for the data collection. A typological analysis of qualitative data acquired during the COVID-19 pandemic in the dimensions of working memory, inhibition, and mental flexibility was used to categorize how children's executive functioning might develop in parental care. Several typologies were identified, giving rise to three ideal typologies as a result of the analysis of research questions. Firstly, it is important to develop children's working memory through different new strategies (typology 1); secondly, positive reinforcement was the strongest factor in inhibition development (typology 2); and finally, dancing with music as a support for mental development and development of thinking (typology 3). The research outcomes require increasing adults' abilities around children to manage diverse learning stimuli and integrate art in them to build working memory, inhibition, and ideal mental flexibility of children.

Keywords:

Dance for Children, Inhibition, Mental Flexibility, Working Memory

Introduction

During this COVID-19 pandemic, there are limited opportunities for outdoor physical activity, with most individuals being forced to stay at home or adopt isolation protocols to prevent viral transmission. This situation has affected the children. Distance learning has a major impact on social development as well as children's movement activities (Hammami et al., 2020). Another dangerous effect of this situation is the risk of deficits in executive function (EF), such as a decrease in the child's inhibitory ability to handle task-reluctant behaviour (Johnson et al., 2020), decreased mental flexibility in creativity and problem solving due to limited interaction with the environment outside the home



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(Filippetti & Krumm, 2020). Working memory deficits, which impact pre-schoolers in particular, have been related to recurring difficulties with math, reading, and science in primary school (Morgan et al., 2019).

Early childhood as a digital native's generation competing in social life faces one of the obstacles to achieving 21st-century skills is anti-social behaviour includes a variety of social behaviours that are not approved, such as a set of behaviours that involve property destruction, violations of social norms and other insults and violations of basic rights. The current phenomenon shows that children's stimulation of EF has not been widely used, while anti-social behaviour is related to inhibitory control ability, mental flexibility, or brain working memory. Although there is a proven positive relationship between social skills and EF, intervention programmes in social competence rarely include EF as a key component in early childhood learning (Benavides-Nieto et al., 2017; Howard & Melhuish, 2017). Evidence on the EF contribution to school readiness is also increasing. Educators and parents need to consider ways in which this information will be optimized for early identification and intervention purposes, making it necessary to develop various intervention approaches that are used to improve executive functioning throughout the early-childhood period (Romero-López et al., 2018; Willoughby et al., 2017).

Several studies reported that working memory, inhibition, and mental flexibility development in children are related to physical activity. According to the findings, the potential benefits of physical activity with broader stimulation have both psychosocial and neurocognitive outcomes (Cameron et al., 2013; Kirpich & Diamond, 2019; Willoughby et al., 2018). Several studies reported that body-movement activity opportunities should fit into the child's learning environment, as positive associations have been found between motoric activity and indicators of skill and inhibition, mental flexibility, and working memory (Diamond, 2012; Mulvey et al., 2018; Paschen et al., 2019; Patten & Bodden, 2019). Moreno et al., (2011) mentioned that only children in the music group showed an increase in performance with 90% of the sample also developing in executive functions. In terms of promoting brain plasticity, dance instruction outperforms repetitive physical exercise (Rehfeld et al., 2018), learning dance shapes the perception of action and neural implementation in the child's brain (Gilbert, 2019; Kirsch et al., 2018), brain training with dancing and familiar music improves children's cognitive abilities (Karpati et al., 2015; Olga et al., 2018; Poikonen et al., 2018; Sawami et al., 2018).

Research on interventions on working memory (WM), inhibitory control (IC), and mental flexibility (MF) development in children has not been done much

by using dance. Many people regard dancing as a separate art form from other aspects of development; however, existing perceptions still rank academic-related stimulation that can improve WM, IC, and MF in children. This study acts as a complement to other similar studies in bridging the problem gap about the impact of dancing on WM, IC, and MF of children at home, specifically, attempting to offer research results related to WM, IC, and MF in children and their stimulation through dance.

Theoretical Perspective

Children Executive Function

The first main point of executive function is working memory, which involves holding information in mind and mentally working with it (E. E. Smith & Jonides, 1999). Working memory is critical for understanding everything that unfolds over time since it constantly requires remembering what happened before and relating it to what happens in the future. The reasoning would not be possible without working memory. Working memory is essential for the ability to recognize connections between seemingly unrelated things or to separate elements from an integrated whole, such as creativity, which involves dismantling and recombining elements in novel ways. Working memory also makes it possible to carry conceptual knowledge, perceptions to support decisions, and to consider in making plans and decisions (Diamond, 2014). Working memory, selective attention, and focused attention seem similar because they belong to the neural base. The prefrontal parietal system (PPS) aids working memory by allowing children to selectively focus on the information in mind selectively, discard irrelevant thoughts, and overlap substantially. Children who use PPS pay attention to stimuli in their environment and emit unconnected stimuli. Simulations have shown that developmental enhancements in working memory can aid in selective attention skills development (Wais et al., 2010).

Inhibition control (IC) involves the ability to control a person's attention, behaviour, thoughts, or emotions to override strong internal tendencies or external lures, and instead do what is more necessary (Diamond, 2014). Without IC, a person will be controlled by impulses, past patterns of thinking or acting (conditioned responses), and/or stimuli in the environmental stimuli that draw a person in various ways. Thus, IC makes it possible for people to change and to choose how to react and how to behave, and not to behave recklessly and save one from fooling oneself (Reck & Hund, 2011).

Self-control is an aspect of IC that involves control over one's behaviour and control over one's emotions to control one's behaviour. Self-control is about

resisting temptation and not acting impulsively (Diamond, 2014). Related to the last aspect of self-control, delaying gratification, according to Mischel et al. (1989), is to make yourself forget the temporary pleasures for a bigger reward later (Louie & Glimcher, 2010). When you make an impulsive decision, it is because you are unable to wait. On laboratory tasks, children are frequently rushed to respond and thus make the mistake of giving inaccurate responses. IC skills help children wait to give the best response that improves their performance and keeps them from rushing and failing (Schmitt et al., 2015).

Being able to alter perspectives spatially is one aspect of mental flexibility. For example, what if someone sees it from a different direction, or interpersonal, or can someone look at something from another person's point of view? (Blair, Clancy & Diamond, 2008). Mental flexibility grows on inhibition control and working memory. Another aspect of mental flexibility involves changing the way of thinking outside the box. For example, if one way of solving the problem does not work, one can find a new way to find a solution or understand something that has not been considered before. Set shifting, also known as Mental flexibility, refers to the ability to switch between tasks, strategies, or mental devices (Moriguchi et al., 2016).

Dance for Children

A bulk of research suggests that working memory, inhibition, and mental flexibility of children's executive functioning skills and constructs of school readiness are essential to early learning and long-term academic achievements. This review focuses only on executive function and related constructs, but also motor skills with a focus on visuomotor integration (coordination of movement and visual perception by the brain), as a basis for learning, and describes how these skills develop in children in a two-way and synergistic (Best et al., 2011; McClelland & Cameron, 2019). Executive Function refers to the cognitive processes necessary for goal-directed brain and behaviour, which develop throughout childhood and adolescence. Best et al. (2011) has shown that intensive aerobic exercise can enhance children's executive function. Another study addressed this evidence as well as the possible mechanisms underlying the relationship between exercise and executive functioning (EmamiKashfi et al., 2019; Mulvey et al., 2018; Patten & Bodden, 2019). Gross motor skills interventions improved preschool children's executive functioning as well as can help children with their learning difficulties.

Dancing for early childhood has many benefits over regular physical activity (Fouracre & Hons, 2010). Heterogeneous literature and research have shown that dance has physical, cognitive, and psychosocial benefits for children (Mancini et al., 2018). Dance

training to familiar music improves cognitive abilities because it can relieve stress (Sawami et al., 2018). Authors (Chatzihidioglou et al., 2018) compared an experimental group of preschool children ($n = 22$; mean age = 5 years, eight months) who followed an 8-week dance program with a control group ($n = 20$; age average = 5 years, five months). The dancing group outperformed the control group in terms of pre-test to post-test improvements in synchronization and balance. Dance training also shapes the perceptions of actions and behavioural performance of participants on the motor and visual tasks to increase during the training period (Kirsch et al., 2018). Considering sensor motor synchronisation importance and balance for next child development and performance of sports and daily activities, these results suggest that dancing is well included in the early childhood curriculum. When children watch performing arts, a vast and complex network of brain processes emerges (Poikonen et al., 2018). Dancing compared to conventional fitness activities leads to a greater volume increase in more areas of the brain, including the cingulate cortex, insula, corpus callosum, and sensorimotor cortex (Rehfeld et al., 2018). Karpati et al. (2015) demonstrated that short-term dance training influenced brain activity in observing the action and simulating tissue. Therefore, it is essential to perform movements in dance activities in front of the children, as well as providing ideas for forming new movements and building creativity.

Research Question

This study aims to find the impact of dancing/listening to music on children's executive function at home by addressing the following research questions: (1) what are the participants' perceptions of WM, IC, and MF of children and their stimulation? (2) How do the participants develop working memory, inhibition, and mental flexibility of children at home? (3) Do the participants involve dance and music in the way of developing WM, IC, and MF of children?

Methodology

This study used the interpretive paradigm with a qualitative case study method (Creswell, 2012).

Participants

The researcher deliberately selects individuals who have a better understanding of the research problem. Each participant is an early-childhood parent in the South Tangerang area. Participants are seven parents aged between 28 and 35 who showed interest in participating to this study and had children aged 5-8 years. Two of the parent group graduated from secondary school while the rest graduated from university. Some participants are

colleagues who already of a trusting relationship with the researcher, making it easier for researchers to communicate effectively and have a professional working relationship. This sample size fulfilled the before-mentioned criteria for being interviewed for this study. The necessary steps are taken to make sure that people are not easily identified by their responses (Lodico et al., 2010).

Data Collection and Instrument

The questionnaire for the semi-structured interview comes from a measurement instrument that has been validated because it adopted The BRIEF-P (Behaviour Rating Inventory of Executive Functioning–Preschool) instrument (Ezpeleta et al., 2015; Gioia et al., 2013). It has 63 executive function items referring to behaviour in the past six months reflecting the extent to which the behaviour was a problem. Interview data were collected through 54 questions, 30 questions on the dimensions of working memory, 11 questions on the dimensions of inhibition, seven questions on the dimensions of MF, and six questions about the role of parents in developing WM, IC, and MF of children. Within 45-60 minutes, I openly presented queries to parents starting with five administrative questions. Due to the Covid-19 pandemic, arrangements for a 45-60-minute open question and answer session were made online. Its purpose is to allow interviewees to choose locations and ways to make sure convenience and transparency.

Ethical considerations and procedures

Before starting the interview, consent was obtained from the participants. Further steps such as explaining the research, identifying risks, maintaining confidentiality, and providing informed consent were taken before the interview began. Participants in this research are constantly exposed to minimal risk. All demographic information was removed from the data collected, and a pseudonym was assigned. Participants were told that the study was completely voluntary, and withdrawals could occur at any time. Participants were given some protection during the interview, starting with their identities kept secret.

The transcript of the interview was compared with the audio recording for accuracy. At the end of each interview, researchers emailed a copy of the transcription results to participants to verify their responses. Participants were also asked to check the appropriateness of the findings in their setting. The researcher extended an open invitation to the participants to discuss the findings following the interview. Researchers verify that correct information is recorded on interview forms, which are then processed by Google's documentation. Audio recordings were played back within 24 hours

after each interview to compare with typed data. Participants will have access to the last publication of the study (Patton, 2002).

Data Analysis

Typological analysis (Ayres & Knaff, 2008, p. 900) begins by identifying a research group organising framework, a series ranging from children's working memory to mental flexibility, based on the main ideas presented earlier in the section on all research variables in the background section research. Furthermore, the researchers established initial source groups to aid in the identification of sources of similarity and variation. Researchers listened to the seven audio recordings and copied them into a Microsoft Word document. Each transcription was governed by three research questions. The next step is to read systematically each transcript several times looking for repeated ideas and phrases that can form patterns in the data. Interviews that last 50 minutes are very insightful. A detailed process is used to analyse data to describe, compare, and interpret participants' reactions and responses (Fink, 2016).

All information relates to the research question and is aligned to explore the development of working memory, inhibition, and mental flexibility of children at home. To clarify and ensure the accuracy of the data collected, member verification and peer-debriefing were utilised. Researchers also document information that is not in line with general themes. Researchers do not force the code to fall into certain categories. With peer-debriefing, researchers and external sources communicate to note discrepancies that do not support the patterns and themes that stem from analysing for interviews and observations. However, the participants had responses that were quite similar in those few different cases were found members can check what they stated during the interview during member checking. Once the procedure is finished, there will be no further editing or interviewing. Researchers use numerous sources or collection methods to compare the collected data with each other as a triangulation measure. Researchers searched all data collected including interview notes and transcripts for evidence to support initial findings. Researchers make sure that they have rich and descriptive records to do transferability. Themes are generated from data sets by reviewing matrices and connecting within and between focus groups and categories. To acquire a better understanding of the data, this study draws on relevant theoretical ideas and literature on which as a basis for the research.

Results and Discussion

The results reveal how researchers construct a research typology based on experiences and

perceptions of parents in developing working memory, inhibition, and mental flexibility of children at home. Interviews were used to support the findings and to develop three categories that informed the typology creation of this study. After reviewing all data sources, the researcher identified data categories from which three typologies emerged (see Table 1).

Each typology was further explained, and distinctive comments were provided for supporting the findings. Representative quotes from the interviews have been reproduced to show the following three typologies (Table 2 shows the participant numbering codes).

Importance to develop children's working memory through different new strategies

Parental strategies that reduced working memory deficits, as found by working memory identification criteria in children, show that parents' strategies tend to carry out instructions that suppress children, especially parents with college graduate status. Some parents devise ways for improving their children's working memory. These are some of the comments given by the parents about their strategy:

I am an impatient person, so I make a schedule for my child, if the child is not able to do their job properly, I am disappointed. My strategy is so that children can be smart in memorizing and so on, I limit the use of gadgets, only Saturdays and Sundays (P5)

I don't have a specific strategy. I am always confused and overwhelmed to educate my children at home; especially this pandemic problem makes office work and guiding children at home clash and chaotic (P1)

My strategy in guiding children, especially to improve memorization and/or do assignments, I imitated my mother's strategy because she was a teacher. I apply the schedule for the child to work on assignments, by agreement (P7)

If I am a relaxed person, the children are relaxed too, I have a strategy that might be quite strange, and I like it when children do the physical activity first before doing tasks that will occupy their focus, such as playing a train. Past. I also gave an example to the children doing assignments while listening to music (P2)

This finding is sorted to answer research questions according to the type of ideal typology found in the study of parents' perceptions of their children's development of working memory, inhibition, and mental flexibility (executive function), and stimulation. Most of the parents interviewed showed difficulties in stimulating the three dimensions of executive function, which include working memory, inhibition, and mental flexibility of children. Parents use strategies and interventions that are not based on a knowledge base. This is a significant finding, indicating that parents require intervention programs that are well structured and easy to understand. The research that explores the relationships in typically developing

Table 1

Results of Qualitative Information Transformation (Typology Analysis)

Dimension of executive function	Data description	Typology
Working memory 1. Attention, memory 2. Task Initiation 3. self-monitoring, time management 4. Goal setting, decision making, Planning 5. Organisation	Parental strategies reduce working memory deficits 1. Different parenting styles 2. Repetition during learning activities 3. The active involvement of children in doing tasks 4. Build discipline and independence 5. Instruction to meet learning objectives and completion of assignments 6. Dance practice helps strengthen memory	It is important to develop children's working memory through different new strategies
Inhibition 1. Control emotions 2. Impulses	Familiar Approach to Inhibition development 1. Build relationships 2. Positive reinforcement 3. Creating a model of self-regulation 4. Consequences 5. Contact with children and the child's immediate environment 6. Dancing strengthens children's patience	Positive reinforcement is the strongest factor in inhibition development
Mental flexibility 1. Adaptability	Providing opportunities for creation and expression 1. An active learning environment to keep children on task 2. Be consistent with the expected behaviour 3. Music and dance open the minds and hearts of children	Dancing to music supports the development of mental flexibility and the development of thinking

Table 2

Participant Name Code, Number, and Location

Central Jakarta	South Tangerang	Bandung
P (1)	P2, P3, P4, P5, P6(5)	P7 (1)

children between the family environment, parenting strategies, and executive functions, suggests the importance value of a supportive family environment and parenting practices training (Schroeder & Kelley, 2010).

Various parenting styles emerged in the findings of this study when identifying the criteria for the task initiation ability in children. Some of the parental comments' excerpts are as follows:

Because I go to college, I also work, I tend to be ignorant of the child's ability to do their work when I finish, thank God, that's okay, I'm tired of my assignments, so is my partner (P1)

I'm ignorant because I'm tired of work and taking care of the house but I'm still trying to watch my child's progress. Especially if there is already a message from the teacher, I will try to guide my child if I need it (P3)

In my opinion, the child must discipline. It's okay to cry a little to get used to it, sometimes I am a bit over the top when I demand that my child gets praise from the teacher or other people. I ask my children to study hard (P5)

This parenting style is different because of the various backgrounds of the parents. According to interview transcripts, parental workload and stress levels are additional factors that influence this difference. Children with lower executive functioning were found to have higher salivary cortisol levels, and higher parenting stress was reported by their parents (Wagner et al., 2016). Finding approaches to boost parental capability in nurturing is a crucial strategy to improve school preparation. Repetition during learning activities these findings emerged when researchers asked about the child's memory skills and attention abilities. Parents describe their support for their child for this ability:

I try to help my child to improve memory by repeating the materials he must master (P6)

I think repetition is most important to help children have good memory skills. I also got rid of gadgets for fear that his concentration on the things he had to study would be disturbed (P4)

To memorize something new for my child, I do it by repeating it until the child has a trained memory. I remember when I asked the child to repeat a new dance move on a gadget; I noticed that the child became easier to focus (P2)

Repetition has indeed been proven in research to improve children's working memory, but it is recorded that what can be stored properly in memory is the repetition of fun activities. Best (2010) said that children's skills development happens more quickly when the components of a task are introduced clearly and repetitively, the retention and transfer of those skills must enhance when there is contextual interference, such as the boring activity.

The active involvement of children in doing tasks in this finding shows the child's ability in the criteria for goal setting, decision-making, planning:

For example, the child gets the task of making clay crafts on Tuesday and must send them on Friday. Going home from school on Tuesday, the child independently looks for materials that agree with the task orders, doing it step by step, because the clay must be shaped, dry, and then given a colour and the assignment is ready on time. The child often independently prepares all the needs of the task (P7)

Evidence from a comprehensive literature analysis indicates that enhancing these three skills is crucial to helping young people handle obstacles better and avoiding or minimising externalisation and related issues. Moreover, strategies can strengthen these three strengths effectively and have been shown to yield behavioural changes of real-world significance (Modecki et al., 2017). Examples are given on how effective intervention is immediately more than one of these capabilities, such as various stimulations of teachers and parents to provide many opportunities for children to be more independent in designing, planning, and carrying out tasks.

The criteria indicated for self-monitoring ability, time management, and time management of children, which are significant for children's thinking development and behaviour, result in the development of discipline and independence. Parental strategies are quite diverse, along with the recorded opinions of the parents:

Incidentally, at home, there is a container for toys so every time he plays; he always tidies up according to his place. If there are items lying out-of-place, he will store them in their place (P7)

I am grateful that his things are well-organized. The pencil, ruler, and eraser are in the pencil case. The book is neatly tucked into the bag so that he has no trouble finding his belongings. After school, keep a bag in its place (P7)

I feel that my organizational skills are not good enough. Maybe children imitate their parents. Children are often late for school, often leave things behind, at times like this, I feel, I need professional help to build independence and discipline (P1)

The results of the interviews show that many parents do not realise that this behaviour is a disruption in time management or children's discipline because of the results of parenting and modelling around the child. According to the findings of Stoeger and Ziegler's (2008) research, children should be taught time management skills and learning strategies as early as possible since they have an impact on children's success in a variety of fields. Instruction to meet learning objectives and completion of assignments: The following category findings are derived from the overall working memory function criteria, which

leads to the discovery of parents' demands for new strategies for enhancing working memory, inhibition, and mental flexibility. Seen in the results of the interview:

Study instruction for time discipline. Teach homework activities such as cleaning the bedroom, sweeping, mopping, helping mothers cook, cleaning the bathroom, wiping the glass of household chores in the child's capacity (P7)

Accompany and motivate every child's activity, both in doing their work from school and their assignments at home. As well as providing facilities agree to the needs of learning activities (P4)

I often give instructions so that children first separate themselves from their friends, so that they focus on doing assignments from school and household chores (P3)

Effective parenting strategies can impact the neurocognitive growth of children. Parental instructions that tend to be comfortable for the child's ears and heart can build children's performance, as evidenced by the findings of the interview quotations, which show that some parents can discipline children and achieve learning goals through their instructions. Linear regression analysis of Spruijt et al. (2018) study showed that children of parents who were more supportive, less bothersome, and asked more open-ended questions performed better on task inhibition, working memory, and cognitive flexibility.

Dancing practice helps strengthen memory. This finding is the child's memory ability identification to memorise dance movements:

The dancing instructions from the gadget helped my child memorize dance moves faster. The child also memorized the song lyrics which I thought were quite difficult for me. If only there was a guide who made it easier for parents to practice dancing at home ... (P4)

Children love to dance, they dare to appear in public with their dance creations, there was an impromptu invitation to fill the void, the children practiced at night, and the next day they appeared boldly (P2)

I compare my son who likes to dance with better focus and catching power even though he dances that is less directed, but compared to his older brother who only likes music, and doesn't really like physical activity, his older brother is more introverted and stiffer, also has difficulty remembering the words he is going to show (P6)

Some parents claim to comprehend their child's brain stimulation by moving and playing music; however, dancing is quite difficult for most parents. Parents stated that dancing was unusual in an ordinary family because if it was done in the house, it is indicated that the family was indeed an artist. Therefore, most parents do stimulation for working memory, inhibition, and mental flexibility development in children through

other strategies. It is vital to share knowledge about dance through various programs that educate parents so that parents are aware of the need to include dancing activities for young children at home. It is because dance develops new cells and connections in the brain; it helps children deal with stress that can interfere with learning, while also motivating, learning to dance is a way of knowing, thinking, translating, interpreting, and creating thoughts (Nim, 2017).

However, some findings sufficiently strengthen the theory of dance for early childhood from one of the participants. The participant (P2) said that she had liked music since she was a little girl, she also liked dancing, but her parents' thought dancing was a bad job for girls. Her parents looked down on dancing a little because they were worried that their child would get used to it into adulthood. This participant shifted their love of dancing to rhythmic gymnastics activities. She has been accustomed to listening to music since she was pregnant, and as a consequence, the children at the age of five months have liked music, and moved, swaying happily when listening to music. The results of the interviews about the child's working memory, inhibition, and mental flexibility also looked good. Recent research has shown that parental behaviour can influence the executive function (EF) development during childhood. The association between parental cognitive behaviour and executive function was modulated by the child's age; smaller children had stronger effect sizes. A naturally occurring influence exists between the behaviour of the parents and the child's future executive functioning. An important note is that early childhood can be a critical period in which the cognitive behaviour (executive functioning) of the parents is especially influential (Valcan et al., 2018).

Positive reinforcement as the strongest factor of development inhibition

The habitual approach to inhibition development is quite difficult to record from the results of the interviews; parents admitted most that the difficulty in this inhibition criterion is more towards getting used to the value of the child's resistance strength in completing the task, or the child's strength to withstand temptations that divert his focus. Instilling a positive attitude in children requires building relationships. This is recorded in several answers from parents:

Doing tasks with cooperation, 50% help first, and then he does the task (P5)

Children can control impulses because since childhood. They have learnt to express feelings, find solutions, so they never get frustrated, can overcome themselves, sometimes they discuss together to solve problems (P2)

Regarding the average of the findings on positive reinforcement of children's inhibitory ability, parents give the following support:

When a child has problems with things, he doesn't like, I give reinforcement through exemplary stories from religion (P6)

Usually, I encourage him when he breaks down to do tasks that he thinks are boring, sometimes because he is tempted to play with gadgets (P1)

... Sometimes he confided in himself but after being given reinforcement, he was enthusiastic again with the efforts he built from within ... (P2)

The answer to research question number two, after looking at the findings of how parents develop children's executive function at home, reveals that their place is the same as the perception and understanding of parents in developing working memory, inhibition, and mental flexibility of children. Parents are confused regarding the interventions needed to improve the children's cognitive function. This is unfortunate because the person closest to the child is the best model in improving the child's executive function (Fay-Stammach et al., 2014).

Making a model of self-regulation found in the results of the interview is one of the positive reinforcement approaches in building children's inhibition, some parents shared their experiences:

Often the father gives an example to the child, how to be kind to bad shop customers, even though sometimes the child is not satisfied with his father and mother patience (P7)

Sometimes I like to laugh at myself seeing children behave imitating my behaviour when doing college assignments, they are eager to imitate their mother (P2)

The exercise of consequences for an offence is one of the findings in the criteria for developing inhibition in children. Few parents utilise the consequences of transgression to teach their children inhibition. However, there is one parental comment:

I use consequence instead of punishment when children violate boundaries; my experience shows that consequences are more effective in controlling children's behaviour than punishment (P6)

Another finding in this inhibitory ability identification is the child's environment that parents have the main role in affecting children emotional. The following is a quote from the parents' opinion:

... I feel like moving to a new house because mixing with other adults in the house makes it difficult for me to educate my children, my child imitates the bad emotions of the people around him... (P4)

I have a hard time overcoming quarrels between children, which sometimes lead to child impulsivity because they feel they are being treated unfairly (P1)

...when a child gets used to being alone at home, the child becomes confused with close friends. He is confused about how to behave, especially in dealing with other children's behaviour that makes him uncomfortable... (P5)

Dancing strengthens children's patience; this interesting finding was obtained when parents were asked about their experiences of dancing or experiences in music:

... I saw that when the children were taking dance lessons for performing arts at their school, I saw my child patiently listening to the teacher's instructions and patiently repeating all the dance moves that were learnt.

. I didn't know if I could do it at home. (P5)

I feel when my child is fussy and tends to throw tantrums; I invite my child to listen to music and dance. Like a panacea, the child immediately smiles and moves along, but unfortunately, I don't do this that often, and tend to forget (P7)

Interviewed parents did not understand the power of music and physical activity of dancing, which was done easily at home, but parents tended to be insecure and found it difficult. On average, the best stimulation for working memory, inhibition, and mental flexibility is through stimulation related to academics and is done in school. During the Covid19 pandemic, parents must pay some attention to educating their children at home, which creates stress for certain parents. Parents need to understand that physical activity with children brings pleasure to the parent-child pair as long as the movement activity together involves music and joyful movements, as well as strengthening the relationship between parent and child (Filanowski et al., 2020).

Some parents believe that professional intervention is required in the development of children's working memory, inhibition, and mental flexibility. Parents hope that in this technological era, the source of knowledge is complete so that they can give directly in improving the EF of children. They understand the EF of children leads to cognitive behaviour that will succeed in school. Parents tend to be anxious about their children's school readiness (Fridani, 2020). Currently, few sources discuss interventions for early childhood executive functions, especially interventions through dance. A dance group study by Chatzihidiroglou et al. (2018) showed a better pre-test to post-test increase in motor sensor synchronisation and balance. These results suggest that dancing must include in the curriculum of early childhood at school and by parents at home.

Dancing to music as a support for developing mental flexibility and developing thinking

The findings of interviews with people about arts involvement in parenting demonstrate that children possess mental flexibility ability and cognitive

development. Providing opportunities for creation and expression is the finding of the results of interviews with the criteria for problem-solving abilities in children, but few parents do this:

... I find children always happy and have lots of ideas when I play their favourite songs (P2)

I see children when they are dancing according to the dance on a gadget, they are easy to create new movements, and are interested in new things (P2)

When relaxed, he can quickly solve difficult problems in his task (P4)

An active learning environment to keep the child on the task of finding is based on the following parental comments:

At home, the learning environment is good because everyone is productive and has their own busy life, the children imitate to always complete tasks faster (P2)

Consistent with the expected behaviour of parents requires the strength of parents as the main role model at home. Almost all the parents interviewed expressed it was difficult to do.

Difficult to consistently show good things in children (P1)

Keep children in good behaviour, I need a lot of knowledge to do that (P5)

Children behave consistently sweetly when parents promise the things they want (P2)

For the last research question, dance is an intervention in the development of working memory, inhibition, and mental flexibility (executive function) in children. Based on this research on dance and brain function, the research findings on the perception and behaviour of one of the participants showed that dance affects working memory, inhibition, and mental flexibility (executive function) development in children. Participants (P2) described that the child's memory ability was better when the child enjoyed music and dancing because dance is a complex form of communicative movement with widespread processing in the brain that is internally differentiated (Nim, 2017). Research by Bugos and Demarie (2017) showed that musical activities integrated with dance movements contribute to cognitive development in areas such as inhibition. The participant (P2) stated that his son, who enjoys dance classes, has the character to endure the pleasure of the moment to complete a task, to control urges while being attacked by his younger siblings, and to wait patiently for things he has not accomplished. The findings as to the interview result show that dance leads to good mental flexibility, such as fast problem solving, adaptability, such as courageous behaviour on stage, flexibility in determining movements in dance when

limited by time, also demonstrates the MF abilities that will become a good foundation when you grow up. According to Hanna in a literature study by Nim (2017), strong claims regarding the workings of the brain of dancing people indicate the influence of dance on brain regions involved in verbal and non-verbal communication; a dance develops new cells and connections in the brain; dance helps children deal with stress that can interfere with learning, while it can motivate learning and learning to dance is a way to know, think, translate, interpret, and create thoughts.

Conclusion

The study findings address three research questions by suggesting three ideal forms of typology analysis outcomes. Firstly, it is vital to improve children's working memory development through different new strategies, which indicates that parents expect the latest guidelines to become the new references related to dancing as a process development tool. Secondly, positive reinforcement is the strongest factor in inhibition development. This reflects that parent play an important role in children's inhibition development at home as a provision to face the challenges of the 21st century. As the main actor models with inhibitory abilities, parents play the role of dance instructors for children. Thirdly, dancing with music supports mental development and thinking development, which reflects that dancing is a tool for children to know, think, translate, interpret, and create thoughts. In conclusion, further research is needed to increase the adult's ability around children to regulate various learning stimuli and involve art in them to form working memory, inhibition, and ideal cognitive flexibility of children.

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