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INFLUENCE OF PROBLEMATIC SMARTPHONE AND SOCIAL MEDIA USE ON MUSCULOSKELETAL HEALTH: FROM CHRONIC DISORDERS TO ACUTE INJURIES

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ABSTRACT

Smartphones and social media platforms are integral to communication, education, employment, entertainment, and social interaction. Although research on problematic smartphone and social media use has focused mainly on psychological and behavioral outcomes, increasing evidence indicates relevant physical and musculoskeletal consequences. This narrative review synthesizes evidence concerning chronic musculoskeletal symptoms, postural and biomechanical factors, myofascial findings, and acute injuries associated with smartphone use, and considers behavioral injury pathways related to social media. Relevant systematic reviews, meta-analyses, observational studies, experimental investigations, emergency-department surveillance studies, and scholarly syntheses were identified through targeted literature searches and reference tracing. Intensive or problematic smartphone use is associated with symptoms involving the neck, upper back, shoulders, wrists, hands, and thumbs, although causal relationships remain uncertain. Acute-injury studies document sprains, strains, fractures, hand and wrist trauma, head and neck injuries, falls, and transportation-related injuries associated with mobile-device involvement. Pediatric studies and experimental pedestrian research support distraction as an important mechanism. Emerging evidence also documents physical harm associated with risky social-media challenges and social-media-related interpersonal violence. Smartphone- and social-media-related physical health risks therefore extend beyond chronic postural complaints and involve mechanical, attentional, environmental, and behavioral mechanisms. Prevention should combine ergonomic education, movement variability, distraction awareness, digital-health literacy, age-specific injury prevention, and responsible engagement with social-media content.

KEYWORDS

Smartphone Use, Social Media, Musculoskeletal Health, Neck Pain, Distraction, Injury

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1. Introduction

Smartphones have substantially changed the manner in which individuals communicate, study, work, travel, obtain information, and participate in social life. Unlike earlier digital technologies that were used predominantly in fixed environments, smartphones accompany users through most daily activities. They are used at home, in educational institutions, at work, during transportation, while walking, during recreation, and during activities that simultaneously require attention to the surrounding physical environment.

Social media constitutes a major component of this digital environment. Messaging, continuously updated feeds, short-form video content, notifications, social feedback, and personalized recommendations encourage repeated interaction with mobile devices throughout the day. Contemporary smartphone exposure therefore often consists of frequent episodes of checking, scrolling, typing, viewing, and responding in addition to prolonged sessions of use.

Scientific interest in excessive or poorly controlled smartphone use has increased in parallel with the expansion of mobile technology. The term smartphone addiction has been widely used, and instruments such as the Smartphone Addiction Scale and Smartphone Addiction Scale-Short Version were developed to quantify patterns that include excessive use, preoccupation, interference with daily activities, and difficulty controlling engagement (Kwon et al., 2013a, 2013b). The terminology remains debated because high use may reflect educational, occupational, or social requirements rather than an addiction-like disorder. The broader term problematic smartphone use is therefore useful when describing excessive or poorly controlled use associated with functional or health-related consequences.

Research on problematic smartphone use initially concentrated on psychological and behavioral outcomes. Physical health, particularly musculoskeletal health, has subsequently received increasing attention. Smartphone activities commonly involve viewing a screen below eye level, varying degrees of cervical flexion, sustained positioning of the shoulders and elbows, prolonged device holding, and repetitive finger and thumb

movements. These characteristics provide plausible mechanisms for muscular fatigue, discomfort, repetitive-use symptoms, and changes in movement behavior.

Systematic reviews have documented musculoskeletal complaints among mobile-device users. Zirek et al. (2020) identified neck and upper-back complaints among the most frequently reported symptoms, while Eitviiptart et al. (2018) summarized biomechanical evidence linking smartphone tasks with altered posture and musculoskeletal loading. More recent meta-analytic evidence reported an association between smartphone overuse and neck pain (Chen et al., 2025). These findings support consideration of smartphone exposure as a potential contributor to musculoskeletal symptoms, while the predominance of observational evidence limits causal interpretation.

Chronic musculoskeletal symptoms represent only one aspect of smartphone-related physical health. Smartphone interaction during walking, road crossing, cycling, driving, stair use, or other activities requiring environmental awareness may contribute to acute injury through distraction. Emergency-department studies have documented sprains, strains, fractures, lacerations, hand and wrist injuries, and head and neck trauma associated with cell-phone use (McLaughlin et al., 2023; Moore et al., 2021; Povolotskiy et al., 2020). Pediatric investigations also describe both minor and severe injuries associated with mobile-device involvement (Guyon et al., 2020; Wagner et al., 2021).

Physical injury may also affect individuals other than the smartphone user. Caregiver distraction has been investigated as a potential contributor to injury among young children, extending the possible consequences of smartphone use beyond the individual directly interacting with the device (Palsen, 2017). Social media introduces additional behavioral mechanisms. Risky online challenges may encourage participation in potentially hazardous activities, while online threats and interpersonal conflict may be associated with subsequent physical violence (Garcia Whitlock et al., 2023; Middelberg et al., 2026).

Accordingly, the physical health consequences associated with smartphone and social-media use may arise through several distinct but interconnected mechanisms. These include cumulative musculoskeletal exposure related to prolonged or repetitive device use, acute injuries associated with distraction, injuries resulting from direct physical interaction with the device, and behavioral pathways through which social-media content or interactions may contribute to risk-taking and physical harm. Considering these mechanisms together may provide a broader understanding of the relationship between contemporary digital behavior and musculoskeletal health and injury.

The aim of this narrative review is to synthesize current evidence concerning these mechanisms and to consider their implications for musculoskeletal health, injury prevention, clinical practice, public-health education, and future research.

2. Methodological Approach

This article was designed as a narrative review to provide an integrated overview of smartphone- and social-media-related musculoskeletal symptoms and physical injuries. A narrative approach was selected because the evidence encompasses conceptually different areas, including chronic musculoskeletal symptoms, biomechanics, acute trauma, pedestrian behavior, road-traffic injury, pediatric injury, caregiver distraction, and social-media-related behavioral harm.

Relevant literature was identified through targeted searches of biomedical and scholarly literature and through reference tracing from systematic reviews, primary research articles, and recent scholarly syntheses. Search concepts included smartphone, mobile phone, cell phone, problematic smartphone use, smartphone addiction, social media, musculoskeletal pain, neck pain, posture, biomechanics, hand, wrist, injury, fracture, pedestrian, distraction, traffic injury, children, social-media challenge, and violent injury. Literature was selected for relevance to musculoskeletal symptoms, physical injury, mechanisms of exposure, or prevention.

Priority was given to peer-reviewed systematic reviews, meta-analyses, observational studies, biomechanical and experimental investigations, emergency-department surveillance studies, and clinically documented injury series. Recent higher-level evidence was used where available, while older primary studies were retained when they provided distinctive experimental or mechanistic information. Evidence was synthesized conceptually rather than quantitatively and was grouped according to chronic musculoskeletal effects, postural and biomechanical findings, myofascial observations, distraction-related trauma, pediatric and caregiver-related injury, transportation-related injury, direct device injury, and social-media-associated behavioral injury.

Several investigations included in the acute-injury literature use the United States National Electronic Injury Surveillance System (NEISS). These studies examine different anatomical regions, age groups, mechanisms, or time periods within the same surveillance system. They provide complementary descriptions of injury patterns but should not be considered completely independent populations, and their national estimates should not be summed to calculate an overall burden of smartphone-related injury.

Evidence concerning social-media-related violence and risky online challenges was interpreted separately from evidence concerning musculoskeletal overuse because these outcomes arise through different mechanisms. The purpose of the synthesis was to identify recurring associations, plausible mechanisms, limitations in the current evidence, and opportunities for prevention rather than to establish a single causal relationship between smartphone use and physical injury.

3. Problematic Smartphone Use and Musculoskeletal Exposure

The concept of smartphone addiction emerged as smartphones became increasingly integrated into everyday life. Kwon et al. (2013a) developed the Smartphone Addiction Scale to assess behavioral patterns associated with excessive smartphone engagement, and a shortened version was subsequently developed for adolescents (Kwon et al., 2013b). These instruments facilitated research but also contributed to the use of addiction terminology across studies with substantially different exposure definitions.

For musculoskeletal research, behavioral dependence and physical exposure are not equivalent. A person may use a smartphone for many hours because of work or education without demonstrating addiction-like behavior and may nevertheless experience considerable mechanical exposure. Conversely, compulsive smartphone checking may involve numerous short episodes rather than a single sustained period of static posture. Relevant physical variables may include total duration of use, uninterrupted duration, frequency of device interaction, screen position, hand dominance, device dimensions, task type, movement variability, and upper-limb support. Future studies would benefit from measuring these characteristics separately from behavioral dependence.

Social-media engagement may increase the frequency and duration of smartphone interaction, thereby increasing cumulative mechanical exposure through sustained postures and repetitive upper-limb movements. This increased physical exposure may, in turn, contribute to the development or aggravation of musculoskeletal symptoms. Social media should therefore be considered an indirect contributor to mechanical exposure rather than a direct biomechanical cause of musculoskeletal pathology.

4. Chronic Musculoskeletal Consequences

Neck pain is among the most extensively investigated physical outcomes associated with smartphone use. Smartphones are frequently held below eye level, producing varying degrees of cervical flexion. When such positions are sustained, cervical and upper thoracic musculature may remain active for prolonged periods, often together with thoracic flexion, shoulder protraction, and reduced movement variability.

Zirek et al. (2020) systematically reviewed musculoskeletal complaints, symptoms, and pathologies related to mobile-phone use. Prevalence estimates varied considerably among the included studies, but neck and upper-back complaints were consistently represented. The review also identified substantial methodological limitations, including frequent reliance on cross-sectional or case-control designs, which restrict assessment of temporal relationships.

Eitivipart et al. (2018) reviewed biomechanical evidence concerning smartphone use and musculoskeletal pain and found support for associations between smartphone tasks, non-neutral positioning, muscle activity, and discomfort. More recent evidence has strengthened the epidemiological association. Chen et al. (2025) included seven retrospective studies comprising 10,715 participants in a systematic review and meta-analysis. Smartphone overuse was associated with increased odds of neck pain, with a pooled adjusted odds ratio of 2.34 and a 95% confidence interval of 1.44-3.82. Between-study heterogeneity was high, with an I^2 value of 94%, reflecting substantial variation in populations and exposure definitions.

The evidence therefore supports an association between smartphone overuse and neck pain but does not establish smartphone use as an independent cause of chronic cervical pathology. Neck pain is multifactorial and may be influenced by occupational exposure, computer use, physical activity, psychological stress, sleep, previous injury, sedentary behavior, and other factors.

4.1. Postural Factors and Musculoskeletal Symptoms

Public discussion frequently attributes smartphone-related neck symptoms to cervical flexion or the concept of text neck. Human posture is naturally variable, and cervical flexion occurs during many ordinary activities. The potential musculoskeletal consequences of smartphone use are more likely to depend on the duration and repetition of exposure, the degree of postural variation, muscular demands, individual physical capacity, and opportunities for movement and recovery.

Manganello et al. (2025), in a recent synthesis of screen use, physical injuries, and orthopedic health in children, emphasized that evidence linking habitual neck flexion with later chronic neck pain is less definitive than simplified descriptions of text neck suggest. Observed postural changes during smartphone use should therefore not automatically be interpreted as evidence of pathology.

This interpretation has implications for prevention. Maintaining one rigid posture throughout smartphone use is unlikely to be a practical objective. Regular movement, variation in device position, upper-limb support when appropriate, and interruption of prolonged static exposure may provide a more reasonable approach to reducing cumulative mechanical load.

4.2. Shoulder, Upper-Back, Hand, Wrist, and Thumb Symptoms

Smartphone use also places demands on the shoulder girdle and upper extremities. Holding a device requires stabilization of the shoulder, elbow, wrist, and hand, and unsupported use may involve sustained low-level muscular activity. Shoulder protraction and prolonged elbow flexion commonly occur together with cervical flexion. The cervical spine, upper thoracic region, shoulder girdle, forearm, wrist, and hand therefore function as an interconnected kinetic chain during device interaction.

Smartphones also require direct repetitive interaction with the screen. Common movements include tapping, typing, scrolling, swiping, pinching, and repeated thumb opposition. Potential contributors to hand and wrist symptoms include repetitive thumb movement, prolonged gripping, one-handed use, sustained wrist positioning, device dimensions, and total exposure duration.

The literature associates intensive smartphone use with shoulder discomfort, upper-back symptoms, wrist pain, hand fatigue, and thumb complaints. Specific diagnoses require cautious interpretation because conditions such as de Quervain tenosynovitis, carpal tunnel syndrome, tendinopathy, and thumb-base pain are multifactorial. Current evidence more strongly supports the conclusion that intensive smartphone interaction may contribute to cumulative upper-extremity mechanical exposure than the conclusion that it independently causes a specific disorder.

5. Myofascial and Emerging Biological Findings

Research has increasingly examined clinical musculoskeletal findings in addition to self-reported pain. Yaşarer et al. (2024) evaluated 136 university students and investigated the relationship between smartphone addiction and myofascial trigger points. Participants classified as smartphone-addicted demonstrated a greater number of trigger points, with significant differences involving the levator scapulae and cervical erector musculature. The cross-sectional design does not establish whether smartphone behavior preceded the muscular findings, and the results should therefore be interpreted as evidence of association.

Alghadir et al. (2025) expanded this area by examining smartphone addiction alongside biomechanical measures and selected biological markers among university students. The analysis included markers related to oxidative stress, antioxidant capacity, collagen-related processes, serotonin, and triglycerides, and reported associations between smartphone-addiction measures, musculoskeletal findings, and selected biomarkers.

These observations broaden the range of outcomes studied in relation to smartphone use but do not demonstrate that smartphone exposure causes systemic inflammation, oxidative injury, collagen degradation, or degenerative musculoskeletal disease. Longitudinal and experimental studies are required to determine whether biological markers change as a consequence of smartphone-related physical exposure and whether such changes have clinically meaningful musculoskeletal effects.

6. Acute Injury Associated With Smartphone Use

In addition to its association with chronic musculoskeletal symptoms, smartphone use has been linked to acute injuries, particularly when device interaction occurs simultaneously with activities requiring attention to the surrounding environment. Smartphone interaction requires visual, cognitive, auditory, and motor resources. When users perform activities requiring environmental monitoring at the same time, device use may compete for these resources.

Walking near traffic, crossing roads, using stairs, cycling, driving, and navigating crowded environments require continuous attention and adaptation to changing surroundings. Engagement with messages, videos, social-media content, or phone conversations may reduce situational awareness and delay detection of environmental hazards. Distraction associated with smartphone use may consequently contribute to falls, collisions, loss of balance, and other mechanisms of acute injury.

7. Orthopaedic Injuries Associated With Cell-Phone Use

Moore et al. (2021) analyzed 20 years of United States emergency-department data to characterize orthopaedic injuries associated with cell-phone use. The weighted national estimate was 44,599 orthopaedic injuries. Sprains and strains represented approximately 56.8% of injuries, while fractures represented approximately 32.6%.

These data demonstrate that cell-phone-related physical consequences include structural trauma in addition to pain and postural complaints. Fractures may require immobilization, surgery, rehabilitation, or prolonged functional recovery and therefore represent a clinically important component of the injury spectrum.

Age influenced the reported injury patterns. Fractures were proportionally more prominent among older individuals, whereas texting-related injuries were more frequently represented among younger users. Differences in exposure patterns, balance, reaction time, bone health, and environmental context may contribute to age-related variation in injury consequences.

8. Hand and Wrist Trauma

McLaughlin et al. (2023) examined cell-phone-related injuries affecting the lower arm, wrist, hand, and fingers presenting to United States emergency departments between 2011 and 2020. The study identified 1,213 recorded cases, corresponding to an estimated 50,487 injuries nationally. Falls represented the most common mechanism, accounting for approximately 29.8% of estimated injuries, while lacerations were the most frequently reported diagnosis. The highest proportion of injuries occurred among individuals aged 11-20 years, followed by those aged 21-30 years.

The hand and wrist may therefore be affected through both cumulative and acute mechanisms. Repetitive smartphone interaction can expose the thumb, wrist, and hand to repeated mechanical demands, whereas falls and accidents associated with distraction may produce acute trauma to the same anatomical region. These mechanisms require different preventive approaches and should not be interpreted as a single pathological process.

9. Head and Neck Trauma

Povolotskiy et al. (2020) investigated head and neck injuries associated with cell-phone use using United States emergency-department surveillance data. The analysis identified 2,501 recorded cases, corresponding to an estimated 76,043 injuries nationally over the study period. Lacerations and contusions or abrasions were among the common diagnoses.

The estimated incidence of cell-phone-related head and neck injuries increased during the study period, with a marked rise beginning in 2007. The mechanism of injury also changed over time. Earlier mobile-phone injuries more frequently involved direct physical interaction with the device, whereas distraction-related injuries became increasingly prominent as mobile phones developed into multifunctional platforms for messaging, social media, navigation, entertainment, and internet access. Younger users were prominently represented among distraction-associated injuries.

10. Pediatric and Adolescent Injury

Children and adolescents represent an important population in smartphone-related injury research because device exposure occurs during a developmental period characterized by increasing independence, mobility, social interaction, and participation in traffic environments.

Wagner et al. (2021) described smartphone-related injuries among children and adolescents treated at two pediatric surgical emergency centers in Germany. Ten patients were identified, eight of whom were injured while actively using a smartphone and were considered distracted. Injuries ranged from minor trauma to serious injury and included a pelvic fracture and a vertebral body fracture. The small sample does not permit population-level estimates but documents the potential severity of distraction-related trauma in younger users.

Guyon et al. (2020) examined cell-phone-related injuries among individuals aged 21 years or younger using United States emergency-department surveillance data. The estimated injury burden increased over the study period, and injury mechanisms differed by age. Direct physical interaction with the device was more relevant among very young children, while distracted mobility became more prominent with increasing age.

These age-related differences support developmentally specific prevention. Safe device handling and caregiver behavior are relevant in early childhood, whereas education concerning smartphone use during walking, cycling, road crossing, and driving becomes increasingly important during adolescence and young adulthood.

11. Experimental Evidence for Pedestrian Distraction

Epidemiological injury studies identify patterns of trauma but do not always demonstrate the behavioral mechanism preceding an event. Experimental research provides complementary evidence regarding the effects of distraction on pedestrian behavior.

Stavrinos et al. (2009) studied 77 children aged 10-11 years using an immersive virtual pedestrian environment. Participants completed simulated road crossings both without distraction and while engaged in a cell-phone conversation. During the distracted condition, children attended less effectively to traffic, allowed smaller safety margins before approaching vehicles, waited longer before initiating crossings, and experienced more simulated collisions and near-collisions.

The virtual environment does not provide a measure of real-world injury incidence. The findings nevertheless support an attentional mechanism through which mobile-phone interaction may impair pedestrian safety and are consistent with epidemiological observations of distraction-related injury among younger users.

12. Distracted Walking and Lower-Extremity Injury

Walking requires continuous coordination of balance, visual scanning, obstacle detection, and anticipatory motor control. Smartphone interaction may interfere with these processes by reducing attention to the surrounding environment and modifying walking behavior. Such changes may become particularly relevant when individuals encounter stairs, uneven surfaces, traffic, obstacles, or crowded environments.

Analysis of United States injury-surveillance data reported more than 13,000 estimated cell-phone-related lower-extremity injuries occurring while walking between 2000 and 2023. The ankle was the most frequently affected anatomical region, followed by the knee and foot, while falls represented an important mechanism of injury. These findings are consistent with the broader literature suggesting that mobile-device distraction during walking may contribute to clinically relevant lower-extremity trauma.

Lower-extremity injuries also demonstrate that the physical consequences of smartphone use are not confined to anatomical regions directly involved in device handling. Distraction during ambulation may expose the lower extremities to injury through falls, collisions, and inadequate responses to environmental hazards.

13. Road-Traffic Injury

Mobile-device distraction while driving represents a potentially severe form of smartphone-related risk. Driving requires continuous visual scanning, rapid decision-making, prediction of other road users' behavior, and coordinated motor responses. Smartphone interaction competes directly with these requirements.

Zatezalo et al. (2018) conducted a systematic review examining road-traffic injuries and fatalities associated with mobile-device distraction. Estimates of the proportion of road-traffic trauma attributed to mobile-device distraction varied widely across the included studies, reflecting differences in study design, definitions, data collection, and documentation.

Determining whether a driver was using a smartphone immediately before a collision is difficult. Phone involvement may be under-reported, police documentation may vary, and road-traffic collisions frequently have multiple contributing factors. Studies directly evaluating mobile-device use and crash risk nevertheless reported increased risk among drivers using mobile devices. The resulting trauma may involve fractures, spinal injury, soft-tissue damage, head injury, or multiple simultaneous injuries.

14. Caregiver Distraction and Injury to Others

Smartphone-related distraction may affect individuals who depend on the user's attention. Palsson (2017) examined childhood injury trends during the expansion of third-generation mobile-network coverage in the United States. The analysis reported increased emergency-department visits for injuries among children aged 0-5 following local expansion of 3G coverage, whereas a comparable increase was not observed among children aged 6-10.

The study used an econometric design rather than direct observation of caregiver smartphone behavior, and individual injuries cannot be attributed definitively to a distracted caregiver. The age-specific findings were nevertheless consistent with the hypothesis that increased smartphone use may interfere with supervision of younger children.

These observations extend the concept of digital distraction beyond personal injury. Safety recommendations concerning smartphone use may therefore be relevant in situations requiring sustained supervision of children or other dependent individuals.

15. Direct Device-Related Injury

Not all smartphone injuries result from overuse or distraction. The physical device may itself contribute directly to injury. This mechanism appears particularly relevant among younger children, who may be struck by falling devices, sustain injuries while handling phones, or be injured during adult interaction with a device.

Guyon et al. (2020) reported that mechanisms involving direct interaction with the physical device were more prominent among younger age groups. Direct device injury differs from distraction-related trauma in both mechanism and prevention. Safe handling and storage of devices may be relevant for younger children, while environmental attention is more relevant to distraction-related injuries among older children and adults.

16. Social Media, Viral Challenges, and Risk-Taking Behavior

Social-media platforms may influence behaviors that have implications for physical health and injury risk. One increasingly recognized phenomenon is participation in online challenges, in which users reproduce specific activities and subsequently share related content through social-media platforms. Certain challenges involve behaviors that may expose participants to physical injury.

Middelberg et al. (2026) conducted a scoping review of risky social-media challenges reported in the peer-reviewed literature between 2000 and 2024. Fifty-four publications met the inclusion criteria, and injuries were reported in the majority of the included publications. Documented adverse outcomes included burns, poisoning, pulmonary injury, strangulation, emergency medical treatment, permanent morbidity, and fatalities. YouTube and TikTok were among the platforms most frequently represented in the reviewed literature.

The available evidence remains heterogeneous and consists predominantly of observational research, case reports, descriptive studies, reviews, and analyses of social-media content. Consequently, the incidence of injury among individuals participating in social-media challenges and the magnitude of the associated risk cannot currently be established with precision.

From a musculoskeletal perspective, challenges involving hazardous movements, falls, jumps, stunts, or sustained extreme body positions may expose participants to mechanisms capable of producing sprains, strains, fractures, dislocations, and other traumatic injuries. The reported consequences of social-media challenges extend beyond the musculoskeletal system, and the available literature does not support attributing all challenge-related injuries specifically to musculoskeletal mechanisms.

These findings indicate that social-media use may be relevant to physical injury through its potential influence on behavior in addition to prolonged device exposure or distraction.

17. Social Media and Interpersonal Violence

A separate behavioral mechanism involves online conflict and threats. Garcia Whitlock et al. (2023) analyzed police reports from Prince George's County, Maryland, between 2018 and 2021 to investigate social-media involvement in violent crime. Among 15,168 violent offenses, 216 involved social media across 208 cases. The cases involved 250 victims and survivors, and physical injuries occurred in a substantial proportion.

Social-media threats were associated with a higher proportion of injury than other forms of documented social-media involvement. Injury occurred in 20 of 28 cases in which social media was used to threaten, compared with 67 of 180 cases involving other social-media uses.

The observational design does not demonstrate that social media caused the violent incidents, and the recorded injuries were not specifically classified as musculoskeletal. The study nevertheless indicates that digital interactions may form part of a pathway connecting online behavior with real-world physical harm. This mechanism should be interpreted separately from musculoskeletal overuse and accidental distraction-related trauma.

18. Integrated Mechanisms of Physical Harm

The available evidence indicates that smartphone- and social-media-associated physical harm arises through several mechanisms that may coexist within the same population. Repeated or sustained device interaction may contribute to cumulative mechanical exposure involving cervical flexion, static shoulder positioning, repetitive thumb and finger movements, sustained gripping, constrained wrist posture, and limited movement variability. The associated outcomes are primarily musculoskeletal symptoms and functional complaints.

Distraction represents a different mechanism. Smartphone interaction during walking, road crossing, cycling, driving, stair use, or other activities may reduce environmental attention and contribute to falls, collisions, fractures, sprains, strains, lacerations, and head and neck trauma. Direct interaction with the physical device constitutes another mechanism, particularly among younger children.

Social-media content and interactions may also influence offline behavior. Risky online challenges may encourage participation in hazardous activities, while threats and conflict may precede interpersonal violence. These behavioral pathways are not equivalent to mechanical overuse or distraction, but they broaden the range of physical-health outcomes associated with contemporary digital engagement.

The mechanisms may overlap in individual users. A person with high smartphone exposure may simultaneously experience cumulative musculoskeletal loading, use the device during mobility, and engage with social-media content that influences physical behavior. This overlap supports assessment of context, duration, repetition, and activity rather than reliance on screen time alone.

19. Vulnerable Populations

Adolescents and young adults are prominently represented in chronic smartphone-use studies and several acute-injury datasets. This population combines high levels of smartphone and social-media engagement with substantial mobility and increasing independence. Device use may occur while walking between classes, commuting, cycling, driving, socializing, or participating in online trends. Young users may therefore be exposed to cumulative musculoskeletal loading and acute distraction-related risks within the same period of life.

Children present a different pattern of risk. Very young children may be injured directly by devices or indirectly through reduced caregiver attention. As children become independently mobile, pedestrian distraction becomes increasingly relevant. The experimental findings of Stavrinou et al. (2009) demonstrate impaired road-crossing behavior during cell-phone conversation among preadolescent children, supporting age-specific education concerning pedestrian safety.

Older adults have received less attention in the smartphone musculoskeletal literature, although distraction-related falls may produce severe consequences in this population. Changes in balance, reaction time, vision, comorbidities, and bone density may increase the clinical consequences of a fall. The orthopaedic injury data reported by Moore et al. (2021) indicate that fractures constitute an important injury category among older users.

Occupational and educational users also require consideration because smartphones are increasingly necessary tools rather than optional entertainment devices. Students, healthcare professionals, delivery workers, drivers, office employees, and other occupational groups may depend on mobile technology throughout the day. For these populations, prevention is more appropriately directed toward reducing uninterrupted exposure, increasing movement variability, improving device positioning, and avoiding smartphone interaction during safety-critical tasks than toward complete avoidance of smartphone use.

20. Prevention and Public-Health Implications

Prevention of cumulative musculoskeletal symptoms should focus on modifiable physical exposure. Variation in device position, upper-limb support when practical, alternation between hands, reduction of prolonged one-handed gripping, and interruption of extended periods of static smartphone use may reduce sustained mechanical demands. Regular movement is relevant because it addresses exposure duration and movement variability without requiring maintenance of a single prescribed posture.

Prevention of acute injury requires greater emphasis on environmental attention. Smartphone interaction should be minimized during activities in which visual awareness and rapid responses are essential, including road crossing, driving, cycling, stair use, and walking near traffic or in complex environments. Public-health education should distinguish these immediate injury risks from the longer-term association between repetitive device use and musculoskeletal symptoms.

Caregiver education should address situations in which smartphone use may compete with supervision. The available evidence does not justify recommending complete avoidance of smartphones around children, but safety-critical settings require sustained attention and may warrant temporary reduction of device interaction.

Digital-health literacy is also relevant to risky social-media challenges. Children, adolescents, and adults should be able to recognize that online visibility and popularity do not provide evidence that a physical activity is safe. Healthcare professionals, schools, families, and social-media platforms may contribute to education concerning hazardous trends and appropriate responses to injury-related content.

Technology may also support prevention. Driving modes, notification suppression, screen-time monitoring, movement reminders, and context-sensitive safety prompts may reduce exposure or distraction. Social-media platforms may additionally develop mechanisms for identifying content that promotes clearly hazardous activities. The effectiveness of such interventions requires empirical evaluation because availability of a safety feature does not necessarily result in use or measurable injury reduction.

21. Limitations of the Evidence

The available literature has several methodological limitations that should be considered when interpreting the relationship between smartphone use and musculoskeletal health. Much of the evidence concerning chronic musculoskeletal symptoms is derived from cross-sectional studies, which limits assessment of temporal and causal relationships. Considerable heterogeneity is also present in the definition and measurement of smartphone exposure. Daily screen time, frequency of device checking, smartphone-addiction scores, social-media engagement, and self-reported excessive use represent related but distinct constructs. Many studies rely on self-reported measures of both smartphone exposure and musculoskeletal symptoms, increasing the potential for recall and reporting bias. University students and young adults are also disproportionately represented in the available literature, which may limit generalizability to other age and occupational groups.

Interpretation of musculoskeletal outcomes is further complicated by the multifactorial nature of pain and physical dysfunction. Occupational and computer-related exposure, sedentary behavior, physical activity, sleep, psychological factors, previous injury, and other repetitive activities may contribute to observed associations. Although cervical flexion and other postural changes during smartphone use provide plausible biomechanical mechanisms for increased musculoskeletal loading, the available evidence does not establish postural deviation alone as a cause of chronic musculoskeletal pathology.

Acute-injury research is subject to additional methodological limitations. Emergency-department surveillance studies can identify injuries occurring in association with cell-phone use but may not always establish a direct causal contribution of the device. Several major United States studies are based on NEISS and may contain overlapping populations despite examining different anatomical regions, age groups, or study periods; their national estimates should therefore not be combined. Mobile-device involvement in road-traffic injuries may also be under-reported or inconsistently documented. Evidence concerning risky social-media challenges remains heterogeneous and is largely based on observational studies, case reports, descriptive analyses, and reviews, limiting estimation of population-level incidence and risk. Social-media-associated violence represents a further distinct outcome and should be interpreted separately from musculoskeletal overuse and accidental trauma.

22. Future Research Directions

Future research should distinguish between smartphone exposure, problematic smartphone use, social-media engagement, mechanical loading, and distraction. These variables are frequently treated as interchangeable despite representing different behavioral and physical constructs. Clear exposure definitions would improve comparability among studies and facilitate identification of clinically relevant patterns of use.

Longitudinal cohort studies are required to determine whether specific patterns of smartphone exposure precede persistent musculoskeletal symptoms. Objective exposure measurement should be prioritized where feasible. Modern smartphones record screen time, application use, device pickups, and other behavioral metrics, while wearable sensors can quantify head position, movement variability, gait, and physical activity. Combining these methods could reduce reliance on retrospective self-report.

Clinical outcomes should extend beyond pain questionnaires and include function, disability, range of motion, strength, muscle activity, clinically diagnosed pathology, and quality of life where appropriate. Studies examining postural variables should assess duration and variability of exposure rather than treating a single measured posture as a direct indicator of pathology.

Acute-injury research would benefit from more detailed classification of mechanism, including direct device injury, injury during active viewing or typing, distraction while walking, cycling, or driving, caregiver distraction, and injuries occurring when a phone was present without evidence of causal involvement. Improved classification may help distinguish preventable behavioral mechanisms from incidental device presence.

Age-specific research is also required because the mechanisms affecting infants, adolescents, working-age adults, and older adults are unlikely to be identical. Research concerning social-media challenges should examine participation rates, motivations, peer influence, platform amplification, injury mechanisms, and the effectiveness of preventive communication.

Intervention studies remain a priority. Ergonomic education, movement-break programs, distraction-prevention technologies, caregiver education, digital-health literacy, and platform-based responses to risky content should be evaluated using behavioral and clinical outcomes. Such studies would provide stronger evidence for prevention than associations derived from cross-sectional exposure data alone.

23. Discussion

The evidence reviewed indicates that the physical-health consequences associated with smartphones and social media extend beyond chronic neck pain. Musculoskeletal studies report recurring associations between intensive smartphone use and symptoms involving the neck, upper back, shoulders, hands, wrists, and thumbs. Biomechanical evidence provides plausible mechanisms involving sustained positioning, repetitive movement, and reduced movement variability. The current evidence nevertheless remains predominantly observational, and the association between smartphone exposure and chronic musculoskeletal symptoms should not be interpreted as proof of a single causal pathway.

The meta-analysis by Chen et al. (2025) provides higher-level evidence for an association between smartphone overuse and neck pain, but the high heterogeneity among included studies indicates substantial variation in exposure definitions and populations. Postural findings require similar caution. Smartphone tasks may alter cervical and upper-body positioning, but the available evidence does not support treating cervical flexion alone as a sufficient explanation for chronic pain. Duration, repetition, movement variability, individual susceptibility, and psychosocial factors are likely to influence symptom development.

Acute-injury evidence broadens the clinical relevance of smartphone use. Emergency-department surveillance studies document sprains, strains, fractures, lacerations, hand and wrist trauma, and head and neck injuries associated with cell-phone use. Experimental pedestrian research demonstrates that mobile-phone distraction can impair environmental attention and safety-related decision-making. The convergence of epidemiological and experimental evidence supports distraction as a plausible mechanism of acute injury, although surveillance studies cannot always determine the degree to which phone use directly caused an individual event.

The NEISS literature should be interpreted as a set of complementary analyses rather than separate estimates of national injury burden. Studies focusing on orthopaedic injuries, hand and wrist trauma, head and neck injuries, and pediatric populations may draw from overlapping surveillance data. Their estimates should not be combined to produce an overall total.

Pediatric evidence indicates that mechanisms of smartphone-related injury vary with development. Young children may be injured directly by devices or indirectly through caregiver distraction, whereas adolescents and young adults increasingly encounter distraction during independent mobility. Experimental evidence concerning pediatric pedestrian behavior further supports the relevance of attention during road crossing. Prevention should therefore reflect developmental differences rather than apply a uniform message across age groups.

Social-media research introduces behavioral mechanisms that are distinct from mechanical overuse and distraction. The scoping review by Middelberg et al. (2026) documents a peer-reviewed literature describing injuries associated with risky social-media challenges. Garcia Whitlock et al. (2023) similarly found social-media involvement in a subset of violent incidents. These findings do not establish that social media independently causes injury, and the outcomes are not limited to the musculoskeletal system. They indicate, however, that digital content and interactions may influence offline behavior in ways that are relevant to physical health.

Taken together, the literature supports a broad model in which physical outcomes depend on the context and pattern of digital engagement. Repetitive device interaction may increase cumulative mechanical exposure, smartphone use during mobility may increase distraction, the physical device may directly cause injury in selected circumstances, and social-media content may influence participation in hazardous behavior. These mechanisms may coexist and should be investigated separately when possible.

The implications for clinical practice are primarily preventive. Patients presenting with neck, upper-back, shoulder, wrist, hand, or thumb symptoms may benefit from assessment of device-use patterns as one component of a broader musculoskeletal history. Relevant questions may include duration of uninterrupted use, task type, device position, repetitive hand activity, movement breaks, and concurrent computer or occupational exposure. Smartphone use should not be presumed to be the sole cause of symptoms, particularly in the presence of other established risk factors.

For acute injury prevention, the context of smartphone use is more relevant than total screen time. Device interaction during driving, cycling, road crossing, stair use, and other activities requiring continuous environmental attention may create immediate risk. Education addressing these situations may therefore be more specific and actionable than general recommendations to reduce smartphone use.

The literature on social-media challenges also supports inclusion of digital-health literacy within injury-prevention strategies. Risky online content may reach users rapidly and may be reproduced without formal safety assessment. Preventive approaches should focus on recognition of hazardous behavior, age-appropriate education, and evaluation of platform-based responses while avoiding assumptions that all social-media participation is harmful.

Smartphones provide substantial benefits in communication, education, navigation, emergency assistance, healthcare access, employment, and social connection. The objective of prevention is therefore not elimination of smartphone or social-media use. Current evidence supports greater attention to duration, repetition, environmental context, age, and the physical or behavioral activity occurring during digital engagement.

24. Conclusions

Smartphones and social media are integral to contemporary communication, education, work, and leisure, and their physical-health implications extend beyond the psychological and behavioral outcomes commonly associated with problematic digital-media use.

Current evidence indicates that intensive or problematic smartphone use is associated with musculoskeletal complaints involving the cervical spine, upper back, shoulders, wrists, hands, and thumbs. Sustained or repetitive smartphone-related behaviors, including prolonged cervical flexion, static upper-limb positioning, repetitive finger and thumb movements, and limited movement variability, provide plausible mechanisms for the development or aggravation of musculoskeletal symptoms. Posture alone should not be regarded as an established cause of chronic musculoskeletal disease, and the predominantly observational evidence requires cautious interpretation.

Smartphone-related physical consequences also include acute trauma. Distraction during walking, road crossing, cycling, driving, and other activities requiring environmental awareness has been associated with falls, collisions, sprains and strains, fractures, hand and wrist trauma, and head and neck injuries. Direct interaction with the physical device represents an additional mechanism, particularly among younger children.

Social media introduces behavioral pathways to physical injury. Risky viral challenges may encourage participation in hazardous activities, while online threats and interpersonal conflict may be associated with subsequent physical violence. These mechanisms differ from smartphone overuse but demonstrate that digital behavior may influence physical health through social and behavioral processes as well as biomechanical and attentional mechanisms.

Prevention should therefore extend beyond general recommendations to reduce screen time. Prolonged and repetitive device use should be interrupted by regular movement and postural variation, and smartphone interaction should be minimized during activities in which distraction may result in injury. Viral popularity should not be interpreted as evidence that an online challenge or physical trend is safe. Hazardous poses, movements, stunts, or other activities encountered through social media may expose participants to preventable acute injury, while repeated maintenance of constrained positions may contribute to musculoskeletal symptoms over time.

Future prevention strategies should combine ergonomic education, distraction awareness, digital-health literacy, age-appropriate education regarding risky online behavior, and responsible technology and platform design. Longitudinal and intervention studies are required to clarify causal relationships and determine which preventive measures produce meaningful reductions in musculoskeletal symptoms and acute injury.

The physical-health consequences of smartphones and social media depend substantially on how, how long, where, and for what purpose digital technologies are used. Recognition of these factors may support continued use of the benefits of mobile technology while reducing avoidable musculoskeletal symptoms and physical injuries.

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