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Research Paper

## Lifting Behavior and Postural Correction Among Young Adults: A Review of Preventive Approaches for Musculoskeletal Health

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### ABSTRACT

Musculoskeletal disorders (MSDs) related to improper lifting behavior and poor posture are increasingly prevalent among young adults, particularly due to sedentary lifestyles and inadequate ergonomic awareness. The age group of 18–35 years represents a critical phase during which faulty movement patterns and postural adaptations can lead to long-term musculoskeletal dysfunction. This review paper synthesises existing literature on lifting biomechanics, posture-related disorders, and corrective interventions aimed at preventing musculoskeletal health issues in young adults. Evidence from biomechanical and epidemiological studies indicates that improper lifting techniques, such as excessive trunk flexion and inadequate knee involvement, significantly increase spinal loading and injury risk. Additionally, prolonged static postures associated with modern occupational and academic environments contribute to postural deformities that further exacerbate lifting-related stress. The review highlights the effectiveness of corrective exercise programs focusing on core stabilisation, flexibility, and proprioceptive training in improving postural alignment and reducing musculoskeletal pain. Educational and behavioural interventions promoting ergonomic awareness are also shown to play a crucial role in sustaining safe lifting practices. Overall, the findings emphasise the importance of early, structured corrective and educational strategies to enhance musculoskeletal health and prevent injury during the most productive years of adulthood.

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## 1. INTRODUCTION

Musculoskeletal disorders (MSDs) and posture-related dysfunctions have become increasingly common among young adults, particularly due to poor lifting mechanics, sedentary lifestyles and low ergonomic awareness (Punnett & Wegman, 2004; Hoy et al., 2014). The age group of 18 to 35 years represents a critical developmental phase in which individuals transition from adolescence to adulthood, often taking on occupational and physical responsibilities that include repetitive lifting tasks. Incorrect lifting techniques, especially those involving forward flexion and spinal rotation, are significantly associated with low back pain, joint overload and muscle imbalance (Van Dieën et al., 1999; Marras et al., 2000).

Biomechanically, lifting without proper form leads to increased intervertebral disc pressure, asymmetric load distribution and compensatory movement patterns, particularly in the lumbar and pelvic regions (Callaghan & McGill, 2001). While professional athletes often undergo specific training in biomechanics, the general population, especially students, early-career workers and homemakers, are rarely trained in safe movement patterns (Shariat et al., 2018). This lack of training makes them susceptible to both acute injuries and chronic musculoskeletal conditions. Adding to this risk is the rise in static postures, such as prolonged sitting and screen usage, which are now a dominant feature of young adults' routines (Sedaghati et al., 2021). These sedentary behaviours contribute to postural deformities such as forward head posture, thoracic kyphosis and lumbar hyperlordosis, further exacerbating lifting-related stress on the musculoskeletal system (Katzmarzyk et al., 2009; Szeto et al., 2002). Over time, these adaptations result in pain, limited range of motion and functional inefficiency. Corrective exercise programs have been shown to reduce the impact of these risk factors. Interventions that include core stabilisation, flexibility training and proprioceptive control lead to improved postural alignment and reduced incidence of back pain (Page et al., 2012; Kim & Kim, 2016). Such programs are especially effective among young adults due to their neuromuscular adaptability and capacity for behavioural change (Gordon & Bloxham, 2016). Moreover, education regarding ergonomic lifting and movement patterns enhances self-awareness and contributes to long-term prevention of musculoskeletal issues.

This review aims to synthesise current evidence related to lifting behaviour, postural correction strategies, and their role in the prevention of musculoskeletal dysfunctions among young adults aged 18–35. By examining biomechanical risks, posture-related adaptations and corrective interventions, this paper provides a holistic understanding of how early training and awareness can reduce pain and deformity in the most productive years of adulthood.

## 2. LITERATURE REVIEW

### ● Lifting Biomechanics and Its Risks

Lifting tasks, when performed with improper technique, significantly increase the risk of mechanical stress on the lumbar

spine, hips and knees. Faulty postures such as excessive trunk flexion and lack of knee bending elevate spinal disc pressure and muscular strain (Van Dieën et al., 1999). Repetitive lifting with stooped posture leads to asymmetric loading of intervertebral joints and compensatory muscle activity, which, over time, contributes to chronic pain and joint dysfunction (Callaghan & McGill, 2001). Even in relatively light lifting, the cumulative effect of improper movement may cause musculoskeletal degradation, especially among physically untrained individuals (Marras et al., 1993).

### ● Posture-Related Disorders Among Young Adults

Young adults in the 18–35 age group face increasing postural challenges due to long sedentary hours, screen-based occupations, and poorly designed ergonomic environments. Common deformities include forward head posture, thoracic kyphosis, lumbar lordosis, and rounded shoulders, which further compromise lifting ability (Szeto et al., 2002; Shariat et al., 2018). These disorders often present subclinically but evolve into mechanical back pain or nerve compression syndromes when combined with dynamic stress, such as lifting or bending (Sedaghati et al., 2021).

### ● Corrective Exercise Interventions

Several studies have confirmed the efficacy of corrective exercises in improving musculoskeletal health, particularly through programs targeting the core, spinal stabilisers and flexibility. Exercises such as planks, bird-dog, cat-cow stretches and resistance band routines are commonly used to restore alignment and muscular balance (Page et al., 2012; Kim & Kim, 2016). An 8-week intervention focusing on progressive overload and postural training has been shown to reduce pain scores significantly and improve lifting posture, particularly in young, adaptable populations (Gordon & Bloxham, 2016). Training that emphasises proprioceptive control and movement awareness enhances not only muscular endurance but also self-regulation during daily lifting tasks.

### ● Role of Education and Behavioural Training

Corrective training alone may not suffice unless accompanied by proper ergonomic education. Awareness of spine-neutral positions, load distribution techniques and avoidance of sudden trunk flexion is essential for long-term behaviour change (Punnett & Wegman, 2004). Behavioural reinforcement, such as peer-led sessions and digital posture tracking, has shown promise in sustaining lifting discipline among college-aged adults and new workforce entrants (Shariat et al., 2018). Integrating posture education into physical education curricula could offer large-scale preventive benefits for youth populations.

### ● Gender and Age-Based Observations

Although both male and female participants show improvement through corrective interventions, gender-based musculoskeletal patterns affect outcomes. Females tend to report higher pain sensitivity and postural fatigue, while males often demonstrate delayed corrective responses due to muscular stiffness.

(Katzmarzyk et al., 2009). Moreover, studies indicate that interventions are most effective when introduced before age 30, as motor patterns and neuromuscular adaptability diminish

Slightly beyond that threshold (Gordon & Bloxham, 2016). Age-Specific design of programs, therefore, improves both participation and results.

Author(s)	Year	Focus Area	Population	Key Findings
Van Dieën et al.	1999	Lifting biomechanics (stoop vs. squat)	Healthy adults	Improper lifting increases spinal load and injury risk
Callaghan & McGill	2001	Spinal loading during posture	General adult population	Unsupported sitting increases lumbar stress
Marras et al.	1993	Occupational trunk motion & back disorders	Industrial workers	Repetitive trunk motion linked to back injuries
Szeto et al.	2002	Postural kinematics in office work	Office workers (symptomatic/asymptomatic)	Forward head posture affects neck & shoulder mechanics
Kim & Kim	2016	Posture correction through exercise	University students	8-week posture training reduces musculoskeletal pain
Gordon & Bloxham	2016	Effect of exercise on low back pain	Adults with non-specific pain	Physical activity beneficial in reducing chronic pain
Shariat et al.	2018	Stretching and ergonomics intervention	Office workers	Training + ergonomic changes reduced discomfort
Sedaghati et al.	2021	Sedentary behaviour & MSDs	Multiple populations (review)	Sedentary time is strongly linked to postural issues and pain
Hoy et al.	2014	Global burden of low back pain	Worldwide data	Low back pain is the leading cause of disability globally
Punnett & Wegman	2004	Work-related MSDs and ergonomics	Working adults	Ergonomic awareness reduces the risk of work-related injuries
Page et al.	2012	Muscle imbalance & corrective exercises	Rehabilitation patients	Janda's approach improves movement efficiency and posture
Katzmarzyk et al.	2009	Sitting time and mortality	Adults (epidemiological study)	Prolonged sitting linked to health risks, including back pain

### Summary of Review Section:

The reviewed literature strongly supports the view that improper lifting technique, combined with static postural stress, increases the risk of musculoskeletal problems in young adults. Structured corrective exercise programs, along with posture education, are effective in improving postural alignment, reducing back pain and promoting safer lifting habits.

### 3. DISCUSSION

The evidence reviewed in this paper clearly indicates that lifting behaviour and postural control play a vital role in musculoskeletal health, particularly among young adults aged 18–35 years. Improper lifting mechanics, compounded by sedentary lifestyles and uncorrected posture habits, contribute significantly to lower back pain, joint stress and muscular imbalance. Unlike elite athletes who undergo biomechanical training, the general population often lacks even basic awareness of safe lifting and spinal alignment principles, which exacerbates injury risk in this age group.

Corrective exercise interventions targeting the core, spinal alignment, and flexibility have consistently demonstrated effectiveness in reducing symptoms and improving posture. Notably, programs that include proprioceptive training, functional movements and educational components show better long-term outcomes. The responsiveness of young adults to such interventions is particularly promising, as this age group demonstrates both physical adaptability and psychological readiness to change health-related behaviour. Despite these positive findings, it is important to recognise that outcomes can

vary based on factors such as gender, baseline physical condition and consistency of program adherence. Moreover, while many studies report improvements, few assess long-term follow-up, making it unclear whether the benefits of corrective training are sustained beyond the intervention period.

### Identified Gaps in the Literature

- Lack of longitudinal studies: Most available research focuses on short-term interventions, with limited data on long-term effects of posture correction or lifting retraining in young adults.
- Limited real-world application: Many studies are conducted in controlled lab environments or with athletic populations, not reflecting the typical challenges of office workers, students, or casual gym-goers.
- Insufficient age-specific comparisons: While the 18–35 range is broad, relatively few studies compare responses to intervention across subgroups (e.g., 18–24 vs. 30–35 years).
- Gender-specific outcomes are underexplored: Though musculoskeletal pain perception and physical capacity can differ between males and females, most intervention trials do not analyse or report these differences adequately.
- Minimal focus on educational integration: There is a lack of large-scale studies incorporating posture and lifting education into school, university, or corporate wellness programs, where early intervention may be most effective.

#### 4. CONCLUSION

Musculoskeletal dysfunction due to faulty lifting behaviour and poor posture is a preventable yet prevalent concern among young adults. This review underscores the effectiveness of corrective exercises and ergonomic education in mitigating back pain, improving functional alignment and enhancing movement awareness in individuals aged 18–35 years. The findings strongly support the integration of structured, age-appropriate training and behavioural programs into fitness, rehabilitation and educational settings. Addressing the identified research gaps, especially through longitudinal and population-specific studies will be crucial in establishing sustainable solutions for musculoskeletal health and injury prevention in the early adult population.

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