

MUSCULOSKELETAL HEALTH IN YOUTH YOUNG ADULTS: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Introduction

Over the past three decades, musculoskeletal pain has emerged as one of the most disabling health conditions affecting young populations worldwide. These disorders—comprising injuries to muscles, joints, tendons, ligaments, and associated neural structures—rank among the top causes of reduced quality of life in adolescents and young adults. The Global Burden of Disease study found that musculoskeletal conditions represent the third most significant source of disability-adjusted life-years (DALYs) in individuals aged 10–35 years, with approximately 87 million incident cases occurring in 2019 alone (Guan et al., 2023). This represents a troubling 40% rise in new cases compared to the baseline year of 1990. The problem becomes even more pressing when examining specific anatomical regions: low back pain contributes nearly half of all MSD-related disability, while neck pain accounts for another 15% of the burden.

Modern lifestyles have fundamentally altered how young people use their bodies. The underlying causes have shifted with changing lifestyles. Extended desk work, classroom time, and ubiquitous screen use create constant ergonomic strain. Smartphone and computer use produce what researchers call 'tech neck'—postural strain from forward head positioning that now affects a large proportion of students (Hartvigsen et al., 2018). Despite clear evidence of this growing problem, youth musculoskeletal disorders receive less research attention than their burden suggests, particularly in developing countries. India, with one of the world's largest youth populations, lacks comprehensive analysis of how widely these conditions affect its students and young workforce.

Problem Statement

Research on youth musculoskeletal disorders exists but remains fragmented across multiple specialties. Studies of school-age adolescents typically focus on specific populations—design college students, healthcare trainees, or competitive athletes—without attempting broader synthesis. Similarly, investigations of young adults concentrate on particular occupational groups: IT workers, healthcare professionals, or manufacturing employees. This fragmentation prevents clear assessment of the problem's true scope (Briggs et al., 2013). Policymakers and health professionals lack unified evidence to determine which groups face greatest risk or which interventions might prove effective (Diaz-Tena et al., 2021).

Research quality varies substantially across studies. Some rely on symptom self-reporting while others use validated postural assessment tools (Harman et al., 2023). Age categories differ inconsistently—some define 'adolescents' as aged 12-16, while others include those up to age 20. Geographic representation is uneven: certain countries are heavily studied while others remain largely unknown. Understanding how musculoskeletal disorders develop and progress from teenage years through adulthood requires integrated analysis across diverse investigations (Akinpelu et al., 2020). This

synthesis serves as a necessary foundation for designing targeted interventions and identifying research priorities.

Methods

This systematic review followed PRISMA 2020 guidelines for comprehensive literature synthesis (Page et al., 2021). We searched eight major databases (PubMed, EMBASE, Scopus, Web of Science, CINAHL, PsycINFO, Google Scholar, and Cochrane Database) using search strategies combining terms related to musculoskeletal health, age groups, and study settings. We incorporated controlled vocabulary (MeSH headings) where available and supplemented with keyword searching. Our search window captured publications from January 2015 onwards, ensuring focus on contemporary research while maintaining relevance to current challenges such as digital device use.

Inclusion Criteria: Studies involved participants aged 13-35 years conducted in educational institutions (schools, colleges, universities) or workplace settings employing quantitative, qualitative, or mixed methods published in English-language peer-reviewed journals using validated assessment instruments (REBA, RULA, Nordic Musculoskeletal Questionnaire).

Exclusion Criteria: The present study excluded investigations involving individuals outside the specified age range; studies conducted among clinical patient populations with established chronic disease; research not primarily concerned with documenting MSD outcomes; gray literature (conference proceedings, dissertations, reports); and articles without accessible full texts. This approach ensured our analysis incorporated only high-quality, methodologically transparent investigations.

Key Findings from Literature

Recent meta-analytic synthesis of 119 studies representing over one million youth participants found that approximately one in five young people experiences chronic musculoskeletal pain. When headache is combined with musculoskeletal pain, prevalence exceeds one-quarter of sampled populations (Chambers et al., 2024). Notably, this extensive analysis revealed no meaningful gender differences in how back pain or general musculoskeletal pain manifests across studies. The distribution of pain across body regions shows consistent patterns internationally. Lower back pain dominates, accounting for more than two-fifths of all disability from musculoskeletal conditions in adolescents and young adults (Lim et al., 2012). Cervical spine discomfort represents the second major problem area, contributing roughly one-seventh of total disease burden.

Both back and neck pain demonstrate clear age-related trends, becoming substantially more common as youth progress into late adolescence and early adulthood. Evidence indicates these conditions rarely resolve spontaneously; young people experiencing early musculoskeletal symptoms frequently continue to experience problems into their working years (Pincus et al., 2013). This trajectory has profound implications for long-term health outcomes and workforce productivity (Shiri et al., 2017).

Ergonomic assessment studies consistently identified modifiable risk factors contributing to musculoskeletal strain. Inappropriate workstation setup—chairs lacking lumbar support, desks at improper heights, computer screens positioned outside optimal viewing angles—emerges as a persistent problem across multiple settings. Poor postural habits, often reinforced by habitual technology use, place young bodies in biomechanically disadvantageous positions for extended durations (Wong et al., 2017). Psychological stress from academic pressures or employment demands associates with both pain reporting and physiological muscle tension. Insufficient physical activity,

inadequate sleep quality, and elevated body mass index independently contribute to musculoskeletal vulnerability.

Synthesis Strengths and Research Limitations

This literature synthesis demonstrates important strengths. The inclusion of investigations from numerous countries ensures findings reflect patterns occurring across diverse healthcare systems and cultural contexts. The requirement for validated measurement instruments provides confidence in data quality and comparability across studies. Deliberately separating adolescent and young adult subgroups allows examination of developmental trajectories in pain patterns. Comprehensive database searching with no date restrictions before 2015 substantially reduces the likelihood of missed publications.

Several important limitations warrant acknowledgment. Studies employed different assessment tools and protocols, sometimes making direct statistical pooling problematic. Much available data relies on self-reported pain rather than objective clinical assessment, introducing potential response bias—individuals experiencing greater disability may report symptoms more readily (Ratzon et al., 2023). The preponderance of cross-sectional research designs precludes causal inference; we can identify associations but cannot determine whether pain produces disability or whether other factors lead to both. Geographic variation exists in research productivity, with some regions extensively studied and others barely represented. Age cutoff points vary inconsistently across investigations, complicating comparisons between age groups (Saastamoinen et al., 2012).

Conclusions and Research Implications

This review consolidates disparate findings into a coherent picture: musculoskeletal pain affects a substantial and growing proportion of young people, with implications extending far beyond immediate discomfort. The economic burden—encompassing healthcare utilization, productivity losses, and reduced educational attainment—likely exceeds current estimates (Vos et al., 2012). The social burden manifests in limitations on participation in recreational and social activities and remains insufficiently acknowledged. Most concerning is the trajectory suggested by epidemiological data: young people developing musculoskeletal disorders now face decades of potential ongoing problems (Katikireddi et al., 2014).

Several critical research gaps demand attention. Longitudinal investigations tracking how musculoskeletal symptoms evolve as individuals progress through adolescence and into working adulthood remain sparse. Rigorous evaluation of prevention and intervention approaches tailored specifically for young populations has received limited focus. Understanding how psychosocial factors interact with biomechanical stressors to produce symptom onset and persistence requires further investigation. Development of culturally appropriate, context-specific interventions suited to educational and workplace environments in developing countries has barely begun (Shen et al., 2014). Digital health approaches for pain management in youth populations merit exploration given their technological familiarity and accessibility advantages. These evidence gaps directly shape the objectives of subsequent investigations examining ergonomic determinants of musculoskeletal health in occupational settings and the feasibility of mobile health interventions for young adults experiencing pain.

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