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From Screens To Senses: The Impact Of Smartphone Overuse On Proprioception

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I. Introduction

Smartphones are incredibly popular, and rightfully so. From weather reports to our favourite movies, almost everything is accessible at the tips of our fingers. While smartphones undoubtedly make our fast-paced lives more convenient, there is a grimmer side to their overuse. As Theodore Levitt once said, "Too much of anything is poison." Excessive smartphone use has been associated with psychological effects such as poor memory, reduced concentration, and impaired decision-making. Many individuals also experience common consequences such as sleep disturbances and procrastination.

Proprioception can be defined as the awareness of the mechanical and spatial state of the body and its musculoskeletal parts. In simple terms, it is the awareness of our body and its position in space. This differs from kinesthesia, which refers specifically to the sense of movement. We unconsciously rely on proprioception in everyday activities, such as walking without constantly looking at the ground or navigating through a dark room using memory and bodily sensations.

Impairment of this "sixth sense" can be inconvenient and, in severe cases, dangerous. Reduced proprioception may lead to difficulty maintaining balance, particularly when visual input is limited. Individuals may experience poor coordination or postural instability, increasing the risk of falls, even among young adults. Proprioceptive impairment may also affect physical performance, making it difficult to learn or refine motor skills.

This article is a narrative review exploring current literature and proposed mechanisms linking smartphone overuse with proprioceptive function.

II. Understanding Proprioception

Proprioception, often referred to as the sixth sense, operates subtly yet continuously in daily life. Unlike vision or hearing, it functions largely outside conscious awareness. Without proprioception, even simple tasks such as pulling a shirt over one's head would be challenging.

Proprioceptive information is detected by mechanosensory neurons known as proprioceptors, distributed throughout the body. These receptors are primarily located in muscle spindles and Golgi tendon organs. They detect muscle length, tension, and joint position, allowing for smooth movement and appropriate posture.

Secondary neurons in the spinal cord play an important role in refining movement and transmitting signals through ascending projection pathways. These pathways relay proprioceptive information to higher centres such as the cerebellum and the external cuneate nucleus of the medulla. Signals reaching the cerebellum contribute to subconscious proprioception, while those transmitted to the somatosensory cortex allow conscious awareness of body position.

Together, these systems help maintain balance, posture, and coordinated movement throughout life.

III. Patterns Of Smartphone Overuse

In today's world, smartphone ownership is nearly universal. Global smartphone subscriptions have been estimated at approximately 2.6 billion. Counterpoint Research (2016) reported that smartphone shipments in India grew annually at 23%, exceeding global growth rates. India surpassed 220 million smartphone users, with nearly 80% under the age of 25. [5][6][7][8]

This trend reflects rising income levels and fast-paced lifestyles, particularly among younger individuals who rely on smartphones as gateways to social and digital interaction. While smartphones have enhanced communication and access to information, certain patterns of overuse may be harmful.

Smartphone use often involves prolonged downward gaze toward the screen, accompanied by repetitive thumb movements. This posture results in forward neck flexion and static muscle loading. Over time,

maintaining such positions may contribute to neck pain and discomfort in the upper extremities.

Additionally, smartphone use exposes individuals to predominantly visual stimuli, encouraging reliance on visual cues for orientation while underutilising proprioceptive input. Prolonged dependence on visual information may disrupt balanced sensory integration. [11][12]

IV. Potential Mechanisms Linking Smartphone Use And Proprioception

Postural Changes and Neck Proprioception

Studies show that prolonged smartphone use contributes to fatigue of the neck and shoulder muscles, particularly the cervical erector spinae and upper trapezius. Symptoms worsen with increased duration of use. Individuals often adopt a "forward head posture" to view screens positioned below eye level. [13]

Another commonly observed posture is "text neck," referring to sustained neck flexion during device use. This posture has been associated with neck pain, upper back pain, increased spinal curvature, and chronic headaches. [14]

Cervical muscle fatigue has been linked to impaired cervical proprioception and reduced postural stability, ultimately affecting balance and righting reactions. [15]

Reduced Sensory Diversity (Visual Dominance)

Reduced sensory diversity, or visual dominance, occurs when the brain relies excessively on visual input while underutilising other sensory systems. Under normal conditions, posture and movement depend on integration of visual, proprioceptive, and vestibular inputs. Prolonged visual dominance may weaken this balance.

During extended smartphone use, individuals remain largely motionless, with minimal movement beyond the hands. This reduces proprioceptive input from the neck, trunk, and limbs, encouraging greater reliance on visual information.

Over time, this imbalance may result in difficulty maintaining balance when visual input is removed, such as when standing with eyes closed.

Repetitive Fine Motor Use and Hand Proprioception

Smartphone use involves repetitive fine motor movements of the thumbs and fingers, often performed for prolonged periods without rest. This leads to continuous activation of intrinsic hand muscles, tendons, and joints.

Hand proprioception refers to the ability to sense finger position, movement, and applied force. With prolonged smartphone use, muscle fatigue may reduce the sensitivity of proprioceptive receptors, resulting in less accurate sensory feedback. Consequently, the brain receives noisier signals, impairing fine motor control.

Over time, this may contribute to reduced grip stability, decreased motor precision, and increased risk of repetitive strain injuries. [20][21][22]

Sedentary Behavior and Sensorimotor Deconditioning

Sedentary behaviour commonly accompanies prolonged smartphone use. Sensorimotor deconditioning refers to the gradual decline in sensory and motor function due to underuse.

Reduced movement decreases sensory input from muscles and joints, leading to weaker proprioceptive signals. Combined with increased reliance on visual input, this further impairs sensory integration. Prolonged underuse of proprioceptive receptors may result in functional consequences such as poor balance and coordination. [26][27]

Clinical and Educational Implications

Smartphone overuse is a modifiable risk factor that should be recognised in clinical practice. Excessive use has been associated with impaired balance, reduced proprioception, hand fatigue, coordination difficulties, neck pain, and headaches. Early identification allows for preventive, cause-based management rather than symptom-focused treatment.

Students are particularly vulnerable, as prolonged digital device use is common during studying. While access to information is beneficial, extended use of touch-screen devices may contribute to sensorimotor underuse.

Sensorimotor deconditioning may indirectly affect attention, motor coordination, participation in physical activity, and overall well-being. Addressing smartphone overuse therefore supports both physical health and academic performance.

Preventive Strategies and Future Directions

Preventive strategies begin with awareness of unhealthy usage patterns. Taking regular breaks, changing posture, and standing periodically can help maintain muscle activity and sensory input.

Poor posture during smartphone use increases muscle fatigue. Holding devices at eye level, avoiding excessive neck flexion, and using both hands may reduce strain.

Long-term effects of smartphone overuse on proprioception remain unclear. Future research should focus on direct measures of proprioception, balance, and motor control rather than relying solely on self-reported screen time. Given widespread use among children and students, future studies should also explore developmental effects and school-based interventions.

V. Conclusion

Smartphone overuse has been associated with impaired proprioception, increased reliance on visual stimuli, and muscle fatigue in the neck and upper extremities. These habits should be addressed early to prevent symptom progression.

Regular screen breaks, posture changes, and reduced sedentary behaviour may help mitigate musculoskeletal discomfort and sensorimotor decline. For healthcare professionals, this knowledge supports a shift toward preventive care. Students and young adults should be encouraged to remain mindful of their smartphone use and overall activity levels.

Author Reflection

I come from a very superstitious country, where minor illnesses are often blamed on smartphone use. Although I initially dismissed this belief, I noticed that my brother, when absorbed in his phone, would not even hear us calling him from the same room.

Exploring the effects of smartphone overuse revealed a niche topic with limited narrative reviews. This motivated me to write my own and examine the relationship between technology use and sensorimotor health.

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