# Enhancing Academic Performance through Physical Activity

*What is the vestibular system?*

The vestibular system is located in the inner ear and consists of semicircular canals and otoliths. It is responsible for maintaining balance, coordinating movement and understanding the body' s spatial orientation. In other words, it tells our brain where the body is in space, whether we are standing upright, tilting our head, spinning or moving quickly.

*What is the proprioceptive system?*

The proprioceptive system starts with sensory receptors located in the muscles, tendons and joints, which send signals to the spinal cord then the brain. It is responsible for providing information about the body' s position and movement by sensing muscle length, joint angle and force. By integrating proprioception with different senses, it enables our brain to know where our body parts are without looking, to perform motor tasks using hand-eye

coordination and determine the amount of pressure needed to manipulate objects.

*What are the benefits of developing the vestibular and proprioceptive system?*

1. Improved balance and coordination: Development of both systems can improve a child's ability to maintain balance, adapt to changes in position and perform coordinated movements.
2. Better body awareness: Increased body awareness through the proprioceptive system allows for more precise control of a child's movements. This can reduce clumsiness, running into people or objects, and frequently dropping things on the floor.
3. Enhanced motor skills: These systems support the refinement of motor skills, including gross motor skills, fine motor skills, hand eye coordination and left right coordination. These skills are important for a

child' s handwriting and for daily activities such as self-feeding, self-dressing, walking up stairs and riding a bike (1).

4. Eye movement control: Reading fluency is strongly related to vestibular processing. Reading requires precise control of eye movements and needs to be combined with vestibular input to stabilise the vision during head movements (2). Spatial organisation and directional concepts (such as reading from left to right) required in reading are also assisted by the vestibular system.
5. Improved attention and focus: The vestibular and proprioceptive systems help maintain appropriate muscle tone throughout the body which affects posture and the ability to stay in positions such as sitting at a desk for a long period of time. A well-developed system reduces fidgeting and constant movement that appear as inattention (3).

*Activities to boost the vestibular system*

1. Rope jumping

Lie a rope straight on the ground. Ask the child to jump forwards and backwards, from left to right, across the rope.

2. Sushi Roll

Ask the child to lie on a mat or ground with arms extended above their head. They can start rolling in any direction they wish.

3. Crawling through the tunnel

Use household objects such as blankets and cardboard boxes to create a narrow tunnel or use a play tunnel. Ask the child to crawl back and forth inside the tunnel.

*Activities to boost the proprioception system*

1. Standing on one leg

Ask the child to hold their arms above their waist, raise one thigh upwards and forwards, creating a 90-degree angle with the leg. Stand in this position for as long as possible unaided.

2. Sitting or lying on a yoga ball

Ask the child to sit or lie on their tummy on top of the yoga ball. The adult can stand in front to assist them in staying balanced on top of the yoga ball.

*Activities to boost concentration and focus*

1. Catching bean bags with a basket.

Ask the child to hold a basket and throw bean bags or soft balls towards the child. Ask the child to catch them with the basket.

2. Dodging the ball

Ask the child to stand in front of a wall and prepare a few soft balls and aim it at the child. Ask the child to dodge away from the ball, they also need to avoid the ball when it bounces off the wall. If the child can dodge all the balls, they win the game!

*Other benefits of physical activities*

Performing outdoor physical activities enable the body to produce vitamin D3 under the sun, which is the active form of vitamin D. Regular moderate physical activity also improves bone health, improves cardiopulmonary health, reduces body fat and improves blood sugar control (4). It has also been shown to reduce the risk of chronic diseases during adulthood such as hypertension, type 2 diabetes and obesity (5). In terms of psychological health, physical activity can lower

stress hormones such as cortisol and adrenaline. After physical activity, there is an increase in the production of endorphins, dopamine and serotonin which are the body' s natural mood stabilizers to lower stress, reduce anxiety and promote better sleep (6, 7). The improved psychological wellbeing of a child enhances their overall self-confidence, positive thinking and mental clarity for better learning.

Note: Pictures were designed with AI app Poe

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