The Effect of PV2T Exercise on the Progress of Social-Emotional Development of Dyspraxia Children in Early Childhood Education

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KEYWORDS
Dyspraxia, PV2T Exercise, Vestibular, Viceroceptic, Tactile, Proprioceptic, Inclusion.

ABSTRACT
Globally, dyspraxia in early childhood is caused by impaired control function of the vestibular organ utriculus for STNR or saculus for ATNR. It occurs due to incomplete contraction of the uterus during the birth process, leading to failure of proprioceptive formation. It requires about four years to treat dyspraxia with Sensory Integration Praxis Therapy. For physical training and cognitive skills rehabilitation, the PV2T exercise method only requires three months. The magnitude of the effect was measured by the Partial Path Analysis Test. The effects of vestibular, viscerosceptic, and tactile alignment by PV2T treatment on the children included the children becoming calm and concentrate, improvements in cognitive skills (balance, gross motor, attention, fine motor, responsiveness, speech language, behavioural attitudes, social independence), and becoming more prepared to play and learn in a classroom at an inclusive school. Out of 69 ADHD children, 67 males and 2 females, 66 children had optimally corrected cognitive skills with the remaining 3 children (4.35%) consisting of 2 females and 1 male child. Out of 34 ADD children, 30 had optimal corrected cognitive skills whereas the remaining 4 children (11.76%) consisting of two boys and two girls were not optimal. The final results of the study showed that PV2T exercise method performed consistently within 3 months had a positive impact on children's cognitive skills. Thus, schools can implement the PV2T method in their inclusion programme.

INTRODUCTION

Human beings born into the world require neuro-psycho-behavioral maturity preparation in order to adapt to the earth's gravitational force so that they are able to socialise intelligently with their environment. The normal birth process begins with the maturation of the vestibular organs as a means of balancing the body through the contraction of the mother's uterus perfectly with the ideal birth weight of 3,000 -3,500 grams. So, both parts of the vestibular utriculus for Symetri Tonus Neck Reflex (STNR) and saculus for Asymmetry Tonus Neck Reflex (ATNR), all the semicircular bracelet flexes, will be able to function to control the dexterity of the body on the surface of the earth (Goddard et al., 2017). Not all children are born with a perfect contraction of the mother's uterus which can be caused by; birth weight below 3,000 grams or above 3,500 grams due to non-ideal height, weight and body mass index of the mother (Tan & Yeo, 2008). The Disorder's Statistical Mannual (DSM) categorises SPD to ASD, where a history of children born by cesarean, induction, forceps and vacuum, will risk 36.1% of babies suffering from sensory or motor impairment (SPD) and 43.5% of babies suffer from total sensory and motor impairment (ASD). While without medical treatment; low birth weight risks 6.3% SPD and 9.4% ASD babies, premature birth risks 12.4% SPD and 16% ASD babies, excessive birth weight risks 14.7% SPD and 18% ASD babies, and breech birth risks 4.7% SPD and 5.7% ASD babies. (Teresa et al., 2009). These children are at risk of impaired vestibular control function from birth, resulting in the possibility of dyspraxia (SPD) ranging from Motor or Sensory Process Disorder 's (ADHD/ADD) to autism spectrum disorder's (ASD). Globally, dyspraxia children are caused by impaired vestibular organ control function due to incomplete uterine contraction in the birth process, failing to form proprioceptors, with a prevalence of 10% of the population of children 5-14 years in Indonesia, according to the Sustainable Development Goals (SDGs) report no. 4 compiled by the United Nations (UN). During this time, due to the development of SPD and ASD with unknown causes, therapy and treatment are used according to the symptoms caused based on the Disorder's Statistical Mannual (DSM), so that the length of healing varies, even some until adulthood are still not cured (Smits-Engelsman & Verbecque, 2021). Experts state that dyspraxia is often identified in childhood and is a lifelong condition, there is no clear

time limit, and it is even difficult to cure (Minnis & Newman, 2023). The main target of therapy for children with dyspraxia is to make the condition able to concentrate on two-way communication so that they understand and are able to respond to instructions consistently. The earlier it is identified the better the results of therapy, even though dyspraxia prediction can be identified when the baby is 3 months old by assessing the type of acrobatic reaction through the stunt test (Budi in ACBLETI, 2020). On the other hand, what has developed in our society is dyspraxia therapy using Sensory Integration & Praxis and other types of therapy (which can be covered by BPJS health care), with a work mechanism that overcomes a collection of symptoms and sometimes requires an energy food diet and the administration of sedative drugs, with the provisions of the time limit allowed by BPJS is up to 14 years. Then, in June 2023, the rules for growth and development insurance claims were reduced to 7 years (Kontan.co.id, 13 June 2024). Therefore, it can be stated that if a child starts therapy at the age of 3 and runs it until the age of 7, the length of therapy needed is 4 years. Meanwhile, through Physical Education and Rehabilitation of Cognitive Skills using the PV2T (Vestibular, Viscerosceptic and Tactile Alignment) exercise method, it only takes 3 months for children to be able to concentrate, be ready to communicate in two directions, and be able to respond to instructions. The terms Vestibular, Visceroceptic and Tactile are medical terms with the following definitions:

1. According to the medical dictionary, vestibular refers to anything related to the vestibular system, which is part of the middle ear. This system plays an important role in maintaining balance, spatial orientation and coordination of body movements. Anatomically, the vestibular system consists of structures such as the semicircular canals, forming the utriculus, and the saculus, which work together with the cerebellum to control posture and balance.
2. **Visceroceptive** is a medical term that refers to internal sensations emanating from the body's internal organs (viscera), such as the heart, lungs, stomach and intestines. Visceroceptive sensations involve autonomic nerve receptors present in these organs, which send information to the central nervous system about the condition or activity of these organs.
3. Tactile, in the context of early childhood education such as in kindergarten, refers to external sensory sensations received through the touch of the skin and is part of a child's sensory learning process.

This study aims to analyse the effect of vestibular, viscerosceptic, and tactile alignment (PV2T) exercise on the developmental progress of cognition skills of dyspraxia children in Early Childhood Education inclusive schools, and its specific objectives are as follows:

1. Investigating the effect of balance on gross motor skills
2. Investigating the effect of balance on fine motor skills
3. Investigating the effect of gross motor skills on attention
4. Investigating the effect of fine motor skills on responsiveness
5. Investigating the effect of comprehensibility on verbal language
6. Investigating the effect of responsiveness on verbal language
7. Investigating the effect of speech language on behavioural attitudes
8. Investigating the effect of speech language on social independence

Executive function: Child's Skills and Development

Complete uterine contraction in labour is an important event for the success of the stages of social development of each child, namely flexing the Vestibular semicircular canals (Utriculus and Sacculus) in order to get the ideal position towards the brain stem. Using the Barany chair test, if rotated, the endolymphatic fluid of the utriculus canal moves, nystagmus occurs in the horizontal position, the child is likely to be anxious to perform STNR, whereas the endolymphatic fluid of the sacculus canal moves, nystagmus occurs in

the vertical position. Then, the child is likely to be anxious to perform ATNR (Lujan and White, 2019). It is **the vestibular** that serves as perfect navigation (Figure 1.) when **the cerebellum** integrates:

1. The primitive reflexes of the visceroseptic system organs (**sense of depth**) constitute the descending motor pathway as the Formatio Reticularis System (FRS) from the hypothalamus down the femoral plexus forming **the symetry tonus neck reflex's (STNR)** during infant age from 2 to 5 months.
2. The senses of the organs of the tactile system (**external sense**) are an ascending sensory pathway as Activators Reticularis System (ARS) starting from the sixth thoracic, brachial plexus, upwards to the thalamus forming **asymmetry tonus neck reflex's (ATNR)** of infant age from 5 to 10 months.

The integration of STNR from the hypothalamus with ATNR from the thalamus through the nucleus medianus in the basal ganglia forms the Proprioseptic system (joint sense) in the form of skilled movements that are unique to each individual. This Proprioseptic System is what causes individuals to develop according to stages ranging from sensory-motor, praxis, to representative at the age of 30 months. The formation of the proprioceptive system is described that the **descending motor** pathway with the **ascending sensory** pathway starting from **the 6th thoracal segment (T6)**, the brain stem to the basal ganglia must be aligned as Dorsum Collum Medianus Lemnicus (DCML) (Al-Chalabi, Reddy, & Alsalman, 2023).

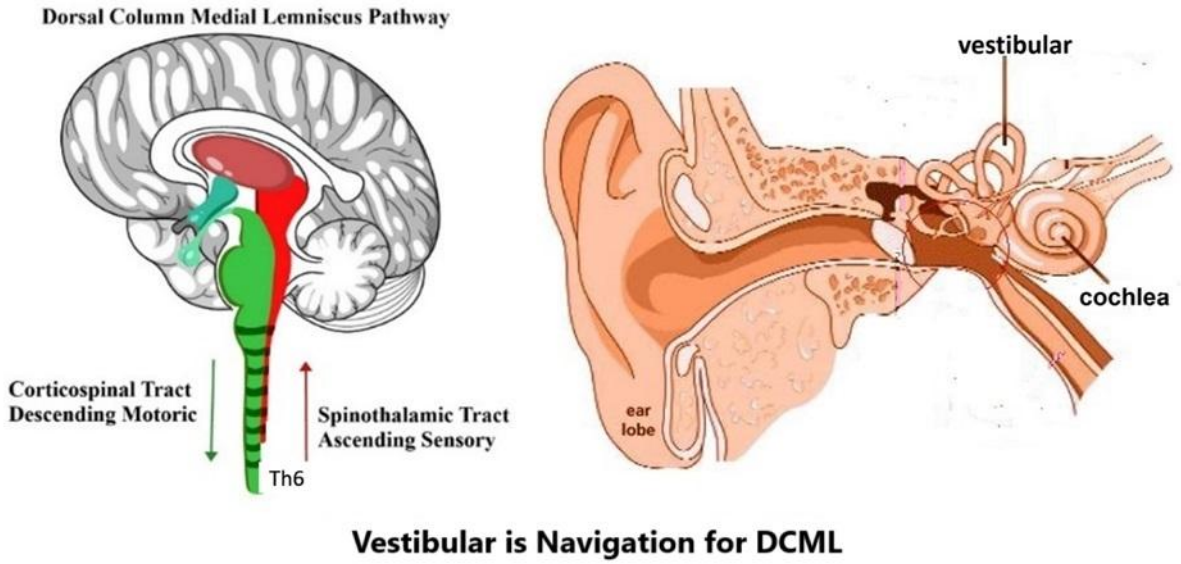
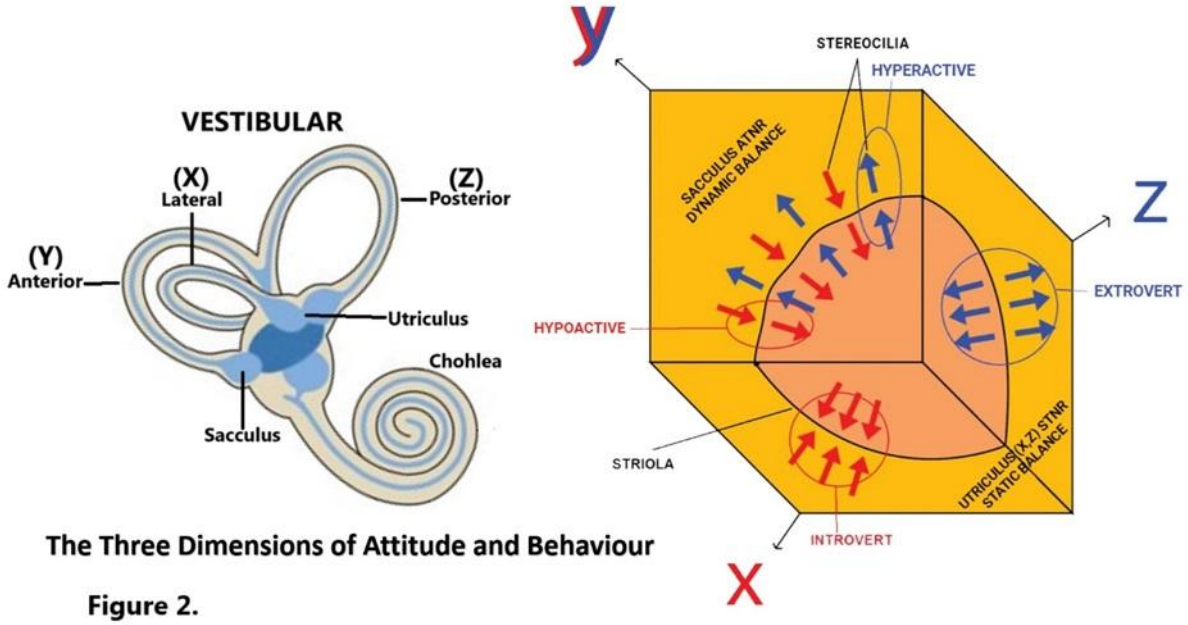


Figure 1.

Failure of integration causes the unique proprioceptive system not to be formed. There will be an obstacle to senso-motor development resulting in impaired praxis stages, becoming dyspraxia or sensory and/or motor disability, so that the child is unable to develop to the representative stage. The Barany chair test shows the presence of vestibular disorders in the form of horizontal or vertical nystagmus, which is then increasingly difficult to correct by inhibiting factors, such as screen time from mobile phones & television (Radesky & Christakis, 2016), baby walkers, (Schopf & Santos, 2015), and post-immunisation adverse events (AEFI) (Stratton, Gable, Shetty, & McCormick, 2000; De Stefano & Shimabukuro, 2019).

The function of vestibular control of the cerebellum can be explained psychologically as depicted in the three dimensions of **attitude** and **behaviour** (Figure 2.) in individuals. (Smith, Curthoys, Laitman, 2023)



The Three Dimensions of Attitude and Behaviour

Figure 2.

The vestibular part of the Utriculus that controls static balance (STNR) shows the direction of the **individual's attitude**, where the lateral semicircular canal (side) controlling the para-sympathetic autonomic nervous system is more **introverted** depicted by stereocilia that meet each other (red arrow direction), while the posterior semicircular canal (back) controlling the sympathetic autonomic nervous system is more **extroverted** depicted by stereocilia separated from each other (blue arrow direction). (Houston & Petric, 2019). The vestibular part of the saccule that controls dynamic balance (ATNR) shows the direction of behavior, if hyperactive is depicted by stereocilia pointing outwards (direction of the blue arrow), while hypoactive is depicted by stereocilia pointing inwards (direction of the red arrow),(Chengqi Wang, Amsal Madhani, Faisal Karmali, 2022).

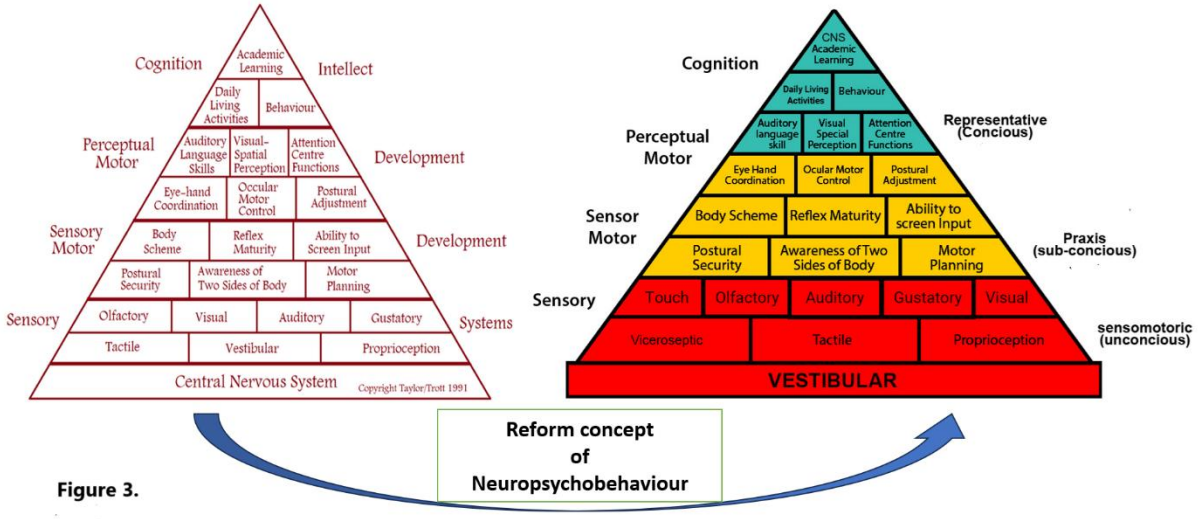


Figure 3.

Based on the function of vestibular control, it is necessary to reform the concept of neuropsychobehavior (Figure 3.), then the foundation of the learning pyramid is the vestibular as a control rather than the central nervous system, because, at the sensomotor stage, the baby's way of thinking is based on an unconscious state, then followed by the praxis stage, the way of thinking is based on a subconscious state, and only at the representative stage does early childhood thinking rely on a conscious state, thus involving the central nervous

system, which, at the age of 30 months, begins to use the central nervous system as a sublime function (Steer & Ayres in Williams-Shellenberger 1996, Dyson in Erikson, 1998).

Executive Function: The Effects of Vestibular Control Disorders on Skills and Development

Based on the reform of the learning pyramid, Physical Education and Rehabilitation of Cognitive Skills (PJ&RKK), which is neuropsychobehavioral based, can identify cases of impairment at the praxis stage called dyspraxia or sensory and/or motor disability, before focusing on exercises with Vestibular, Viscero septic, and Tactile Alignment (PV2T) Rehabilitation techniques. (Urbančič, Battelino & Vozel, 2023).

Dyspraxia can thus be classified into two broad groups of balance system disorders related to motor and sensory disabilities:

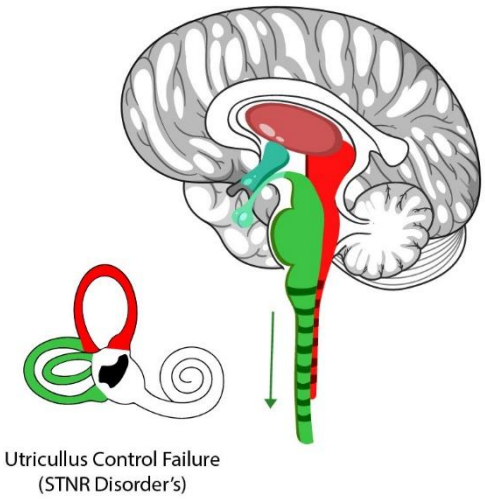


Figure 4.

1. Disorders of the static balance system, namely the vestibular organ of the utriculus, then anxiously unable to STNR so that primitive reflexes have not been integrated to produce motor disabilities, SPD (Sensory Processing Disorder) type ADHD (Attention Deficit Hyperactive Disorder), which may be followed by motor complaints, such as; Speech Delay, Picky Eater's selective motor swallowing, defecation pattern disorders, urination pattern disorders, sleep pattern disorders, generally have a history of low birth weight babies under 3. 000 grams, so that the child is comfortable moving and difficult to concentrate on two-way communication. The STNR (Figure 4.) is not aligned, illustrating that the gracillis segment is too shifted downward. (Millichap JG, 2008)

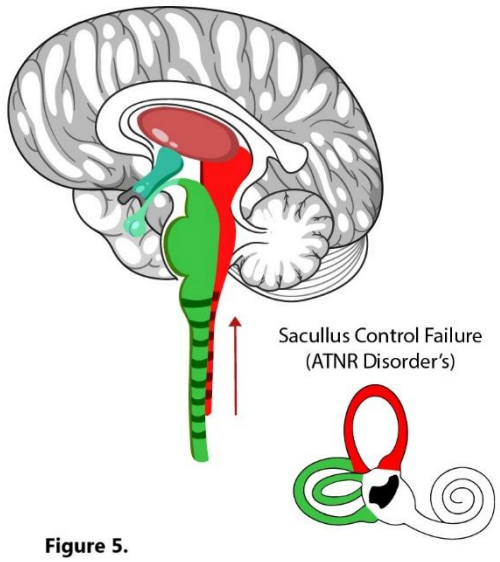


Figure 5.

2. Disorders of the dynamic balance system, namely the vestibular organ of the sacculus, then anxious unable to ATNR so that the sensory senses have not been integrated to produce sensory disabilities, ADD type of SPD, which may be followed by sensory complaints, such as Dyslexia, Picky Eater's sensory selection of soy sauce, disturbance of bowel movement, urination, sleep patterns. It also generally has a history of babies born weighing more than 3.500 grams, so that although it does not like to move, it is difficult to concentrate on two way communication. The ATNR (Figure 5.) is not aligned and described as the cuneatus segment is too shifted upwards (Mendez & Rosenbaum, 2010).

Generally, if only one part of the vestibular system, namely the utriculus, has a motor disability or the sacculus has a sensory disability, the individual will suffer from Motor or Sensory Process Disorders (ADHD/ADD), but if both parts of the vestibular system are impaired due to faulty intervention, the individual will suffer from autism spectrum disorder (ASD), which is extremely rare (Jamali, Sadeghi, & Cullen, 2008).

Patients with sensory or motor disabilities experience physical disorders of the spine that grow twisted, so that the shoulder axis is not parallel and not aligned with the hip axis. It appears that the knees of both legs are not the same height, making it difficult for the child to stand upright or sit statically, always moving in response to the earth's gravitational force. Furthermore, the child is comfortable standing, walking, and running on tiptoe, in order to stay balanced and not fall easily. However, when sitting for a stable body, the child performs the W sitting manoeuvre by showing an anxious and tense face (Figure 6.) when a friend approaches him. (Rethlefsen, S. A., Mueske, N. M., Nazareth, A., Abousamra, O., Wren, T. A. L., Kay, R. M., & Goldstein, R. Y., 2020)

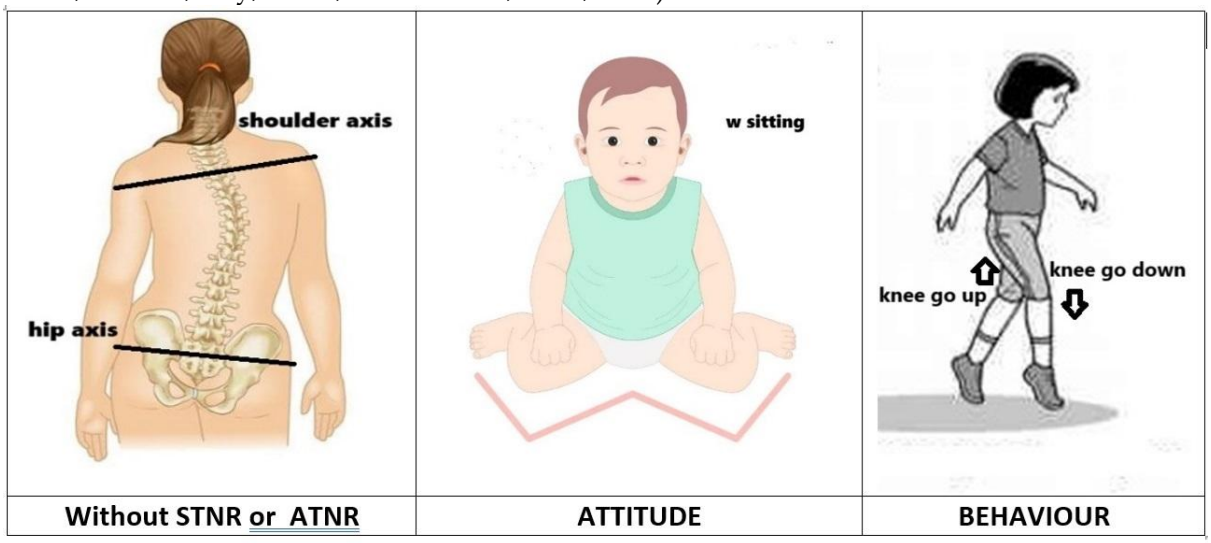


Figure 6.

Impaired vestibular control function makes it difficult for the cerebellum to integrate sensory with motor, so primitive reflexes still emerge as wild energy in the form of tics, which are sudden, brief and repetitive movements involving several muscle groups without realising it, making it difficult to concentrate. Simple repetitive motor tics include eye blinks and glances, facial grimaces, shrugs, head jerks. Similarly, there are repetitive simple vocal tics, including throat clearing, sniffing, humming, whining, and others. (Gieysztor, E. Z., Choińska, A. M., & Paprocka-Borowicz, M., 2018).

Some complex motor tics may appear purposeful, including sniffing or touching an object, jumping, hopping, bending, and twisting the body. Sometimes complex vocal tics may also appear, including repeating some of one's own words or phrases, repeating some of someone else's words or phrases (echolalia), using vulgar, obscene or swear words (coprolalia).

Some of the most dramatic tics include motor movements that result in self-injury such as punching oneself or a friend in the face, even mixed with vocal tics such as echolalia or cursing. This collection of tics is all difficult to sort out as a benchmark (Disorder's statistical mannual) in stating the type of disorder, so it is referred to as wild energy, known as Tourette Syndrome. (Imelia, B. & Ulya, 2020)

PV2T rehabilitation training is a Physical Education and Rehabilitation of Cognitive Skills (PJ&RKK) exercise with repeated head nodding movements and a combination of dominant leg and hand locks simultaneously having the effect of stimulating vestibular, visceroseptic, and tactile, so that weak legs and hands become active and physically the spine becomes

straight. The hip axis is parallel and in line with the shoulder axis, and the knee of the left leg with the right one becomes the same height when standing (Blomberg, Dempsey, 2011). While the psychological effects cause calmness, loss of anxiety until there is regularity in sleep, defecation, and eating patterns, and produce optimal concentration so as to be able to respond to the environment socially. Therefore, this PV2T training is referred to as concentration exercise. The rationale for simultaneously stimulating STNR (green area) and ATNR (red area) to form Proprioseptic (yellow area) whose neuro-psychobehavior can be structured as follows:

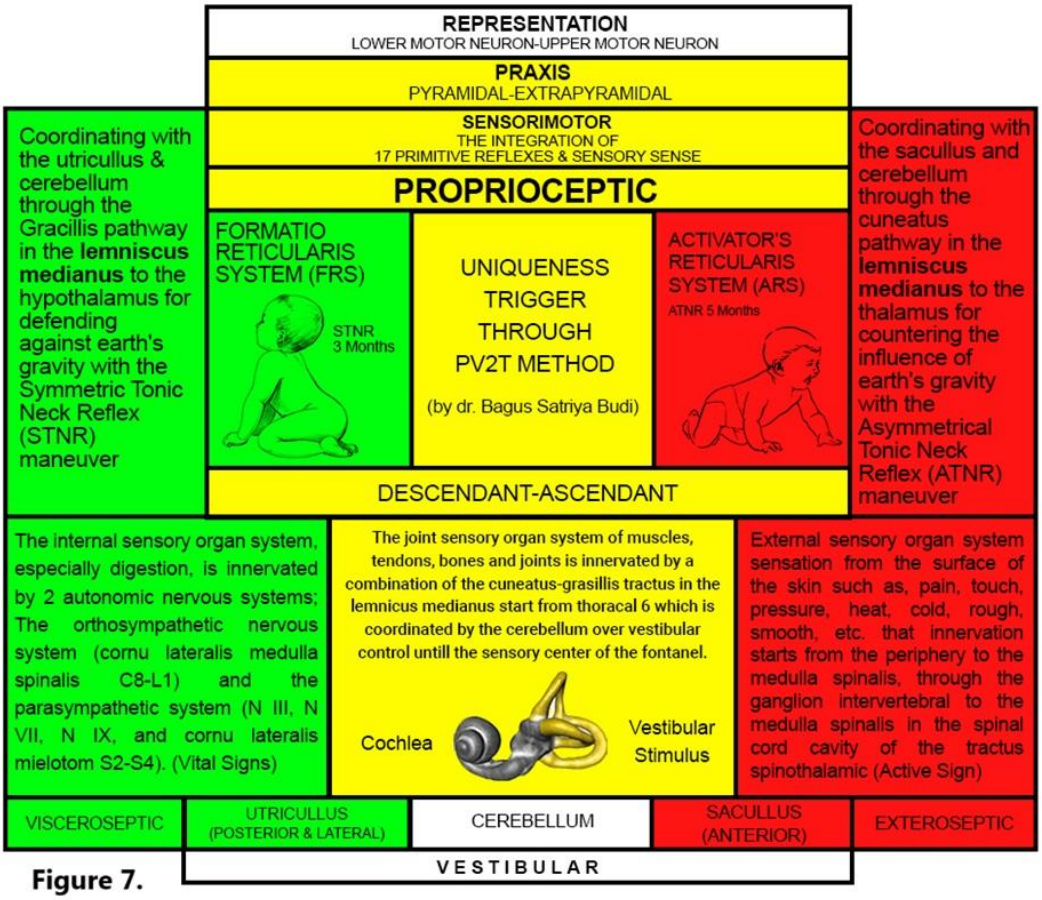


Figure 7.

Methods

The experimental test used a benchmark cognition skills test, once before PV2T and twice after PV2T for three months. All children underwent mandatory rehabilitation PV2T training for 3 months with a frequency of 11 times per day, per PV2T duration of 33 seconds, with a break every 45 minutes, along with additional rehabilitation PV2T in case of emotional tantrums, flapping, skimming, and others that are included as Tourette's Syndrome with a frequency of 3 times 33 seconds in a row with a break of 11 seconds and repetition can be done as needed.

Samples were taken from the data of children with tantrums from parents who consulted PJ&RKK with PV2T rehabilitation technique concentration exercises. From 61 groups, there were 921 children who entered the pre-school group and a sample of 103 children was taken. Out of the total sample, 96% had a history of birth with incomplete uterine contractions that put them at risk of impaired balance organ function (vestibular), while 4% with perfect uterine contractions were born naturally normal but also experienced disorder.

The 103 children aged 3-5 years with motoric or sensory disability from the ECD group consisted of:

a. A total of 69 deaf children (67 males and 2 females) falls into the SPD category of motor disabilities including ADHD, Speech Delay, Picky Eater's selective swallowing, disturbed bowel movements, tubs, disturbed sleep patterns, so that children are comfortable moving difficult to concentrate on two-way communication.
b. The remaining 34 children (32 males and 2 females) fall into the SPD category of sensory disabilities such as ADD, Dyslexia, Picky Eater's selective soy sauce, disturbed bowel movements, tubs, disturbed sleep patterns, so that although they tend to be sedentary, they are also difficult to concentrate on two-way communication.

All samples were taken with the criteria that one of the child's parents was unemployed, so that they could intensively and consistently perform PV2T for 3 months and be evaluated monthly. **PV2T rehabilitation is mandatory** for 3 months with a minimum frequency of 11 times per day, with a duration of 33 seconds per PV2T and a break every 45 minutes. Then there is **an additional PV2T rehabilitation** if there is wild energy, such as emotional tantrums, flapping, skimming, and others. The frequency is 3 times in a row with a pause of every 11 seconds and can be repeated as needed similar to Rhythmic Movement therapy (RMT) (Jorge Pérez-Rey, Pablo Fanlo-Mazas & Marina Gil-Calvo). PV2T would require a lot of energy from the child so there is no need for an energy diet, and it is also free from sedatives.


Figure 8.

There are **eight** combinations of leg and hand locks. Each combination is determined based on the dominance of the right or left side of the child's legs and hands, because the dominance of the limbs is what causes the development to grow and the spine to twist. Each parent is required to fill out a developmental history form from birth to 30 months of age which describes the stages of development from **sensomotor** (0-12 months) stage, the process of aligning the reflex system and sensory system, **praxis** (10-22 months) stage, the integration of several aligned movements for simple purposes, and **representative** (18-30 months) stage, graded aligned movements for more complex purposes.

The first meeting is based on the developmental history since birth. The type of failure of the praxis stage can be determined whether it is ADHD dyspraxia, ADD, or ASD. A cognitive skills test is tried, then a combination of limb locks and balance (vestibular) stimulation is determined. The parents are taught to do PV2T rehabilitation every day at home for one month, by avoiding watching television and mobile phone screens, not dieting, and not taking anesthetic or sedative drugs.

The second meeting assessed the results of the cognition skills record, then observed the physical shoulders, hips, spine, and limbs and vestibular control in the form of balance marked by elongated concentration and responsiveness to instructions both verbal and action, then to attitudes and behaviour according to the wishes in the family for one month.

In addition, evaluating the development of expected social behavioural attitudes is optimal and also ensures that the onset of wild energy in the form of emotional tantrums, flapping, skimming, jumping, and other deviant behavioural attitudes gradually disappear.

The third meeting is to assess the results of the cognitive skills record, then observe the elimination of wild energy and the ability to concentrate optimally with good behavioural attitudes and social independence. Then, it is determined and prepared to enter the school whether it is directly regular or through the inclusion program.

Measurement Tools

Each child and his/her parents were consulted three times for initial PV2T rehabilitation and continued for 3 months. At each meeting, the child was tested on cognitive skills consisting of 8 basic abilities, including balance, gross motor, attention, fine motor, response, speech-language, attitude-behaviour, and social independence. (Smith Roley, Mailloux, Miller-Kuhaneck, & Glennon, 2007). Each meeting the child was assessed for the speed of time in responding to the commands of the eight groups. The basic skills listed in the cognitive skills test instrument (Sturner, Horton, Funk, Barton, Frothingham, & Cress, 1982), with the following response times:

1. Responding at 10 seconds, no interference or optimised
2. Responding at 30 seconds, there is mild interference
3. Responding at 60 seconds, there is moderate interference
4. Responding at 90 seconds or no response/failure to respond, there is severe impairment

At the first meeting, all 103 samples were observed to have a twisted spinal posture that appeared to indicate that the shoulder axis was not parallel and not in line with the hip axis, so that the knees of the feet did not appear to be the same height and were assessed using a cognitive skills test. Almost all command items were responded in over 60 seconds, and some even failed to respond. Based on the weaknesses of these limbs, a combination of limb locks was determined to carry out training in the PV2T method of concentration exercises taught to parents.

At the second meeting after one month of intensive PV2T, all samples were assessed for improvement in cognitive skills tests, as well as physical condition and behavioural psychological records, summarised as follows:

1. Physical shoulder to hip axis is parallel and aligned
2. Physical spine is no longer twisted, but straight and flexible.
3. Sitting posture is calm and there is no longer W sitting
4. The attitude of understanding has begun to respond to commands, but the ability to respond is still largely above 10 seconds.
5. No longer walking on tiptoe
6. Ability to ride a two-wheeled bicycle
7. Non-selective dietary behaviour, regular sleep, regular defecation & toileting time without diapers pants
8. Tourette Syndrome, in the form of Skimming, Flapping, Tantrums, and other negative behaviours, were significantly reduced.

The third meeting after optimal focus, the cognitive skills test was assessed, including balance, gross motor skills, attention span, fine motor skills, response skills, speech and language. However, it is necessary to monitor behavioral attitudes and social independence, all response speeds were below 10 seconds as the symptoms of Tourette's Syndrome disappeared.

The characteristics of the respondents are parents who have dyspraxia children aged 3 to 6 years old, where one of the parents is not working, and or can also be with the companion teacher.

The amount of influence is measured by the Partial Path Analysis Test. The measured variables are balance, gross motor skills, attention, fine motor skills, responsiveness, verbal language, behavioural attitudes, and social independence.

Procedure

Analyze data to answer the objectives of this study, the researcher used path analysis, with a design outlined in the chart below:

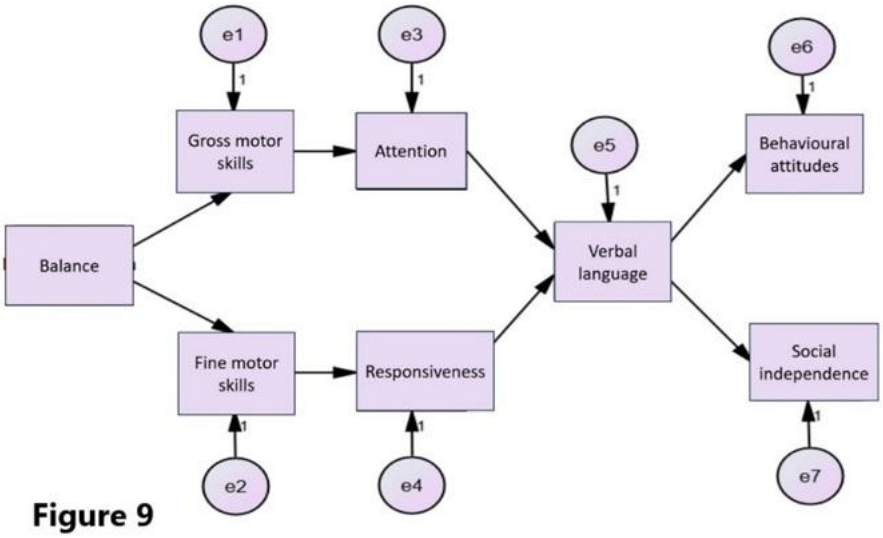


Figure 9

Path Analysis Chart

Path analysis was conducted 6 times according to the combination of observation (O1, O2, O3) and group (ADHD, ADD) in this study.

To test the hypothesis that has been proposed and to detect the effect of intervening variables in moderating the independent variable on the dependent variable, the path analysis method, simultaneous testing (F test) and partial testing (t test) were used. There are 8 variables in the path analysis model which are depicted in the path analysis diagram. The path analysis diagram describes the research framework in a path diagram which will be the framework for making path analysis in AMOS software.

Results

Descriptive statistics

Based on the results of the application of PV2T focused exercise in early childhood who have dyspraxia disorder with ADHD type, 69 children (67 male and 2 female), the number of optimally corrected samples is 66 children (95.65%), while the remaining 3 children (4.35%) consisting of 2 female children and 1 male child, do have a history of dieting and receiving sedatives for several weeks. Thus, they still do not fully understand and are still reluctant to carry out orders so they need further assistance in social independence.

In ADD cases, from 34 children, there were 30 children (88.24%) with optimal corrected cognitive skills. The remaining 4 children (11.76%), consisting of two girls and two boys, did have a history of dieting and received sedatives for several weeks, so they still lacked understanding and were still reluctant to carry out orders because they were worried about being wrong. Therefore, they needed longer assistance in social independence.

In general, there is regularity in eating, sleeping, defecating and urinating patterns. The number of samples that have not optimally improved their cognition skills so that they still require assistance in social independence is 7 children (3 ADHD children and 4 ADD children), which is 6.79% of the total 103 samples. Therefore, it can be concluded that the effect of PV2T rehabilitation exercise movements on improving cognition skills reached 93.21% of children or 96 children consisting of 66 ADHD children and 30 ADD children.

The balance of the body and gross motor movements affect the ability to attention, while balance and fine motor movements affect the ability to respond, meaning that balance controls the ability of concentration span to be able to communicate. The ability to attention and respond leads to the emergence of speech desires and the language utterance begins to have a clear vocabulary, which means that the child becomes skilled in two-way communication, so that the child's concentration increases. Furthermore, children's ability in language and

speech as well as two-way communication and their understanding of instructions are closely related to good attitudes and behaviour in daily life, both at home and at school. Finally, the development of language and speech will encourage children to have better two-way communication so that it has an effect on the formation of social independence, following the rules in the family, a varied regular diet without choosing a particular taste or texture, a regular sleeping pattern. In addition, children are able to defecate and urinate themselves to the toilet without using diapers.

Partial Test of ADHD Child Group

Partial tests are used to partially test the hypothesis between the independent variable and the dependent variable. The results of the Partial Test with Path Analysis are presented below:

	Initial ADHD		ADHD in the second month		ADHD in the third month	
	Estimate	P	Estimate	P	Estimate	P
B --> GMS	-0,304	0,007	-0,047	0,696	0,876	0,000
B --> FMS	0,040	0,727	0,017	0,889	0,935	0,000
GMS --> A	0,046	0,725	0,015	0,899	0,979	0,000
FMS --> R	-0,126	0,349	-0,012	0,919	0,800	0,000
A --> VL	-0,083	0,468	-0,267	0,024	0,478	0,005
R --> VL	-0,032	0,779	-0,057	0,625	0,492	0,008
VL --> BA	-0,064	0,630	0,182	0,114	0,895	0,000
VL --> SI	0,217	0,095	-0,142	0,224	0,930	0,000

Note: balance (B), gross motor skills (GMS), attention (A), fine motor skills (FMS), responsiveness (R), verbal language (VL), behavioural attitudes (BA), social independence (SI).

Tabel 1. *Regression Weights: (Group number 1 - Default model)*

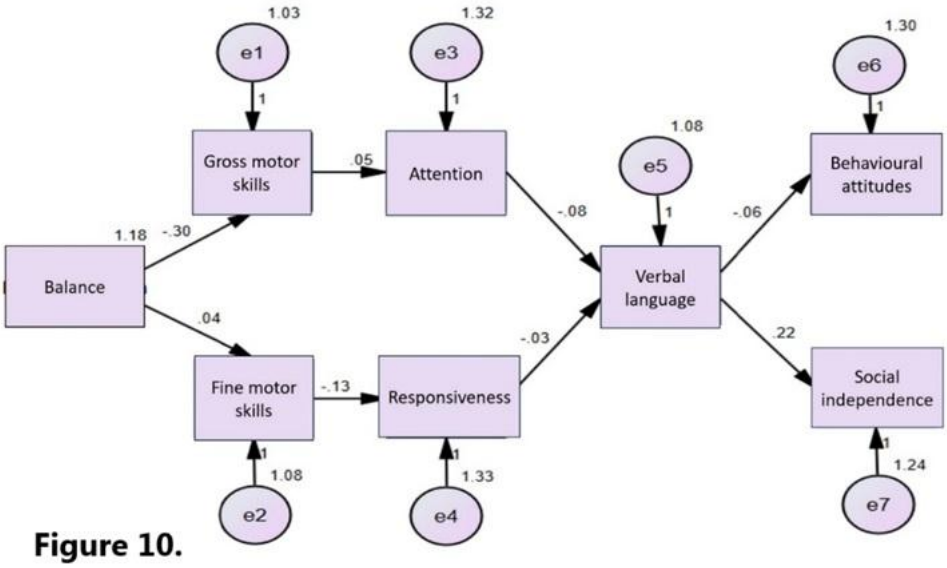


Figure 10.

Initial Observation ADHD

Hypothesis: the effect of balance on gross motor, the effect of balance on fine motor, the effect of gross motor on attention, the effect of fine motor on responsiveness, the effect of attention on verbal language, and the effect of responsiveness on verbal language, all have an insignificant effect because of the frequent occurrence of various tics from unintegrated primitive reflexes called Tourette syndrome.

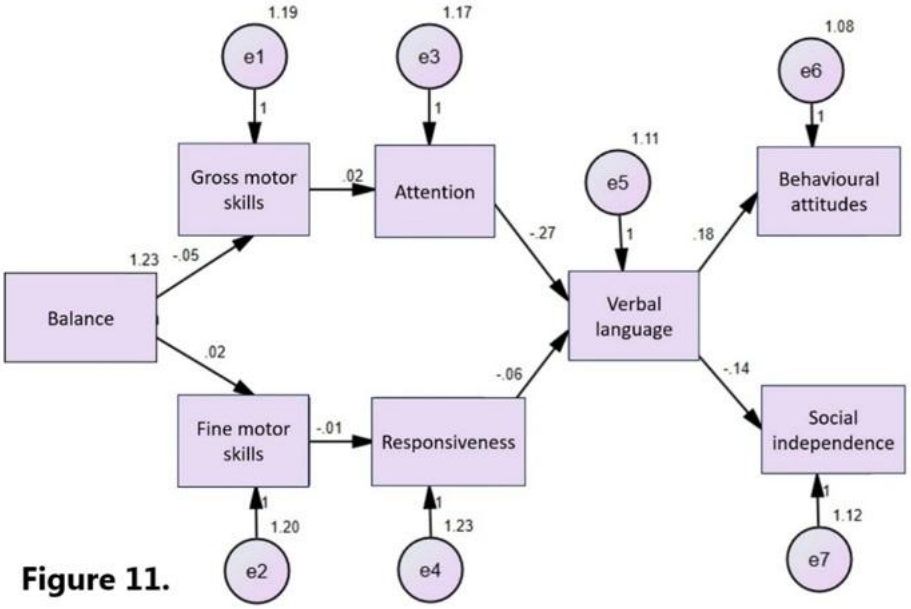


Figure 11.

Second Month Observation ADHD

Hypothesis: the effect of balance on gross motor, the effect of balance on fine motor, the effect of gross motor on attention, the effect of fine motor on responsiveness, the effect of attention on verbal language, and the effect of responsiveness on verbal language, all have an insignificant effect because there are still some tics from Tourette syndrome.

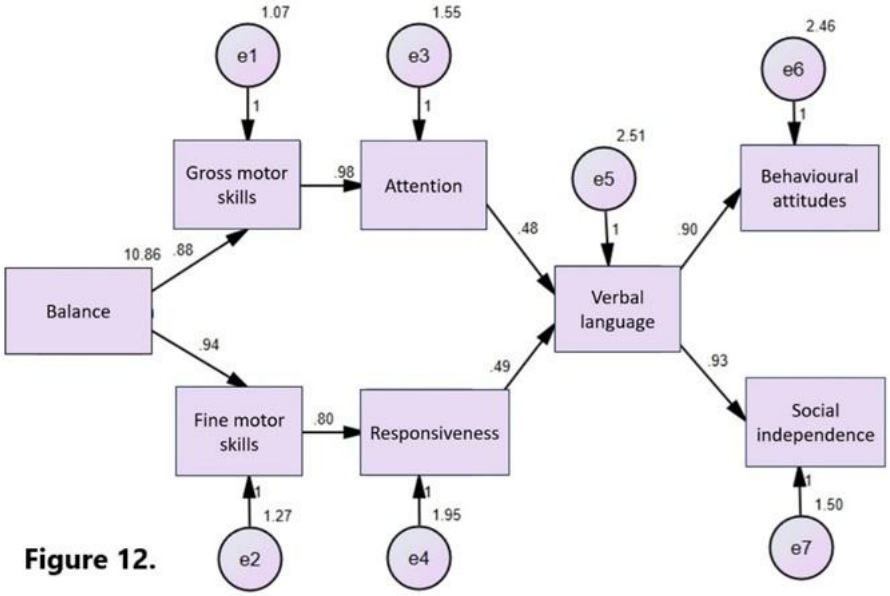


Figure 12.

Third Month Observation ADHD

Hypothesis: the effect of balance on gross motor, the effect of balance on fine motor, the effect of gross motor on attention, the effect of fine motor on responsiveness, the effect of attention on verbal language, the effect of responsiveness on verbal language, the effect of verbal language on behavioural attitudes, and the effect of verbal language on social independence all have a significant effect because Tourette syndrome can be eliminated.

Partial Test of ADD Child Group

Partial tests are used to partially test the hypothesis between the independent variable and the dependent variable. The results of the Partial Test with Path Analysis are summarised below:

	Initial ADD		ADD in the second month		ADD in the third month	
	Estimate	P	Estimate	P	Estimate	P
B --> GMS	-0,013	0,938	-0,028	0,686	0,937	0,000
B --> FMS	0,167	0,234	0,062	0,381	1,036	0,000
GMS --> A	-0,213	0,231	0,096	0,599	1,042	0,000
FMS --> R	0,143	0,460	0,063	0,732	1,001	0,000
A --> VL	-0,137	0,438	-0,124	0,483	0,394	0,049
R --> VL	-0,079	0,677	-0,128	0,450	0,436	0,022
VL --> BA	-0,111	0,495	0,035	0,831	1,086	0,000
VL --> SI	0,421	0,005	-0,182	0,272	1,128	0,000

Note: balance (B), gross motor skills (GMS), attention (A), fine motor skills (FMS), responsiveness (R), verbal language (VL), behavioural attitudes (BA), social independence (SI).

Tabel 2. *Regression Weights: (Group number 1 - Default model)*

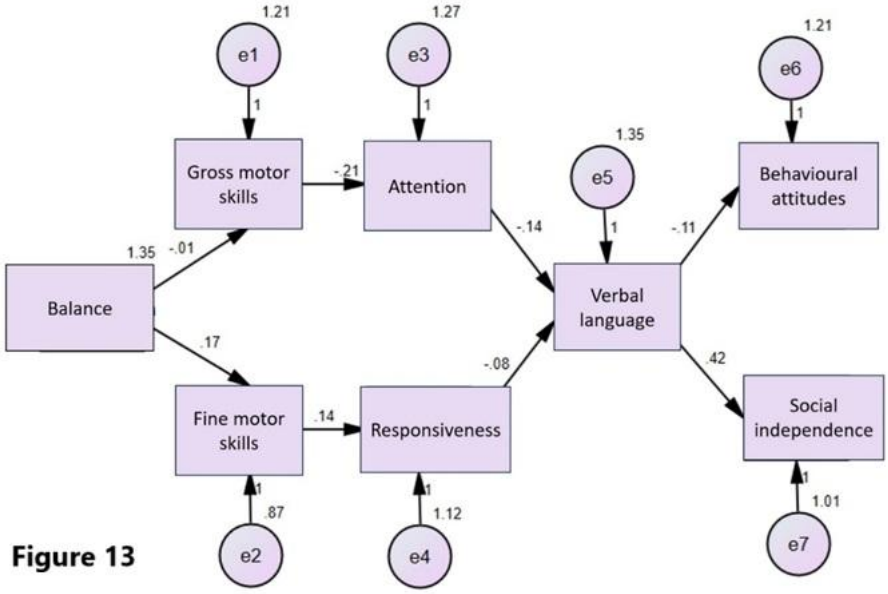


Figure 13

Initial Observation ADD

Hypothesis: the effect of balance on gross motor, the effect of balance on fine motor, the effect of gross motor on attention, the effect of fine motor on responsiveness, the effect of attention on verbal language, and the effect of responsiveness on verbal language, all have an insignificant effect because of the frequent occurrence of various tics from unintegrated primitive reflexes called Tourette syndrome.

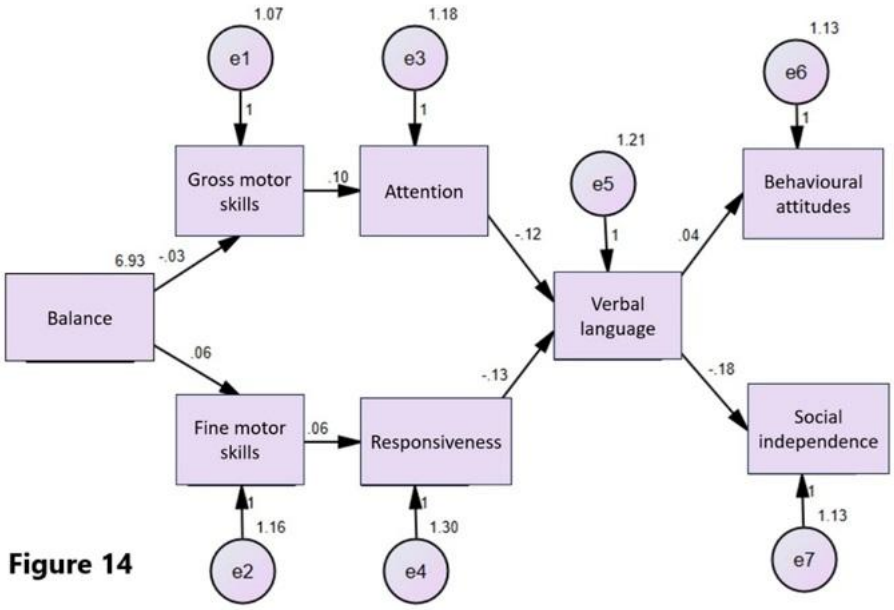


Figure 14

Second Month Observation ADD

Hypothesis: the effect of balance on gross motor, the effect of balance on fine motor, the effect of gross motor on attention, the effect of fine motor on responsiveness, the effect of attention on verbal language, and the effect of responsiveness on verbal language, all have an insignificant effect because there are still some tics from Tourette syndrome.

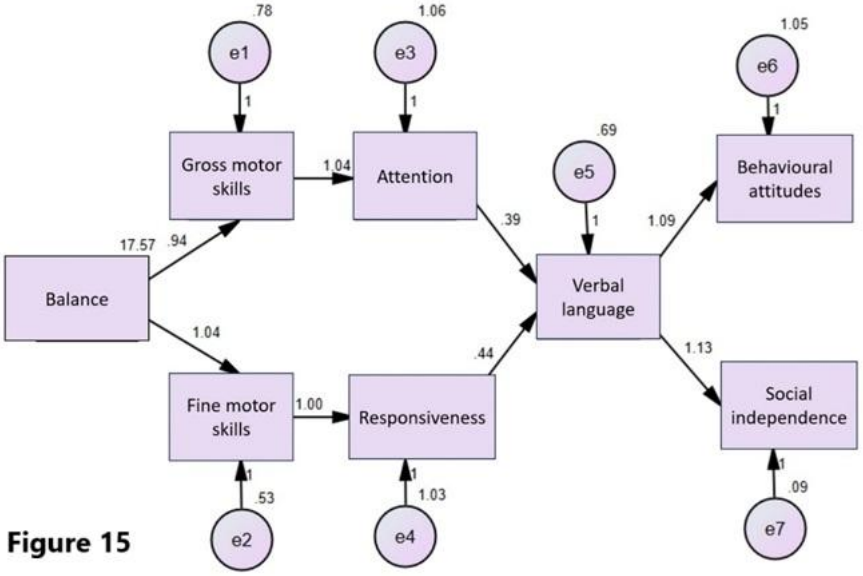


Figure 15

Third Month Observation ADD

Hypothesis: the effect of balance on gross motor, the effect of balance on fine motor, the effect of gross motor on attention, the effect of fine motor on responsiveness, the effect of attention on verbal language, the effect of responsiveness on verbal language, the effect of verbal language on behavioural attitudes and the effect of verbal language on social independence all have a significant effect because Tourette's syndrome has disappeared.

Discussion

Hypotheses: the effect of balance on gross motor, the effect of balance on fine motor, the effect of gross motor on attention, the effect of fine motor on responsiveness, the effect of attention on verbal language, and the effect of responsiveness on verbal language, all proved to have a significant effect.

PV2T is a stimulation of the vestibular system through head nodding and the closeness of the chin to the sternum when bowing is a stimulation of the swallowing reflex and the taste buds to move the vocal cords. The visceroseptic system (for the sense of inside) is stimulated by the dominant foot lock, and the tactile system (for the sense of outside) is stimulated by the dominant hand lock, so that there is harmony to form proprioseptic (for the sense of joints) which causes a sense of psychological awareness shown by elongated concentration, calm and improved attitudes and behaviour in the family. (Elizabeth O. Johnson, PhD, 2010)
Thus, it can be said that PV2T is an exercise on the neuropsychobehavioral system in the form of simultaneous stimulation of balance, STNR and ATNR combined to form proprioseptic, resulting in awareness, optimal eye focus and responsiveness to the social environment. (Bigelow & Agrawal, 2015).
Vestibular stimulation of the utriculus will improve **gross motor** integrating with all senses, sequentially according to the learning pyramid starting from; see, taste, hear, smell, and touch from the saculus which produces awareness for **attention** to instructions. **Fine motor** integrates with all senses in the reverse order of the learning pyramid starting from; touch, smell, hear, taste, and sight from the saculus which produces awareness for **responsiveness** to instructions (Van Hecke et al., 2021).
The stimulation of the vestibular part of the utriculus will optimise the motor reflexes of the visceroseptic to integrate with all the senses of the tactile part of the saculus from the combined **attention** and **response ability** will stimulate the mechanism of the oral motor and vocal cords, producing the sound of verbal language through the process of integration between the sucking reflex with the sense of smell, and the swallowing reflex with the sense of taste (Le Gall, Hilber, Chesneau, et al., 2019).
Vestibular stimulation of the utriculus and the saculus builds basic cognitive skills to be able to **verbalise a language** that understands introvertly or extrovertly to behave and respond actively or passively towards commands, as a whole as a form of **behavioural attitude** (Beltrão, N., Meira, C. M., Souza, L., Cunha, A., & Cattuzzo, M., 2012).
Vestibular stimulation of the utriculus and the saculus is able to **verbalise a language** for initiative in action as a form of **social independence** towards the need for defecation from the integration process between the sense of touch and the sphincter muscle reflexes of the colon, and urination from the integration process between the sense of touch and the sphincter muscle reflexes of the urinary tract (Rassafiani, M., Akbarfahimi, N., Hosseini, S. A., Shahshahani, S. O., Karimlou, M., & Tabatabai Ghomsheh, F., 2020). The stimulation of these two vestibularies creates alignments, including the sucking reflex to the sense of smell, the swallowing reflex to the sense of taste, resulting in conscious oral motor and concentration on moving the vocal cords for **verbal language**. The emergence of **attention**, **response**, and **verbal language** results in the ability to determine **attitudes** (introvert or extrovert) and also **behaviour** (active or passive) in the form of understanding, acceptance or rejection of an instruction. Furthermore, the alignment of the reflexes of the muscles of the defecation and urination tracts to the sense of touch lead to **the social independence** of always heading to the toilet before defecation or urination can occur in daily activities (Wiener-Vacher, Hamilton, & Wiener, 2013).

Conclusions and Suggestions

In conclusion, there is a positive effect of the PV2T exercise method on the cognition skills of early childhood children with dyspraxia within 3 months.
Early childhood children with dyspraxia, who are intervened with the PV2T exercise method intensively every day for 3 months and with adequate nutritional intake, will become calm and concentrated, proven to be able to communication, receive and reply to teacher instructions in the classroom optimally.

It is recommended to avoid randomised dietetic programmes (e.g. sugar, glutein and casein free diets), as well as long-term administration of sedatives and similar drugs, as they interfere with the correction of the child's cognitive skills.
With significant effects and considering time efficiency, schools can adopt PV2T exercises in inclusion programmes, especially in areas that are still unable to the reach of mainstream child development therapy facilities.

Research Limitations and Improvement Plans
This study experienced a series of limitations, such as the nature of measurement, sample size, co-teachers and classmates, cultural and potentially large numbers of family members at home.
Firstly, the instrument used to measure children's cognition skills reported by parents at home was the companion teacher at school on children's executive function.
Secondly, there is the confounding factor of household members during the three-month school holiday program in establishing a causal relationship between the variables.
Thirdly, as our sample size is limited, the effect of size and statistical power may be lower than expected from a larger sample.
Future research could investigate the influence of family size, parents with low education, and the number of friends in the neighbourhood. This research direction will have an important impact on designing a completely new educational and social inclusion program for preschool children based on empirical, narrative, theoretical, philosophical and professional evidence.

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