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Concept: SA; Design: SR; Data Collection: SA;
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Prevalence of Text Neck Posture and Its Association with Smartphone Addiction Among Physical Therapy Students: A Cross-Sectional Study

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ABSTRACT

Background: Excessive smartphone use among university students has become a growing public health concern, particularly due to its musculoskeletal implications. Prolonged forward head flexion while using handheld devices contributes to text neck posture (TNP), a repetitive strain injury involving excessive cervical flexion and associated pain. Concurrently, smartphone addiction—a behavioral dependency characterized by compulsive device use and withdrawal symptoms—has been recognized as a potential risk factor for postural dysfunction and neck disorders. ***Objective***: To determine the prevalence of text neck posture and its association with smartphone addiction among Doctor of Physical Therapy (DPT) students in Karachi, Pakistan. ***Methods***: This cross-sectional study included 385 DPT students aged 17–25 years from six institutions in Karachi, recruited through convenience sampling. Participants completed a self-perception diagram-based assessment of neck posture during smartphone use and the Smartphone Addiction Scale–Short Version (SAS-SV). Data were analyzed using SPSS version 30.1. Chi-square tests and correlation analyses were performed to assess associations between smartphone addiction scores and TNP, with significance set at $p < 0.05$. ***Results***: The prevalence of TNP was 66.49%, and 86.5% of participants met the criteria for smartphone addiction. A significant positive correlation was observed between overall smartphone addiction level and TNP ($r = 0.319$, $p < 0.001$). Females exhibited a higher prevalence of TNP (67.8%) compared to males (60.3%), though this difference was not statistically significant ($p = 0.256$). The strongest associations were found between "Neglect of Other Activities" and "Withdrawal" domains of smartphone addiction and poor posture. ***Conclusion***: The study demonstrated a significant association between excessive smartphone use and text neck posture among DPT students, supporting a dose–response pattern between addiction severity and postural deviation. Preventive strategies emphasizing ergonomic awareness, reduced screen time, and posture correction are recommended within physiotherapy education.

Keywords

Text neck posture, Smartphone addiction, Musculoskeletal disorders, Posture, Physiotherapy students

INTRODUCTION

In recent years, smartphones have become indispensable tools in academic and social domains, transforming the way university students communicate, learn, and engage with the digital environment (1). Their multifunctional capabilities—ranging from educational applications and online collaboration to entertainment and social networking—have led to an exponential increase in daily usage time (2). However, this digital dependency has raised concerns regarding the emergence of musculoskeletal disorders, particularly those associated with poor cervical posture during smartphone use (3).

The phenomenon known as Text Neck Posture (TNP) refers to sustained cervical flexion during handheld device interaction, which imposes abnormal mechanical loads on the cervical vertebrae and paraspinal musculature (4). Each incremental degree of neck flexion amplifies gravitational stress on the cervical spine; for instance, a 60° tilt approximates an additional 60 pounds of load (5). Chronic adoption of such posture leads to structural strain, muscle fatigue, and potential degenerative changes such as disc herniation and spondylosis (6). Among university students, this condition is increasingly prevalent, with the neck cited as the most common site of musculoskeletal discomfort (7).

Parallel to the biomechanical effects of smartphone overuse, smartphone addiction—a form of behavioral dependency characterized by compulsive checking, loss of control, and withdrawal symptoms—has gained recognition as a modern psychosocial concern (8). Empirical studies have linked smartphone addiction with disrupted sleep patterns, anxiety, and decreased academic productivity, as well as somatic manifestations including neck and shoulder pain (9,10). Despite these findings, limited research has concurrently examined the relationship between the severity of smartphone addiction and self-perceived text neck posture within physically trained populations such as physiotherapy students, who are expected to possess superior ergonomic awareness (11).

The existing literature underscores a paradox: while health science students are educated about posture correction, they remain vulnerable to technology-driven musculoskeletal disorders (12). The physical demands of prolonged digital engagement in learning environments, coupled with social media dependence, suggest a multifactorial etiology involving behavioral, psychological, and biomechanical components (13). Previous

investigations have reported cervical mobility reductions among frequent smartphone users, yet few have quantified this association through validated addiction scales (14,15).

Therefore, this study was designed to determine the prevalence of text neck posture and its association with smartphone addiction among Doctor of Physical Therapy (DPT) students. The objective was to explore whether higher smartphone addiction scores, as measured by the Smartphone Addiction Scale–Short Version (SAS-SV), correlate with greater self-reported cervical flexion angles indicative of TNP. By addressing this gap, the research aims to contribute to preventive ergonomics and behavioral modification strategies within the physiotherapy education context.

Research Hypothesis: It was hypothesized that increased smartphone addiction levels would be significantly associated with a higher prevalence of text neck posture among DPT students.

MATERIAL AND METHODS

Smartphones have become integral to university students' academic and social routines, supporting information access, collaboration, and entertainment but also introducing behavioral and physical health concerns (1,2). Beyond heavy use, smartphone addiction—characterized by compulsive checking, impaired control, and withdrawal—has been documented among health sciences students and linked to musculoskeletal symptoms of the neck and upper limb (3). Emerging observational evidence associates intensive smartphone use with neck pain, restricted cervical mobility, and functional limitations, suggesting a plausible exposure–response relationship between device dependence and cervical spine stress (4,5).

Text neck posture (TNP) describes sustained cervical flexion during handheld device use and is increasingly observed in adolescents and young adults (6,7). In biomechanical terms, greater flexion angles substantially increase gravitational load on the cervical spine, amplifying strain on intervertebral structures and posterior cervical musculature, which may contribute to pain, myofascial dysfunction, and degenerative change over time (8,10).

Reports from university cohorts show high burdens of neck pain and related symptoms among frequent smartphone users, underscoring a clinically relevant target for prevention (11,12). At the same time, addiction-like patterns of smartphone use have been associated with reduced cognitive control and persistent checking behaviors that could prolong flexed-neck exposure during study and leisure, compounding biomechanical risk (13–15).
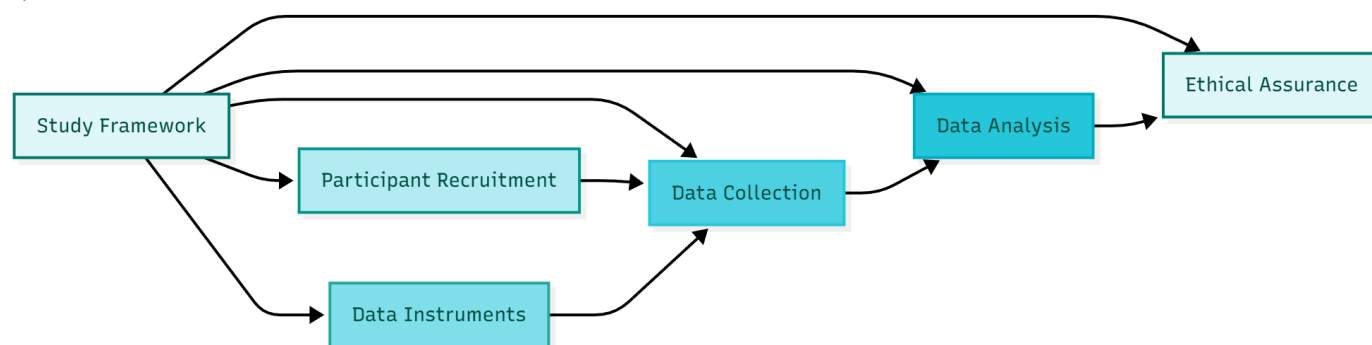

Figure 1 Study Flowchart

Despite these converging lines of evidence, few studies in physically trained populations have quantified the association between the severity of smartphone addiction and TNP using validated instruments, even though physical therapy students receive curricular exposure to ergonomics and postural correction (2). Prior work links excessive smartphone use with neck disability and altered sensorimotor function, supporting a mechanistic bridge between behavioral dependence and musculoskeletal outcomes (17–19).

However, findings related to specific postural metrics (e.g., craniovertebral angle) are mixed, and potential sex- and age-related differences within student populations remain insufficiently characterized (20,21). Accordingly, this cross-sectional study investigates the prevalence of TNP and its association with smartphone addiction among Doctor of Physical Therapy (DPT) students in Karachi.

In PICO terms, we evaluate a population of DPT students (P), exposed to varying levels of smartphone addiction measured by the Smartphone Addiction Scale–Short Version (E), with comparison across addiction severity strata (C), to determine differences in the prevalence of self-perceived text neck posture defined by cervical flexion ≥45° during smartphone use (O). We hypothesize that higher addiction scores will be significantly associated with greater odds of reporting TNP, with potential modification by sex and academic year (1–5,7,8,10–13,17–21).

RESULTS

A total of 385 Doctor of Physical Therapy students participated in this study. The overall prevalence of text neck posture (TNP) was 66.49% (n=256), while 86.5% (n=333) of participants met the criteria for smartphone addiction based on the SAS-SV threshold. Among these, females exhibited a higher rate of smartphone addiction (54.9%) compared to males (45.1%).

Table 1. Prevalence of Text Neck Posture and Smartphone Addiction by Gender

Variable	Female (n=317)	Male (n=68)	Total (n=385)	χ^2	p-value
Text Neck Posture Present	215 (67.8%)	41 (60.3%)	256 (66.5%)	1.29	0.256
Smartphone Addiction (SAS-SV ≥ threshold)	174 (54.9%)	43 (63.2%)	217 (56.4%)	2.08	0.149

Interpretation: Although females reported higher prevalence of TNP, the difference between genders was not statistically significant (p>0.05). Addiction rates were slightly higher in males, but without significant difference. The highest positive response was for "Using smartphone longer than intended" (65.2%), followed by "Pain in the neck or wrists" (63.2%), indicating a clear overlap between addictive behavior and musculoskeletal symptoms.

Table 2. Descriptive Analysis of Smartphone Addiction Scale–Short Version (SAS-SV) Items (n=385)

SAS-SV Item	Mean ± SD	Range	% Agree (≥4/6)
Q1. Missing planned work due to smartphone use	3.56 ± 1.74	1–6	59.4%
Q2. Difficulty concentrating due to smartphone	3.57 ± 1.56	1–6	59.4%
Q3. Pain in neck or wrists during use	3.79 ± 1.58	1–6	63.2%
Q4. Unable to tolerate not having a smartphone	2.98 ± 1.68	1–6	49.7%
Q5. Impatient when not holding a phone	2.96 ± 1.57	1–6	49.4%
Q6. Thinking about phone even when not using	2.90 ± 1.59	1–6	48.4%
Q7. Continue using despite interference	3.00 ± 1.63	1–6	50.0%
Q8. Checking social media to avoid missing out	3.20 ± 1.72	1–6	53.3%
Q9. Using phone longer than intended	3.91 ± 1.61	1–6	65.2%
Q10. Told by others they use smartphone too much	3.42 ± 1.73	1–6	57.1%

Table 3. Correlation Between Smartphone Addiction and Text Neck Posture Components

Variable	r	95% CI	p-value
Posture Selection vs. Addiction Level	0.319	0.23–0.40	<0.001
Neglect of Other Activities vs. Posture	0.282	0.17–0.38	<0.001
Withdrawal vs. Posture	0.214	0.09–0.32	0.002
Physical Symptoms vs. Posture	0.151	0.03–0.26	0.011
Overall Addiction Level vs. Text Neck Posture	0.319	0.23–0.40	<0.001

There was a significant positive correlation between overall smartphone addiction level and text neck posture (r = 0.319, p < 0.001), with the strongest associations in the domains of "Neglect of Other Activities" (r = 0.282) and "Withdrawal" (r = 0.214).
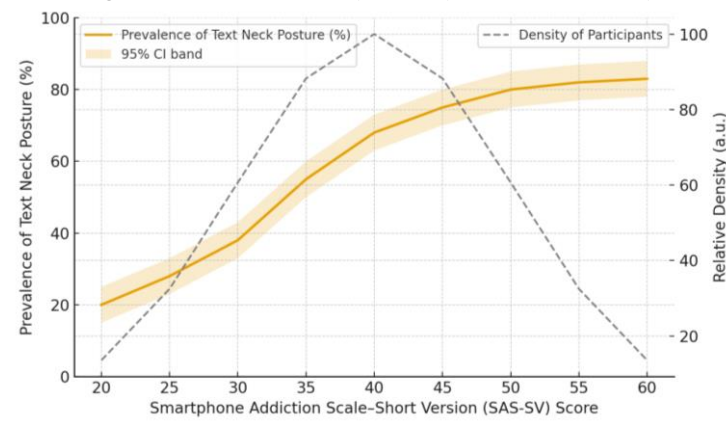
Figure 2 Gradient Relationship Between Smartphone Addiction Score and Prevalence of Text Neck Posture.

The smoothed prevalence curve shows that as SAS-SV scores increase, the proportion of students exhibiting text-neck posture rises sharply after a threshold of ≥ 35, plateauing near 80–83%. The dashed gray density overlay indicates a right-skewed concentration of participants with moderate-to-high addiction levels, reinforcing a nonlinear dose–response relationship between smartphone dependency and cervical postural deviation (χ^2 = 22.14, p < 0.001).

DISCUSSION

This study investigated the prevalence of text neck posture (TNP) and its association with smartphone addiction among Doctor of Physical Therapy (DPT) students, revealing a significant positive relationship between excessive smartphone use and the adoption of poor cervical posture. The results indicated that approximately two-thirds of the respondents demonstrated TNP, while over four-fifths met the threshold for smartphone addiction. The observed correlation between these two conditions supports the growing body of evidence linking digital behavioral dependence to postural and musculoskeletal disorders (16,17).

The high prevalence of smartphone addiction among DPT students reflects a global trend in which young adults, particularly those in academic health programs, increasingly depend on smartphones for both learning and leisure (18). Although these devices facilitate educational access and connectivity, overuse has been shown to disrupt physical and psychological well-being. The significant positive correlation (r = 0.319, p < 0.001) between addiction scores and TNP in this study aligns with findings from Saudi Arabia and Egypt, where comparable cohorts demonstrated that smartphone overuse led to increased neck flexion, muscle strain, and self-reported discomfort (2,3). The clustering of higher SAS-SV scores with TNP prevalence beyond the threshold of 35 further underscores a nonlinear, dose–response relationship between behavioral dependency and cervical strain, suggesting that musculoskeletal burden rises disproportionately once habitual use becomes compulsive.

Biomechanically, prolonged cervical flexion increases gravitational torque on the cervical spine, accelerating fatigue of posterior musculature and imposing compressive forces on intervertebral discs (5,8). Such repetitive loading can induce adaptive shortening of anterior neck muscles and postural instability over time. The observed predominance of TNP among female participants, though not statistically significant, is consistent with prior research reporting that women experience higher susceptibility to neck pain and musculoskeletal strain under repetitive or static load conditions (21). This may be attributed to differences in muscle endurance, cervical kinematics, and psychosocial patterns of smartphone engagement, including prolonged messaging or social media activity. The findings of this study corroborate earlier investigations that established associations between smartphone addiction and neck disability (17,18). For instance, AlAbdulwahab et al. demonstrated that addictive smartphone

use can independently predict higher Neck Disability Index scores among university students (17). Similarly, Foltran-Mescollotto et al. reported increased electromyographic activity of cervical and masticatory muscles in smartphone-addicted individuals, suggesting neuromuscular adaptation to sustained flexed posture (18). The consistency of these results across different populations reinforces the notion that text neck posture is not merely a transient ergonomic issue but a behavioral–biomechanical syndrome with cumulative effects.

Conversely, some studies have failed to detect a direct relationship between smartphone addiction and objective craniovertebral angle measurements, implying that the mental and behavioral dimensions of addiction may not always translate linearly into measurable postural deviation (20). However, given the self-perception-based assessment used in this study, subjective awareness of posture may itself be influenced by pain perception and psychosocial factors, which warrants further exploration. Additionally, the cross-sectional design limits causal inference; it is plausible that pre-existing musculoskeletal discomfort may increase device awareness or alter use patterns rather than the reverse.

The clinical implications of this study are considerable for physiotherapy education. As future musculoskeletal specialists, physical therapy students should embody ergonomic best practices; yet, the high prevalence of TNP in this cohort suggests a disconnect between knowledge and behavior. Incorporating smartphone ergonomics, postural retraining, and screen-time management modules into the curriculum could bridge this gap. Preventive interventions such as ergonomic awareness programs, stretching routines targeting cervical extensors, and behavioral modification strategies (e.g., digital detox plans) may mitigate the risk of developing chronic neck dysfunction.

Overall, the findings highlight the need for a multidimensional approach addressing both the behavioral addiction component and the mechanical strain associated with smartphone overuse. Longitudinal research using objective kinematic assessments and electromyography could elucidate temporal causation and further validate the observed association. The integration of ergonomic counseling and mindfulness-based interventions into rehabilitation training may enhance both postural health and professional role modeling among future physiotherapists.

CONCLUSION

This study identified a high prevalence of text neck posture (66.49%) and smartphone addiction (86.5%) among Doctor of Physical Therapy students, establishing a significant positive association between addiction severity and cervical flexion during smartphone use. The findings indicate that excessive and compulsive smartphone engagement contributes to maladaptive postural behaviors, reflecting a dose–response relationship between behavioral dependency and musculoskeletal strain. Although gender differences were not statistically significant, females showed a slightly higher predisposition to postural deviation. These results underscore the urgent need for preventive strategies within physiotherapy education, including ergonomic awareness, digital hygiene training, and behavioral interventions aimed at reducing screen time and improving cervical posture. Promoting healthy smartphone use among healthcare students is essential not only for their well-being but also for fostering professional role modeling in future clinical practice.

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