

Sensory Integration and Functional Movement: A Guide to Optimal Development in Early Childhood

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Abstract: Sensory integration is a process that occurs naturally and becomes parts of the brain. In this process, information from all the senses will be managed then given meaning and then filtered whether it was important or were ignored. This process allowed individuals to behave according to experience and was the basis for academic abilities and subsequent social behavior. Apart from the five individual senses, namely the eyes, nose, tongue, ears, and skin, from birth humans are equipped with close senses in charge of receiving stimuli that come from the body. There are 3 senses that are closest to the child, tactile, vestibular, proprioceptive. These three senses are fundamental to be the basis for the development of a healthy child. When these senses function automatically and efficiently, a child will have eyes and ears and good attention to the world around him. Sensory integration stimulation becomes very important for the optimization of child development especially in early childhood.

Keywords: *sensory integration, early childhood, optimal development*

Introduction

In this modern era, seeing children can move on their own without coercion is important. Children awareness of motion is influenced by the child's brain in receiving and processing sensory information that is commonly called sensory integration. Sensory integration is produced by occupational therapists to cope with sensory disturbance or dysfunction. Through assessment, sensory integration can be used as an alternative test in measuring the relevance of children who has symptoms of language disorders as a form of dysfunction. Some cases of dysfunction, for example, children with a diagnosis of attention disorder or wrong focus on certain objects, hyperactive symptoms, autism developmental disorders, autism spectrum disorders and learning disabilities. With the application of sensory integration assessments, it can be handled with motion problems, attention disturbances and focus on certain objects that can be assessed and can be found that the children developmental motion.

An effort to find out the development of children's movements can be seen through functional movement screening. Functional movement screening is one of the techniques for referencing the mapping development of children's movements. To do the screening required several instrument tests that have been carried out for adults. As previously investigated by Gray Cook (2010) states that the test instrument of functional movement screening (FMS) can be used as one technique to determine the natural movements of adults. In Indonesia, there has been no research on the manufacture of test instruments based on Indonesian children. Through functional movement screening (FMS) and analysis of sensory integration tests children can find out the development of motor movements in the future and prevent the development of children's learning disorders.

An understanding of sensory integration can be used as a means to develop the ways of assessing sensory difficulties with new brain imaging techniques. Difficulties in sensory integration are known as sensory processing disorders in several senses including proprioception, vestibular and interoception. Through research, it is expected to be able to find out which organs and joints are inside the small sensory

receptors that tell our brains about body parts . Secondly, through understanding sensory integration, it can be used as a way to find out the receptors in the canals of our ears to take up positions of movement and send information to our brains. So we know if we are moving forward our brain uses this information to plan movements and help us maintain balance. Finally, through a collaborative assessment of fundamental movement screening and sensory integration can be seen how our bodies tell us, when we are hungry or full, when our hearts beat fast or when we feel the butterfly sensation.

Based on this background, there are at least some considerations in the preparation of research papers, as follows: First, there are symptoms of learning development disorders that are influenced by the difficulty of children sensory processing. Second, there are difficulties in accessing information to the brain from receptors. Third, motor movements as a basis for children's learning processes. Fourth, to determine the barriers to the child's physical motor development. Fifth, to find out early the barriers to motor physical development. Sixth, Functional basic movements of children carried out daily. From the consideration of the research, the research question of this research is "How do you collaborate sensory integration with functional movement screening in knowing the learning development of children?"

Theoretical Study

Sensory Integration

Sensory integration is the process of recognizing, changing and differentiating sensations from the sensory system to produce a response in the form of adaptive behavior. According to Mumpuniarti (2015), stating that sensory integration is the process of organizing, or interconnecting sensory systems to function correctively, the brain can accurately interpret information. The concept of sensory integration results from occupational therapist experts and is developed primarily in the occupational therapy profession, where the theory of sensory integration and its application provides a set of important knowledge and skills for practitioners around the world.

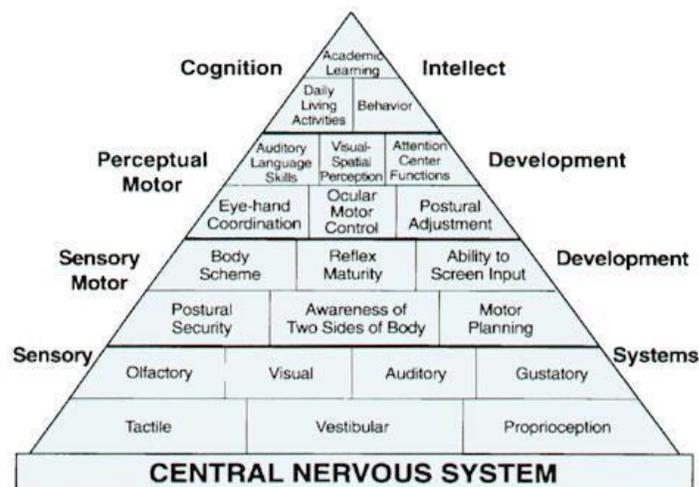


Figure 1. Sensory Integration Development Williams and Shellenberger (1996)

Sensory integration theory comes from A.Jean Ayres, first described as a concept that requires a lot of imagination about unexpected phenomena. Sensory integration is also one of the first occupational therapies produced to provide evidence of the validation of the motoric disorder construction while

providing direction for strategies that doctors use to correct fundamental sensory problems that affect performance. Sensory integration is about how our brain receives and processes sensory information so we can do the things we need to do in our daily lives.

According to Jean Ayres (1972) sensory integration is defined as a neurological process that regulates the body's sensation and from the environment and makes it possible to use the body effectively with the environment. Most people experience the development of sensory integration when they are young. This is considered as one of the normal developments in the things we do such as; roll over, crawl, walk and play; for others sensory integration is poorly developed. Therefore, through sensory integration and its relation to the problem of child movement shows a significant influence. One of the efforts made is to develop a way to assess the difficulties of child movement by understanding the sensory integration of children.

Difficulties in sensory integration are known as sensory processing disorders in several senses. In this case, sensory integration is interested in all 5 senses, namely the sense of seeing, hearing, feeling, smelling and feeling the touch and 3 other things namely proprioception, vestibular and interception. While other forms of sensory integration include;

Visual

Vision as a main milestone of the children motor development and put a major role in all development domains. Vision interprets color, light, movement, location, body language, facial expressions and the possibility of danger in front of him. The visual system consists of a 9-eye ocular system and eye muscles connected to a perceptual system to the brain). This system is experienced by children aged 0-10 months.



Figure 2. Visual

Auditory



Figure 3. Auditory

Auditory is the process of sound entry into the external ear and walking into the canal, and vibrate the eardrum. The vibrations are transformed into chain reactions that are transmitted to the inner ear such as cochlea, semicircular, canal and auditory nerve to bring sound vibrations to the brain. Children aged 7-10 months react to invisible sound. While children aged 11-15 months begin to hear related to object and are happy with certain sounds and try to imitate. words that will result in reactions of various kinds of shock, distrust, rejection or anger, sadness and confusion. Various kinds of thoughts and reactions from parents when their child is

decided as a person with hearing impairment, the future of the child and educational contribution is to deal with stress from family and family members that must be overcome.

Gustatory

Gustatory system is a sensory system that refers to a sense of taste. According to Cincinati (2017) the gustatory system is more refer to taste word or sensory oral system or taste system. Symptoms of sensitivity include; sensitive when brushing teeth (hypersensitive), sensitive to certain foods



Figure 4. Gustatory

(hypersensitive), chewing on foods and exploring textures such as chewing pencils, clothes, often drooling and loving or having a strong fear of going to the dentist.

Olfactory System

System olfactory is closely related to the sense of smell that automatically runs when doing daily activities. For example, when we eat, then we will smell something first. If it smells good, we tend to try. If it smells bad, it will send a warning that we might not like it or it is dangerous for us to eat. The odor journey is through chemical receptors with direct neuronal connections to the limbic system (responsible for emotional memory). That is why our emotions are bound by the smell of food. Suggested activities include play dough, finger paint or sensory dough, use scented markers or stickers, make smelly bottles with various seasonings or items to introduce new scents, use scented chewing objects, avoid scented soap, lotions, perfumes and oils.



Figure 5. Olfactory

Table 1. Material from Sensory Integration and Child Copying

Auditory	----->			Dialog and Language
Vestibular (gravity and movement)	Vestibular (gravity and movement) For example posture, eye movements, balance, muscle tone, gravity security	Body percept Coordination of two side of the body, motor planning, activity span, emotional stability	Eye hand coordination → between hand and eye	
Proprioceptive (muscles and joints)	Sucking Eating	Activity level Attention span Emotional stability	Visual perception Purposeful activity	<ul style="list-style-type: none"> • The ability to concentrate, organizational ability • Self esteem • Self control • Confident academic learning ability specialties on each side of the body and brain
Tactile (touch)				
Visual (seeing)				

Proprioception

It is our organs and joints have small sensory receptors that tell our brains where our body parts are. The task of the sensory system is to receive information about the position of the body through muscles, ligaments, joints; healthy feeling and balance (Blythe, 2017). For example, when someone puts a spoon in his mouth, he doesn't need to look at the spoon to see where the spoon is. The brain will use this information to plan movements so that it can coordinate our bodies.



Figure 6. Proprioception

Vestibular

Vestibular is the sensory organ in the ear, has a small channel that contains fluid, where it moves every time we move our heads. The vestibular system is in charge of providing information about movements, gravity and balance received through the inner ear. So, these receptors are useful so that our brain uses this information to plan movements and help us maintain balance (Blythe, 2017). Interception, which is a fairly new area to be discussed in sensory integration. Interoception is how our body tells us, when we are hungry or full, when our heart beats fast or when we feel the sensation of a butterfly. A description of the sensory integration of system perception, vestibular and tactile can be seen in Table 1.



Figure 7. Vestibular

Based on Table 1, it shows that the process of motion or mobility that is a sensory process to provide body posture adjustment. While stability is a sensory process that aims to maintain a measurable balance and continue the sensory process in the sense of sight, hearing and touch. Then vestibular (gravity and movement) such as posture, eye movements, balance, muscle tone, gravity security.

Furthermore Proprioceptive shows the level of activity, attention and emotional stability that is influenced by some of the child's sensory abilities. The ability to concentrate, organizational ability, self-esteem, self-control, self-confidence, academic learning ability, specialization of each side of the body and brain.

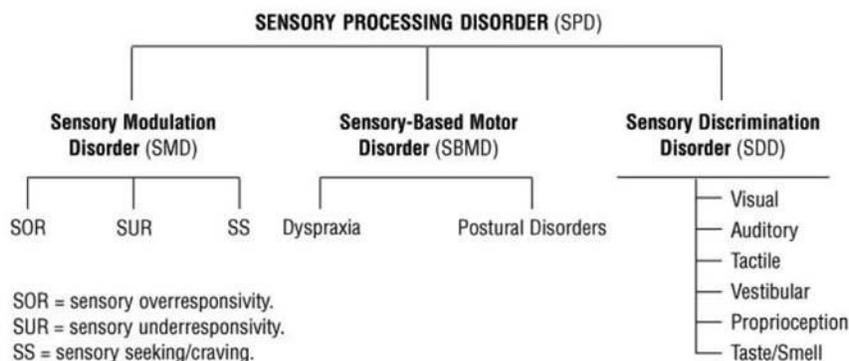


Figure 8. Sensory Processing Disorder

In addition to know of the seven sensory systems as sensory integration, there are several sensory processing dysfunctions or obstacles (sensory dysfunction). Perception and sensory processing dysfunction as well as interactions and neurological functions produce various limitations of functional behavior. The purpose of Sherlock's research is to determine the effectiveness of sensory integration

programs in children with autism. a way is to do sensory integration therapy effectively in caring the autism children because it helps children to become more independent and participate in daily activities (Blythe, 2017).

Tactile System

The tactile system is the largest sensory system formed by receptors in the skin that sends information to the brain on the stimulation of light, touch, pain, temperature, and pressure. Waiman et.al., (2011), states that the tactile system consists of two components, namely protective and discriminatory that work together in performing daily tasks and functions. Hypersensitivity to stimulation. Tactile, known as tactile defensiveness, can cause misperception of touch, in the form of a response to withdraw when touched, avoid groups of people, refuse to eat certain foods or wear certain clothes, and use the tips of fingers to hold certain objects.



Figure 9. Tactile

Sensory integration is widely used as a framework for understanding children's behavior and for guiding assessments and interventions with children who demonstrate functional challenges based on sensory processing disorders by providing controlled interactions with a rich sensory environment, therapists help children improve their ability to process and use sensory input successfully in children's activities. This is because many children with sensory processing disorders (including motor planning deficits, poor attention and difficulties in emotional and behavioral regulation) consisting of language and speech and language skills may encounter children who receive sensory integration services (May-Benson & Koomar, 2010). As such, it is important for practitioners to understand the key principles and components of sensory integration (see Tables 2).

Table 2. Sensory Integration Activity Elements

Core Element	Descriptions of Attitudes and Behaviors in Sensory Integration Activities
Giving Sensory Stimulation	Giving opportunities for children to experience a variety of sensory experiences, which includes tactile, vestibular, and/or proprioceptive; the activities provided involve more than one sensory modality.
Giving the right challenges	Giving challenging activities, not too difficult or too easy, to evoke's children's adaptive response to sensory and praxis challenges.
Cooperation determines the choice of activities	Invite children to play an active role in the process of play activities, giving opportunities for children to control the activities, do not set schedule and plan activities without involving children.
Guiding independent organizations	Support and guide children to organize behavior independently, choose and plan behaviors that suit the child's abilities, invite children to take the initiative, develop ideas, and plan activities.
Support optimal stimulation	Guarantee a good environment to achieve or maintain optimal stimulation, by changing the environment or activities to attract children's attention, engagement and comfort.
Create a play context	Creating games that build children's intrinsic motivation

Core Element	Descriptions of Attitudes and Behaviors in Sensory Integration Activities
Maximizing children's success	and enjoyment of activities; facilitate or develop object, social, motor and imaginative games. Give or modify activities so that children can succeed in some or all activities, which produces responses to these challenges.
Guarantee the physical security	Ensuring the child is physically safe, using safe equipment or always accompanied them during play activities
Arrange room for children interaction	Organize equipment and space so that it can motivate children to choose and be involved in activities.
Facilitating children's togetherness	Respect children's emotions, give a positive outlook for children, establish relationships with children, and create a climate of trust and emotional security.

Functional Movement Screening (FMS)

Functional Movement Screening (FMS) is designed to identify the difficulty of children's movements that affect learning development. FMS is structured as an alternative strategy to overcome functional movement and asymmetry deficits that may be predictive of general conditions and musculoskeletal injuries, with the ultimate goal of being able to modify the movement deficits identified by individual exercise prescriptions (Chorba, et.al, 2010). As an indication of the development of motion assessment for children's check lists is through the process of optimization the function of the muscles and nerves of human muscles. The six advantages of functional movement skills relate to motion assessment tools, among others; (1) regarding the output program; (2) the motion product is better than the motion process; (3) movement skills rather than motor skills; (4) dynamic system approach; (5) non-standard tests; (6) is the application of technology in the assessment of motor skills in the future.

Functional Movement Screening consists of mobility (human tendency), stability (balance) and proprioception (awareness of motion). Mobility is range of motion. Stability is related to the joints in the ankles. Proprioception is an awareness of human motion that directly responds to motion. One of the mainstay studies of Helen Little and Naomi Sweller (2015) states that motor competence and physical activity are established for many years in early childhood. Early childhood education settings are an important context for children's involvement in physically active games. The results of research from Hellen and Naomi showed that the characteristics of the external environment and the inner environment have more influence on the external environment or nature in the formation of physical activity and give freedom to young children to play, learn to understand the environment and adapt to their environment.

One recent piece of evidence shows that young children seem to have enough opportunities to do physical activity on weekends. More than 40 percent of Australian children do not meet the recommended daily physical activity requirements on weekdays (Okeley, et.al, 2009). Therefore early childhood services provide an important context for supporting children's health and physical well-being.

Some of the general benefits of applying functional movement screening instruments include; (1) Identifying individuals at risk, who seek to maintain or increase their level of activity. (2) Assist in program design by systematically using corrective exercises to normalize or improve patterns of fundamental movements. (3) Provide a systematic tool to monitor the development and development of movement patterns with changes in injury status or fitness level. (4) Creating a baseline of functional movements, which will allow ranking and ranking movements for statistical observations. The authors of

this clinical commentary suggest that screening and analysis of fundamental movements should be included in pre-season screening and returned to sports testing to determine. (5) increase the ability to make certain essential movements.

From the seven functional movement screening test instruments, there were 3 FMS assessments that can be collaborated with sensory integration. First, active straight leg raise. Second, Trunk stability, push-ups and third, rotary stability. Active straight shows the ability to be able to move flexibly, while trunk stability and rotary stability try to obtain a balance of motion through a sensory integration process.

Conclusion

Every child born must have different characteristics. When children experience sensory processing disorders indicate a problem of learning development. Through the analysis of sensory integration theory collaborated with fundamental movement screening instrument assessment becomes one of the strategies to prevent sensory processing difficulties and children's learning development. If in previous studies the difficulty of child movement affects the learning development of children in the classroom and learning space, then in this study focuses on the difficulty of processing information from receptors in the child's ear into the brain that experiences obstacles. So through collaboration between FMS and Sensory Integration, communication and interaction between the body's organs and the child's nervous system can be connected because of training in processing with the child's basic motion activities.

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