[Paper]

Engaging Fathers To Increase Their Involvement In Psychomotor Therapy And Early Intervention-Based Parent Support Program For Young Children With Developmental Disability

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Abstract

This practical research study aims to improve the effect of psychomotor therapy and early intervention-based parent support program and increase the parents' involvement during weekly sessions, especially on how to increase fathers' participation in the development and support of their child with developmental disabilities.

During the 48 months of a psychomotor therapy and early intervention-based parent support program, parents or guardians were asked to participate actively in the sessions. This developmental approach utilizes a modified psychomotor therapy that needs the participants' physical strength, stamina, agility, speed, and peer work.

Parents were asked to record their home activities (engaging parent, activity type, and engagement frequency) with their child daily in a weekly chart at home. Additional data were obtained from qualitative analysis of semi-structured interviews, modified onsite slow-motion video recordings (Video Interaction Guidance), and field notes of participant observations.

Results showed that fathers were well acquainted with the general concept of child development. However, how they engage their child with developmental disabilities leaves space for early intervention programs and continuous parent education.

Further research is needed to address the father's involvement in child-rearing in the Japanese cultural setting and the future direction of early intervention practice. This practical study provides actionable insights for family and parent support programs on working with parents, especially fathers, involving them with their child's developmental progress.

Keywords: Developmental disability, Psychomotor therapy, Early intervention-based parent support program, father participation and involvement, Video Interaction Guidance

1. Introduction

> *"Loving my son, building my son, touching my son, playing with my son, being with my son… these are not tasks that only super dads can perform. These are tasks that every dad should perform. Always. Without fail."* (Pearce, 2011)

Families are dynamic systems that change roles and structures throughout their life course, influenced by broader political, cultural, social, and economic contexts. Over the past 15 years, there has been increased interest in involving fathers in early childhood care and development, particularly in supporting the relationship between fathers and their young children with developmental delays or disabilities, where mothers typically handle most tasks during the early years (Wolpert, 2002; Bagner, 2013). Early childhood, from prenatal development to eight years of age, is a crucial phase

of growth and development, as experiences during this period can influence outcomes across an individual's life (WHO, 2007). Children with developmental delays require access to early interventions to help them reach their full potential (UNESCO, 2009).

While the developmental effects of mothers' involvement with their young children during the early years are well established, recent research indicates that a responsive, adequate, and sensitive father-child relationship also contributes to more optimal early development (Magill-Evans & Harrison, 2001; Shannon et al., 2002). However, there are limited studies on the effectiveness of interventions involving fathers, particularly in community-based early intervention programs for children with developmental delays or disabilities.

Although many principles promoting mothers' involvement can be applied to fathers, they must be tailored differently, especially in the early years. Frieman and Berkeley (2002) suggest that early intervention practitioners are often predominantly female, making it challenging for fathers to relate to and see male role models on staff.

Increasing father involvement is a feasible goal in early childhood settings. A practical approach called "hooking" by Levine (1993) engages fathers in activities that match their interests (e.g., physical activities requiring strength, speed, agility, and stamina). Proper timing of these events or workshops significantly boosts fathers' participation in early intervention-based parent support programs (Turbiville et al., 2000; Frieman & Berkeley, 2002). Cooperation between parents is crucial; therefore, programs should aim to engage both parents simultaneously, as their interactions can significantly influence each other (Johnston & Mash, 1989).

Early intervention programs for parents, especially fathers of children with various disabilities, including chromosomal abnormalities and developmental disorders, are essential for addressing developmental delays and enhancing overall child growth. These programs are typically multifaceted, including physical, speech, and occupational therapy elements, which are vital given these children's common developmental challenges.

2. Psychomotor-based early intervention and parent support program of the CDSC

Psychomotor therapy is a method that is based on a holistic view of a person (somatic psychology) originating from the wholeness of body, mind, brain, and behavior (Figure 1). Assessments (observation and other continuous evaluations) are essential to achieve developmental and therapeutical goals (Hartley, 2004; Probst, 2017). Psychomotor therapy in early intervention focuses on basic motor skills like sitting, crawling, and walking, which are often delayed since these children may have problems with muscle tone and motor coordination. Thus, psychomotor therapy helps them develop necessary muscle strength and motor skills early, vital for overall mobility and independence. Supporting speech and language development is also essential to start early to cultivate communication skills, even before verbal communication begins. This includes fostering pre-language skills such as imitating sounds and understanding basic commands, foundational for later speech and language development.

In general, there have been three types of interventions or supports for families that have been subject to research evaluation: (1) training for parents designed to improve their parenting skills, (2) psychological interventions for parents designed to reduce distress, and (3) supports designed to help the family as a whole or focused on family members other than parents (IASSIDD Families SIRG, 2013). The present study partially involved all three types, mainly with the first. In April 2013, a Childcare & Development Support Centre (Kosodate Shien Sentā: CDSC) was established at

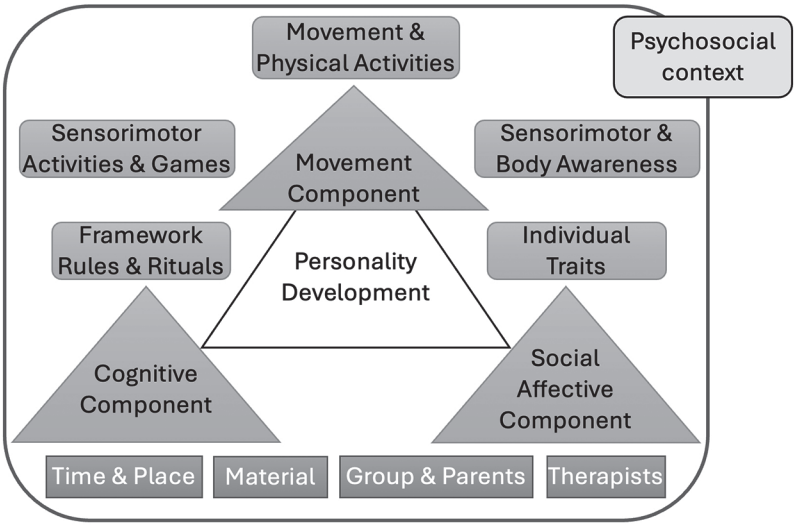

Figure 1 Psychomotor therapy: motor, cognitive, and social-affective components
(Modified model to fit the program, original by Probst, 2017)

the university (where the author works). First, it functioned as a developmental support resource room for families in the local community who needed advice and support for child rearing or developmental issues, like delayed development. Since April 2014, it has functioned as a multilevel early years childcare support center, with advisory, developmental evaluation, family support, research on parent education, parent empowerment, and volunteer group functions.

This practical research study aims to overview an early intervention-based family support program and its effect on parent involvement, especially on how to increase fathers' participation in the development support of their child with a developmental disability. The program aimed to promote increased involvement of fathers in their child's development progress during targeted psychomotor therapy in an early intervention setting. Psychomotor development, in a broader sense, is made up of five subsystems:

1. Neuromotor system: neuromuscular activities, muscle tone, muscle composition.
2. Sensorimotor system: sensory perception and integration.
3. Psychomotor system: experiencing movement processes.
4. Sociomotor system: the use of one's body and movement in interaction and communication.
5. Performance motor system (movement skills) : measurable and evaluable movement performances, sports activities, etc.

On one level, the present study introduces the CDSC's early intervention program for children with developmental delays or disability, where parents are actively engaged. Mothers and fathers are invited to participate in the complex developmental program. A well-designed psychomotor therapy aims to positively affect neurophysiological (brain) dysmaturity through movement, sensory integration, communication, and social behavior (Ayres, 1979; Bundy et al., 2002). This complex therapeutic approach aims to stimulate the postnatal maturational mechanisms of the central nervous system by activating different brain structures using modular sensorimotor stimulation (utilizing all known senses) and other activity areas to support child development during the early years (Kandel et al., 1995). These sensory systems include proprioception (muscle-joint awareness, body position), vestibular (balance, orientation in space, sensing movement), tactile (touch: pressure, hot, cold,

and pain), auditory (hearing), visual (sight), gustatory (taste), and olfactory (smell). The central nervous system tries to receive and integrate all sensory inputs without becoming too overwhelmed (hypersensitive), distracted (inattentive), unresponsive (hyposensitive), or disengaged (not processing or storing: "go through").

On the second level, the intervention program aims to help and educate parents on how to deal with their child with developmental delay and chromosomal disorders by giving them activity examples/models and showing how those could be done together with the child as routine daily activities at home.

In summary, the program contains two main elements. The first one is the planned psychomotor therapy session for children with the four "big" activity areas of developmental difficulties during the early years (Figure 2):

1. Motor development area (gross-, fine motor, and vocal movements).
2. Sensory development and psycho-cognitive area.
3. Communication development area.
4. Social development area.

The second element is to provide parents – in this study, which primarily focuses on fathers – multiple opportunities to interact with their children and observe them in a controlled therapeutic setting where parents work together with professionals. Participant observations, field notes, periodical short semi-structured interviews, and video record analysis help them provide positive feedback about the children's abilities and parental behavior changes.

The Pyramid of Learning begins in the central nervous system, as shown in Figure 3 (Williams & Shellenberger, 1996). Each level must properly integrate with the previous level or levels to progress to the next level. The goal is to reach the cognitive level of functioning. Progress to the cognitive level of functioning is necessary for children to attend learning and daily living (Bundy et al., 2002). This will happen with the two lower levels of the Pyramid of Learning to work optimally and connect well.

Looking at the Pyramid of Learning, it becomes evident that if the sensory and motor systems cause the malfunctioning of the higher levels (if those are not developed and working correctly),

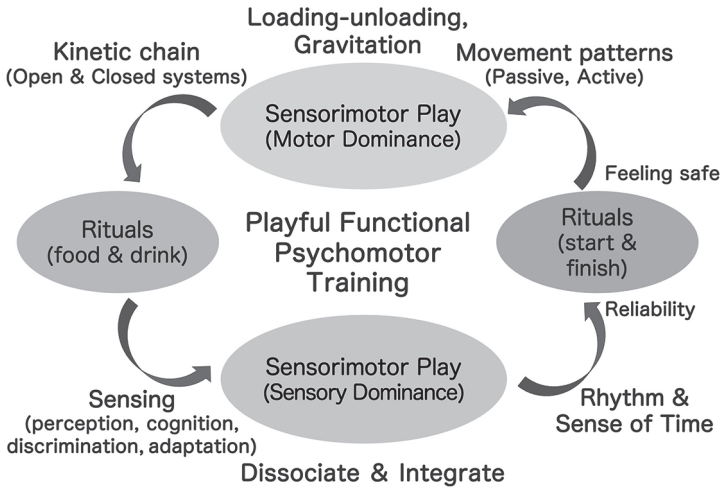

Figure 2 The four "big" psychomotor activity areas of the CDSC's psychomotor therapy and early intervention-based parent support program

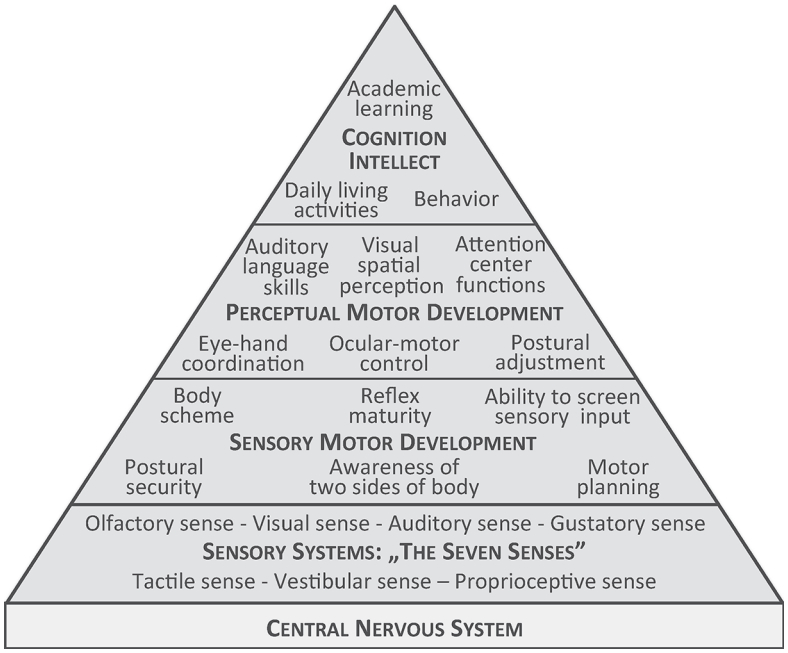

Figure 3 Foundations for behavior and learning: The Pyramid of Learning (Modified from Williams & Shellenberger, 1996)

then a therapeutic approach, which focuses on restructuring the neurophysiological system of these levels, seems to be a valid and a logical start for an early intervention practice.

3. Methods

This study employed qualitative approaches, including semi-structured interviews, to explore the experiences of fathers and mothers of children with developmental and chromosomal disorders actively engaged in an early intervention and parent support program. The parental interviews were transcribed, coded, and analyzed using an inductive thematic approach. Initially, parents were asked about their general demographic and lifestyle information, such as parents' age at their participating child's birth, educational background, socioeconomic background, and number of children. They also provided necessary anamnestic data on pregnancy, childbirth, developmental, and health issues of their child. Information on parenting style, personal matters (hobbies, strengths, weaknesses, anxiety, etc.), and previous experience within the medical and social welfare system and services were also collected. Weekly participation in the program was voluntary for local families within one hour of travel time.

3.1 Participants

Participants included fathers and mothers of young children with developmental disabilities (28 families). The children's ages ranged from 6 months to 5 years 10 months (average age: 2 years 8 months). Of the 28 children, 16 were boys (57.2%) and 12 were girls (42.8%), mostly with chromosome-related conditions (Down Syndrome 75%, Prader-Willi Syndrome 3.5%, XYY Syndrome 3.5%), while others had different developmental disabilities (early onset Autism Spectrum Disorder 10.7%, Attention Deficit and Hyperactivity Disorder 7.2%). Out of 28 families, 16 fathers (57.1%)

were actively involved in the program. The other 12 fathers (42.9%) who did not personally attend the weekly sessions received necessary information from the mothers, prepared activity materials (printed illustration aids, written explanations, and recorded videos by mothers), and short questionnaires as a replacement for semi-structured interviews. This study is part of a long-running program of 13 years and has been continuously shaped over the years. This study focuses on fathers whenever possible to separate the results of observation data, field notes, and charts. When no distinction was possible, the study used "parents" or "mothers" if the mother's actions or comments were dominant or informative. Table 1 shows the primary descriptive data on fathers who actively participated in the program and those who did not attend personally.

3.2 Data collection

The participant sample consisted of 28 families, of which 16 fathers could personally participate in the program. The other 12 fathers received information on the program from their partners or spouses, including activity information sheets, short video clips, and other written materials. The baseline semi-structured interviews were conducted individually before the program started and included an anamnesis questionnaire with basic information on the family, the child's developmental progress, and health and medical history. The author conducted all interviews in Japanese except two, one in English and the other in Hungarian, as the parents were more familiar with those languages and requested that they not be performed in Japanese. However, during the program, they could have daily conversations in Japanese with other parents. The participants were informed of the semi-structured interview procedure and recordings, which lasted approximately 40-90 minutes on average the first time. Interviews were transcribed verbatim using the inductive thematic approach.

Table 1 Descriptive statistics of fathers participating in the program

Demographic and Lifestyle Data	Fathers
Age at birth, mean (SD), yrs.	35.7 (6.3)
Educational background (%)	
*Compulsory**	—
*Upper secondary*** (*High school graduate*)	1 (3.6)
Vocational school or junior college graduate	10 (35.7)
University bachelor's degree or higher	17 (60.7)
Employment Status (%)	
Full-time	23 (82.1)
Part-time	5 (17.9)
Job classification (%)	
Education (Early Childhood, Primary, Secondary, Higher)	2 (7.1)
Manufacturing, transportation	3 (10.7)
Sales, services	13 (46.4)
Technical, clerical, managerial	10 (35.7)
Monthly Income in JPY (%)	
80, 000-110, 000	1 (3.6)
120, 000-290, 000	2 (7.1)
300, 000-490, 000	17 (60.7)
500, 000 or more	8 (28.6)
Number of children (mean)	1.5

* Compulsory: Junior high school (until the age of 15)

** Upper secondary and higher (vocational or high school, junior college or higher)

The inductive thematic approach is a qualitative research method (Braun & Clarke, 2006) that analyzes verbatim data and identifies themes or patterns. In addition to spoken words, the interviewer used side notes during the interview to record nonverbal cues (e.g., body language, silence, facial movement) and emotional aspects (e.g., sighs, coughs, crying). Therefore, in this study, the semi-structured interviews were analyzed using this thematic approach, and interpretive description was applied to explore potential patterns and similarities. These were thematically coded by keywords and organized into categories such as vocalization, nonverbal communication, verbal communication, age-appropriate practical tasks and skills, personal self-care, leisure and play activities, coping skills, parental anxiety and fears, experience with services, work and life balance, activities of daily living, time spent with the child, play activities, medical emergencies, developmental issues (medical, physical, and mental), progress in development, and shared participation in childrearing and household chores.

All subsequent interviews at the end of each semester were shorter due to the unique structure of each session (see 3-TSDA structure of the program). Some questions from the first interview were modified, and new questions were added (adjusted according to the family's needs). These short semi-structured interviews lasted between 10 and 30 minutes during the program and were used for follow-up questioning while also answering questions from the parents. Similar questions from parents were discussed in the program's parent support group.

3.3 Structure of the program (Three-Tiered Schedule Developmental Approach)

The CDSC's psychomotor therapy-based early intervention and parent support program uses a Three-Tiered Schedule Developmental Approach (3-TSDA). Each session is divided into a three-part schedule. The first part is the planned multimodal psychomotor therapy, where all children and their parents are supported by two certified psychologists (therapists), one early childhood care and education (ECCE) specialist, and four seminar student volunteers. During the second part of the 3-TSDA, children participate in playful group activities with one therapist, supported by the ECCE specialist and student volunteers, while the other therapist engages with the parent group nearby (information sharing, coaching, and counseling). After the second part of the 3-TSDA, parents leave the CDSC with their children. The therapists, the ECCE specialist, and student volunteers have a post-session meeting for information sharing on what happened in the first two parts of the 3-TSDA, identify necessary changes, emphasize essential points of participant observation and field notes, followed by planning the activities for the next session as the third part of the 3-TSDA.

3.4 Participant observation, field notes, and the analysis of WHAC sheets

Observation is a social research method that gives the researcher direct access to information on social phenomena. The researcher becomes a firsthand eyewitness of social actions. Researchers observe overt phenomena manifesting as behavior, actions, and/or interactions. Researchers use different strategies to observe. The main decisions for observational research concern the participatory level, structural issues, and the research setting. Widely accepted sub-classifications of observation are participant, direct (non-participant), and indirect (Whitley & Crawford, 2005). This study utilized participant observation due to its socially acceptable nature during fieldwork. The observer can take three roles during participant observation: complete-participant, participant-as-observer, and observer-as-participant. In the case of complete participation, the researcher becomes part of the group; therefore, it is a covert, non-reactive observation that could involve deception of group members. The other two roles could be summarized as participating, depending on the

researcher's involvement. The participant-as-observer option is 'doing' rather than 'being' there (e.g., nurse) ; the observer-as-participant role is 'being' rather than 'doing' (e.g., therapy supervisor). This study chose the second and third roles during the study and switched between them as the situation changed. Two certified psychologists did the observation and were the leaders of the program. One is a kindergarten teacher and clinical psychologist; the other is a clinical developmental psychologist, speech-language therapist, and trained early intervention specialist with 30 years of field experience.

The observation used field notes – so-called "jottings" – by the therapist to record important moments that were regarded as important or meaningful to be remembered and later used in discussion for clarification.

Another utilized instrument was the CDSC's Weekly Home Activity Chart (WHAC), a weekly one-page easy-mark table (see Figure 4). The WHAC sheets were designed to track and analyze parents' daily activities with their children. It refers to an easily fillable chart where the parents can record their daily activities with their children on weekly sheets. The WHAC was developed as a simple frequency-matrix method to record and later analyze the parent-child activities outside the early intervention setting. WHAC sheet categories are based on activities practiced and encouraged during sessions. However, other categories are part of the daily life of families. Here are some WHAC sheet categories that focus on the types of activities parents typically engage in with their children at home:

- Basic Care Activities (Feeding, Bathing, Dressing, Diapering/Toileting)
- Routine Activities (Morning routines, Bedtime routines, Daily schedules)
- Educational Activities (Reading books, Educational games)
- Play Activities (Indoor play: toys, games; Outdoor play: parks, playgrounds; Creative play: drawing, coloring and painting)
- Social Interaction Activities (Family gatherings, Playdates with other children, Attending social events)
- Physical Activities (Structured physical therapy exercises; Exercise: running, jumping; Sports like activities: ball games, water & pool activities)
- Emotional and Social Development Activities (Talking and listening; Emotional support: comforting, hugging, Problem-solving together)
- Household Chores and Daily Living Skills (Cleaning and tidying; Preparing meals and the table together)
- Therapy and Medical Care Activities (Medical appointments, Attending therapy sessions, Administering medication)
- Special Activities (Celebrations: birthdays, holidays; Outings: zoo, Disney Land and Sea)

The filled weekly sheets were handed in by the participating parent weekly at the CDSC. These WHAC sheets were later studied and analyzed, and a frequency matrix of daily life activities of fathers and mothers engaging with the child (separately) or when both were involved at the same time together was drawn up. The frequency of their engagement and the activity type were counted, resulting in a ranking system. Each time a parent engaged with the child, they marked it on the sheet according to the day of the week (column) and activity category (row), clearly marking who did it (father, blue marker; mother, red marker; both parents together, double circle mark) in the appropriate cell. These marks represented a usage-frequency unit, and the simple analysis procedure involved counting and categorizing these units. The scores were ranked by the usage frequency of each activity category to find out which activities were used most and least by the parents, then a usage frequency order described which activity and time (day) needed attention

Weekly Home Activity Chart (WHAC)

Activity Type	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Rank*
Gross Motor Activities								
Fine Motor Activities								
Sensory Activities								
Balance and Spatial Activities								
Language and Communication Activities								
Self-help and Self-regulation Activities								
Free Play Activities								
Others								

◯ Blue circle = activity with father; ◯ Red circle = activity with mother; ◎ Double circle = activity involving both parents

Rank* number (1-8): shows the activity frequency ranking of each activity type. It helps to identify goals and modify engagement plans.

Figure 4 Weekly Home Activity Chart (WHAC) of the CDSC's program to record activity type, engagement frequency, engaged parent, and the rank by occurrence

and possible change to provide a better balance of activities. The therapists used these weekly results as essential reference points to advise parents on "home activities" during group sessions.

The therapists applied the following three questions to establish reference points:

1. Which activity type was used most frequently by the parent?
2. Which activity type was used least frequently by the parent?
3. Which activity type could be utilized more frequently to be more effective?

3.5 Video Interaction Guidance (VIG)

The Video Enhanced Reflection on Communication (VEROC) technique was developed and first used in the 1990s in the Netherlands. Later, it was modified and renamed Video Interaction Guidance (VIG) at the University of Dundee (UK) (Fukkink & Tavecchio, 2010; Kennedy et al., 2011). There are approximately 500 practitioners of VIG in the UK, including educational psychologists, speech and language therapists, teachers, social workers, family therapists, and academics. VIG is designed as a family-centered intervention based on observation of real-life communication between parent and child. Moments from the video are then selected and played back to the parent. It demonstrates what the "guider" (therapist) has identified as successful communicative events and aims to co-construct an understanding of the moment's success. In this way, it is anticipated that participants will perceive existing positive contingencies and be able to build upon them in future communication (Pilnick & James, 2013). The study of Fukkink and Tavecchio (2010) shows that video feedback training for early childhood educators is a promising method to increase their socio-emotional support and verbal stimulation in childcare practice.

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VIG is a therapeutic approach to enhance communication and relationships through video feedback. It involves recording interactions between individuals (e.g., parents and children) and then reviewing the footage to highlight successful interactions and areas for improvement. This method is grounded in attachment, social learning, and mediated learning theories.

The therapists examine the parent-child interaction during each psychomotor therapy session (1st Tier). When they see a notable connection, they noninvasively take a slow-motion video with a 120-per-second frame speed on-site. Then, the recording is used as a shared reflection, a short clip of a so-called "moment of vitality" to support the parent by building on current strengths and "positive moments." It is a complex technique that requires a training course and years of practice. The Initial Training Course is typically a four-and-a-half-day course that can be taken as a standalone or as the first step towards becoming an accredited VIG practitioner. It provides the foundational understanding of VIG principles and practical skills for initial application. After completing the Initial Training Course, trainees begin supervised practice, which involves at least 15 supervision sessions. Continuous supervision and self-directed learning are crucial parts of the microanalysis of interactions.

Key points of the VIG method relating to parent-child interaction include:

- The parent can understand the child and choose an appropriate response to the child's specific needs.
- "Sharing magical moments" to bring positive change (meeting the child at an emotional and cognitive level).
- Promotes empathy and builds positive relationships by reviewing micro-moments

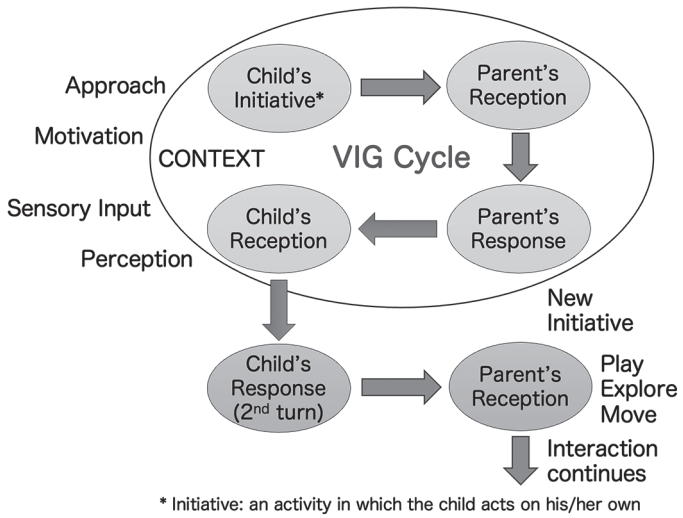

Figure 5 The VIG Cycle shows the relation changes between parent and child

(metacommunication signals).

・ It provides "moments of vitality" and "communicative dance" (Murray & Trevarthen, 1985).

Figure 5 shows the VIG cycle and how the relationship changes between a parent and child during an interaction cycle.

4. Results

The CDSC's program utilized public holidays on Mondays (approximately 4–6 times per school calendar year) to enhance father participation, resulting in 24 sessions with active involvement from 16 fathers (57.1%). Over the four-year research period, 30 sessions were planned annually (15 per semester). On average, 27 family attendances were recorded annually (approximately 13 times per semester), with absences primarily due to medical treatments, hospital visits, or planned family activities. This resulted in 108 sessions over four years, with a father participation ratio of 22.2% (24 times). Only one father managed to participate continuously in weekly sessions as he was the child's primary caregiver while the mother worked full-time (Table 1: stay-at-home father).

The mean age of the 28 fathers at their child's birth was 35.7 years (SD = 6.3), compared to the reported mean age of 32.8 for fathers at their first child's birth in Japan (Statistics Japan, 2016). Table 1 indicates that all 28 fathers had a high school education or higher, and 96.4% had vocational school/junior college or higher degrees. This educational background may have influenced participating fathers to seek additional information on health and developmental subjects and ask follow-up questions during the second tier of the session (parents and therapist only).

Most participating families were two-parent households (90%), with all fathers employed (full- or part-time; even the stay-at-home dad had a small part-time job). Nearly half of the mothers (42.9%) also worked full- or part-time outside the home but managed their time to participate.

The average monthly salary in Japan varies significantly based on location, occupation, and experience. For reference, the participating fathers' monthly income (see Table 1) fits the average profile, with the Ministry of Health, Labour and Welfare's Monthly Labour Survey 2022 reporting an average wage of approximately 326,000 yen (The Japan Institute for Labour Policy and Training, 2022).

Family size ranged from one to three children (mean number of children per family: 1.5). All participants lived in the Tokyo and Kanagawa prefectural areas. Twenty-two families (78.6%) participated in local support groups for parents of children with disabilities, primarily the Association for Parents with Down Syndrome. These parents were more knowledgeable about developmental and health issues and actively sought early intervention programs.

Participants were informed about the program's purpose and study-related issues, including consent, confidentiality, and the right to withdraw, making participation voluntary. Parents could choose to continue attending the following year or withdraw for various reasons (e.g., moving away, the child entering kindergarten, progressive health conditions). Thus, there were a few changes in participating families each year. Veteran parent members welcomed new participants and invited them to join activities outside the program.

Semi-structured short interviews revealed that fathers were well acquainted with the general concept of child development. However, engaging with children with developmental disabilities requires early intervention and parent support programs. Twenty-two parents (78.6%) reported feeling "very involved" in their child's development since joining the program (including both mothers and fathers). Of 28 fathers, 21 (the 16 actively participating and 5 others) expressed a desire to "get more involved" in their child's early development but needed professional help due

to health and developmental issues with their children. Five fathers with other children reported feeling "afraid" or "uncertain" about engaging with children with atypical development as they were "different" from typically developed siblings. They viewed the sessions as training and wanted to learn more. Two families acquired basic information on the MAKATON language program, including signs and symbols for everyday communication, and were redirected to a short course involving hands-on practice and interactive activities. Table 2 summarizes some of the semi-structured interview questions.

The WHAC collected information on engagement frequency and activity type but did not include hourly data on weekly time spent directly with the child. Using the WHAC, all fathers (28) acknowledged increased involvement (12% to 42%) compared with baseline interview data in supporting the individual child at home.

Baseline data for fathers' self-reported engagement frequency at home was taken on a simple 100 mm line with no markings. Fathers marked a point where they felt their active engagement frequency with their child was at that time. The therapist checked the marking on the line and assigned a score based on the millimeter position from the left end of the line. Follow-up interviews used the same assessment technique. The 16 actively participating fathers showed increased (all over 30%) involvement with their child at home, feeling more "empowered" after weekly group sessions. Thus, the study indicated that the quality and content of fathers' participation mattered more for children's developmental outcomes than increased time at home.

The 22 fathers who participated in the VIG video analysis (16 at sessions and six who received recordings as file attachments) of parent-child interactions and rigorously recorded their activity type and frequency on the WHAC sheets at home showed more engagement in other home-related tasks (e.g., shopping, cleaning, cooking) compared to those who did not participate in weekly sessions or were uninterested in VIG video analysis recordings. Therefore, promoting increased fathers' involvement in early intervention services is essential.

Interview results with the 16 participating fathers (and other participating mothers) indicated that fathers with more participation had better skills in addressing childcare problems at home. The

Table 2 Semi-structured interview questions

Type of Questions	Examples of Questions
General Questions	What do you hope to gain from this program? Do you have a *personal goal* to attend these sessions? Can you describe how *easy or difficult it was to you to attend* these sessions?
Questions related to changes in the child's behavior	Have you *noticed any changes* in your child's behavior? How *do you see the progress* of your child? How do you *feel* about your child's developmental progress or behavior changes?
Questions related to changes in the parent's behavior	Can you describe any *personal changes in you* since you attend these sessions? Is there anything that you *wanted to change* that hasn't since the program started? What did you find personally most *helpful in* these *sessions* (or benefit from)?
Questions related to parent-child relationship	Looking at your day-to-day interactions with your child, *how this program helped* you? Can you give me an example on *what do you enjoy doing together with your child* at home? Can you describe some of the *changes that you noticed between you and your child* since attending the program?

VIG analysis helped fathers perceive and understand their children's behavior and unique needs. In general, VIG analysis assisted fathers in perceiving their children more positively, feeling more self-confident in their parenting roles, and dealing with everyday issues.

Video Interaction Guidance (VIG) is primarily a qualitative method focused on improving communication and interaction through video feedback. The study used qualitative ratings during initial baseline data collection during the first three sessions. Table 3 uses subjective ratings of interaction quality from the observer's viewpoint. These ratings were used initially to help parents understand the purpose of video recordings. However, the therapist did not use these ratings afterward for two reasons. Firstly, the most significant changes occurred from baseline to the third session. Afterward, the improvements flattened, and the quality of interaction became more important than the frequency of interaction behaviors. Secondly, counting and scoring were too direct and authoritative, disrupting the natural flow of fieldwork. The VIG continued with narrative analysis of vital moments (e.g., eye contact, physical touch, turn-taking, positive feedback frequencies). The therapist immediately showed the slow-motion clip to the parent and waited for the parent to identify those points. If not identified, the therapist pointed them out. The therapist and parent-rated the VIG recording together by verbally agreeing on the quality of the interaction.

Field notes ("jottings") of participant observations showed that children became more positive in mood and behavior and more open to the father. Children made more eye contact with their father when the father actively engaged rather than just observing during the early intervention program. Fathers became increasingly active after each session in which they participated, requiring less instruction and using their imagination to combine different play activities confidently, especially in structured physical activities requiring strength, agility, stamina, and speed.

Field notes of observations during sessions and WHAC data indicated that the 16 fathers who actively participated in the psychomotor therapy and early intervention-based parent support program showed the most significant positive change in direct interaction with their children. The other 12 fathers received interview questions through the mother and later forwarded the completed forms to the CDSC, discussing them with their participating partners.

Table 3 Example table of qualitative rating of interactions of three fathers in a session captured by VIG recording

Session	Participan	Observer rating (1-5)	Key Observations
Session 1	F1	1	No eve contact, hesitant
Session 2		3	Improved eye contact, but still hesitant
Session 3		4	More confident better tum-taking and continuously could keep eye contact
Session 1	F4	1	Hesitant, no tum-taking, few physical touch moments
Session 2		2	Improved eye contact, still does not facilitate physical contact
Session 3		4	Continuously keeps eye contact, gained interaction
Session 1	F12	3	Confidant, too verbal
Session 2		4	Good eve contact. not hesitant.
Session 3		5	Excellent interaction skills, good positive feedback

Summarizing the results of parental semi-structured interviews at the end of each semester on parental workshare and participation:

- Sensitive and responsive parent-child interactions are related to more optimal child development.
- Interventions with mothers have been successful in increasing maternal sensitivity and responsiveness.
- Activities involving the father's active participation, with or without observation of their child, enhance father-child interactions.
- Intervention is more likely to be effective if the father is exposed to the program multiple times (regular participation).
- There was high agreement between mothers and fathers concerning the extent of "participation in child-rearing" of fathers, with the highest emphasis on playing, nurturing, deciding on services, and discipline.
- Mothers explained that while fathers are personally concerned with coping with their child's developmental delay or disorder, mothers are concerned with the complex task of how to work together for the child.

5. Discussion: Key Findings and Future Directions

For a child to be mature enough to attend school at six and fit well into the community, they must function adequately in their environment from their early years. According to Bloom's Taxonomy (1956), learning has three classical domain categories: psychomotor, affective, and cognitive. The psychomotor domain involves the development of the body and its skills, including seven levels: perceiving, patterning, accommodating, refining, varying, improvising, and composing. Psychomotor learning mainly contains sensorimotor-related perception-based actions requiring speed, accuracy, dexterity, and physical skills (Bloom, 1956). The affective domain addresses acquiring attitudes and values (e.g., receiving, responding, valuing, organization, and characterization) (Krathwohl et al., 1956). The affective domain is mainly based on feelings from emotional learning, such as attitudes, appreciation, interests, values, and adjustment. The cognitive domain involves learning and applying knowledge (rational learning) with six levels: knowledge, comprehension, application, analysis, synthesis (creative thinking), and evaluation (critical thinking) (Bloom, 1956).

Over 48 months of targeted psychomotor therapy and early intervention programs, parents were asked to participate actively in group activities during weekly sessions. The developmental approach was based on tailored multimodal psychomotor therapy requiring physical strength, stamina, agility, speed, and peer work between parents. Parents were asked to use WHAC sheets to record which parent engaged with the child, the type of activity, the frequency of their daily engagement, and the occurrence rank of each activity group (see Figure 4). These WHAC sheets were used during semi-structured short interviews to identify goals and modify engagement plans for the following weeks in agreement with the parents. Additional data were obtained through qualitative analysis of field notes of participant observations, analysis of slow-motion short VIG recordings, and semi-structured interviews (baseline and anamnesis initially and follow-ups at the end of each semester).

The list below gives a summary of the aims and exercise groups of the psychomotor therapy that parents – after necessary explanation, hours spent in therapy sessions, and receiving sufficient coaching – were able to carry out at home as well with their children during the early years while participated in the CDSC's program.

5.1 Aims and Exercises of Psychomotor Therapy

- Improve the child's visual and acoustic attention (e.g., familiar sounds, words, toys, pictures).
- Enhance the child's ability to imitate (e.g., animals, basic movements, emotional faces).
- Develop physical endurance (exercises for about 30 minutes).
- Understand task situations (e.g., repetitive movements, new movements, essential tool use in daily life).
- Maintain task situations (e.g., passive vestibular exercises).
- Improve the child's ability to calm down (e.g., start points and closing exercises).
- Improve the quality and quantity of the child's social interactions (e.g., pair exercises).
- Motivate the child (e.g., using favorite toys or instruments).
- Increase interest in objects (e.g., exciting tools/toys, musical instruments, lights, tactile stimulation).
- Exercises for adaptive motor responses (e.g., rotational exercises).
- Participation in group activities other than gross motor exercises (e.g., active vestibular exercises).
- Develop balance ability and synchronize movements.
- Ensure parental satisfaction.

The following section shows the advantages of successfully applying psychomotor therapy and early intervention in small-group settings by the CDSC.

5.2 Advantages of Small-Group Settings for Psychomotor Therapy and Early Intervention

- Small group activities help children with developmental disabilities experience sensorimotor and concrete operational stages of development, facilitating reaching the formal operational level (abstract thinking) after at least three years.
- Correct children's posture and develop physical abilities (balance, strength, speed, endurance) even after a year if starting the CDSC's program around one year old.
- Develop a feeling of security in a small group setting and make social connections with others who are not family members.
- Parents, especially fathers, can practice at home and become "partners" with their children by participating in therapy sessions and becoming more competent in dealing with other family matters.
- There is a gradual transition from active helper to participant observer, taking turns (father-mother, therapist-parent) during VIG recordings using mobile phones or tablets with slow-motion video capabilities.

Other recommended examples of the advantages of well-planned small group activities and playful exercises for 2-4-year-old children with developmental delays or disabilities.

- Develop the ability to imitate in serial and coordinated form (2, 4, or 8-cycle exercises).
- Physical endurance (45-60 minutes, active vestibular exercises, basic developmental movement patterns).
- Memorize and remember complex task situations (2-4-8-cycle serial exercises).
- Develop a sense of rhythm by moving the whole body and performing fine motor movements in a controlled manner.
- Use rhyme as typical children's songs (e.g., "Genkotsu Yama") for synchronizing movements and words (2-4-8 cycles of coordinated tasks).

- Use stairs and walk on slopes (upwards and downwards).
- Perform playful exercises with ropes.
- Improve the quality of social interactions (e.g., exercises that develop multi-channeled attention, exercises in pairs).
- Perform exercises while sitting, standing, walking, or skipping.
- Develop inner controls and keep rules (e.g., exercises involving bilateral motor coordination and cognitive tasks).
- Recognize and solve fundamental problems.
- Develop adaptive motor responses.

5.3 Advantages of Fathers' Active Participation in Early Intervention Programs (besides reaching developmental aims and goals)

- 57.1% of fathers participated in the program 24 times, with a 22.2% participant ratio compared to mothers, with no dropouts in this group.
- Fathers actively participated and assisted their children, developing stronger bonds.
- Fathers felt it was beneficial to attend the program where their children were happy to be in the group and play with different equipment and toys.
- Emotional empowerment for fathers is achieved through hugging their children, feeling part of the child's developmental progress, and becoming competent parents.
- Previous studies indicate that advanced maternal age carries higher risks of complications compared to younger maternal ages (Ogawa et al., 2017; Frick, 2021). In this study, the mothers' mean age was 31 years (SD = 5.4), close to the mean age of Japanese mothers at first childbirth (30.7 years) (Statistics Japan, 2016). Only 9 out of 28 mothers (32%) were 35 years or older at their child's birth, and 7 (25%) planned to have more children despite present difficulties.

Participant parents reported developmental issues with their child (medical, physical, and mental), some treated or expected to cause further difficulties. Participants expressed concerns and interests in issues the early intervention program could positively affect. Follow-up semi-structured interview questions addressed changes caused by participating in weekly group sessions, stress, and anxiety.

5.4 Follow-Up Interview Questions Related to Group Sessions

- What impressions do you have about your child? Did anything change today?
- What were your impressions of the activities during early intervention sessions at the start, and what about now?
- What were your impressions after receiving advice during or after an early intervention session?
- Have you noticed any changes in your child during or after an early intervention session?

5.5 Questions Related to Stress and Anxiety

- Do you feel any anxiety about childcare? If so, when, how, why, and how severe is it?
- Have there been any changes in your anxiety about childcare? What changes have you made, or what changes have occurred?
- Did your anxiety about childcare decrease or increase? To what extent and for what reason?

Participant children had the following developmental issues (medical, physical, and mental) that parents reported during the program sessions, which made them more conscious. Still, it is also a possible cause for their perceived parental anxiety. The early intervention program could address some of those underlined below.

5.6 Developmental Issues Reported by Parents on Participant Children

- Congenital heart defects
- Delayed intellectual development (e.g., cognitive issues like lower-than-average IQ)
- Muscle tone issues (e.g., too much or too little muscle tone, rigid/spastic muscles)
- Poor muscle coordination (slow and/or weak movements)
- Joint issues
- Immunological issues and recurrent infections
- Vision issues and eye diseases
- Balance issues
- Hearing problems (e.g., need early hearing aids)
- Difficulty speaking
- Epilepsy and seizures
- Breathing issues (e.g., asthma)
- Sleep issues (e.g., sleep apnea)
- Delayed motor development
- Difficulty swallowing, drooling, and chewing (oral health issues)
- Digestive issues and gastrointestinal complications
- Weight control and nutrition problems
- Emotional issues and behavioral problems

Fathers and mothers who worked full-time reported higher psychological stress, while those who stayed home with their children reported higher levels of anxiety and physical tiredness. Although the study did not employ special assessments on these issues, the information resulted from semi-structured interview sessions with parents. Fathers who worked part-time reported positive benefits from employment work overload, allowing them to spend more time with their children while the mother worked full-time. Parents who both worked full-time or one of them full-time and the other part-time reported receiving childcare assistance from relatives or professional help through social welfare support. Most participating families (78%) belonged to an association for parents with Down syndrome or another local self-support group aimed at helping parents with their child's developmental difficulties. Therefore, both fathers and mothers were more connected to social networks and aware of different services in their local communities.

During follow-up semi-structured interview sessions, 14 of 16 fathers revealed fluctuating working hours, noting a decrease in the first year after birth (due to many health issues) followed by a gradual increase and subsequent plateau after two years. This dynamic shift in work hours over time provides a nuanced understanding of the evolving work-life balance dynamics for fathers. Given the demanding nature of parenting children with developmental and chromosomal disorders, childcare support centers (Kosodate Shien Sentā) and other social welfare support services need to collaborate with families to assess demands, identify special needs (medical, psychological, and social well-being), and develop intervention programs designed to enhance family functioning and early supported development of a child. In the meantime, it is vital that these services provide parental support and encourage parents – like in the case of this study and early intervention programs –

especially fathers, to cope with the cumulative demands of daily life.

The present study shows that the mother was the primary caregiver in many families during weekdays. Therefore, involving fathers helped increase family functioning and led to better communication and domestic workload sharing between mothers and fathers. Follow-up semi-structured interviews with all 16 actively participating fathers showed increased interest and anxiety about their child's development and future uncertainty. The weekly sharing experiences within group sessions with other fathers and mothers facing similar caregiving challenges became a solid supporting factor of the group dynamics in this program. For the 16 actively participating fathers, the most significant increase was in accessibility to their child and the tremendous growth in support for learning new things during group sessions. Therefore, it is vital to encourage and empower fathers to develop their caregiving skills and use their abilities, special interests, and social networks.

This study finds it essential that the early intervention program with parent support group activities provided fathers with adequate information and assistance with behavioral management, play activities, and positive parenting in caring for their children. Future studies can adopt more qualitative approaches to allow fathers and mothers to discuss their experiences. The present program had an open-door policy, allowing parents to bring (with agreement from other participants) siblings, grandparents, and other actively engaging professionals (e.g., nursery teachers) as guests into the early intervention program.

Specific data on the educational background and job classification of participating parents and their self-reported issues–during semi-structured interview sessions – showed that these factors could influence a family's access to resources and support systems, which are critical in managing the child's condition. Income levels can also impact healthcare, educational services accessible to the child, and the families' general quality of life. On the other hand, fathers reported during interview sessions that parental involvement is necessary for the development of their children with disabilities; thus, fathers should be taught and encouraged to engage with them.

This practical research study used a modified version of the VIG video analysis. Slow-motion video with 120 frames per second was shot on-site during the first part of the 3-TSDA and used as a shared reflection on short clips of parent-child interaction to support the parent by building on current strengths and "positive moments" in the second part of the 3-TSDA. Each clip typically showed positive feedback in a "here and now" situation(after those moments just happened, "straight reflections"). The VIG recordings are short, approximately 1-2-minute videos with slow-motion recording and playback options where the parent (e.g., father) "engaged" with his child in an activity. Observed behaviors of the parent and the reciprocal behavior of parent and child were then searched, and "positive moments" were shared from the video.

The leading researcher established eight VIG measurement points for video evaluation of parents' behavior during the study:

- Turning toward the child (directions of face and body)
- Making eye contac (eye movements)
- Following the child
- Verbal reception
- Non-verbal reception (e.g., facial expressions)
- Letting the child take a turn
- Acknowledging the child
- Parent recognizes self

Follow-up semi-structured interview sessions with 16 fathers revealed that involvement in the

early intervention program and receiving VIG measurement points was particularly empowering, providing them with the skills to support their child's development effectively. Engaging fathers in this program fostered a stronger parent-child bond and offered fathers a deeper understanding of their children's needs and capabilities. During these follow-up interview sessions, the study revealed that fathers and mothers of children with developmental disabilities, including Down syndrome, may experience similar levels of stress, but the nature of their stress differed. Fathers reported stress related to emotional attachment to the child, while mothers' stress was more often associated with the demands of caregiving. This distinction underscores the importance of understanding and supporting fathers' unique experiences and contributions in early intervention settings. All 16 fathers also reported that after each session in which they actively participated, they felt more competent and more satisfied in their parenting role at home because they experienced less stress related to attachment and were able to play with and care for their child more effectively. Thus, the study suggests that parenting efficacy – which includes parents' confidence and satisfaction in their parenting roles – is crucial for both fathers and mothers.

The study shows that collecting data and quantifying fathers' involvement in an early intervention program is difficult and limited. However, the results highlight fathers' role and the need for more targeted support and acknowledgment of their contributions to these programs. This can help ensure that interventions are more family-inclusive, recognizing and bolstering both parents' critical roles in the development and well-being of children with developmental delays or disabilities.

The present study focused more on parental characteristics than providing detailed occupational and economic data for fathers. Therefore, further specialized studies are needed to provide more detailed and specific information about the father's role and demographic attributes in families with a child with developmental and chromosomal disorders like Down Syndrome. In the future, it might be essential to determine whether the early intervention-based parent support program is more effective if both parents participate or if the intervention is directed only to fathers. Fagan and Iglesias (1999) found that fathers with the most exposure to an intervention over eight months had the most significant behavioral changes.

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Compliance with ethics guidelines

All procedures followed were by the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all participant parents for being included in the study.

Conflict of Interest

The author has no actual or potential conflict of interest to disclose.

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