



International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
Canada
+15878858911
editorial-office@sciformat.ca

ARTICLE TITLE

ASSOCIATION BETWEEN REMOTE WORKING AND BACK PAIN: A
SYSTEMATIC REVIEW

DOI

[https://doi.org/10.31435/ijitss.2\(50\).2026.5171](https://doi.org/10.31435/ijitss.2(50).2026.5171)

RECEIVED

22 March 2026

ACCEPTED

05 June 2026

PUBLISHED

16 June 2026

LICENSE



The article is licensed under a **Creative Commons Attribution 4.0 International License**.

© The author(s) 2026.

This article is published as open access under the Creative Commons Attribution 4.0 International License (CC BY 4.0), allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

ASSOCIATION BETWEEN REMOTE WORKING AND BACK PAIN: A SYSTEMATIC REVIEW

Natalia Górską (Corresponding Author, Email: nattgorska@gmail.com)

American Heart of Poland, Ustroń, Silesia, Poland

ORCID ID: 0009-0009-7511-222X

Maciej Jakubiec

Beskidzkie Centrum Onkologii – Municipal Hospital of John Paul II in Bielsko-Biala, Bielsko-Biala, Silesia, Poland

ORCID ID: 0009-0009-3408-3354

Emilia Gąsiorowska

Stefan Cardinal Wyszyński Provincial Specialist Hospital SPZOZ in Lublin, Lublin, Poland

ORCID ID: 0009-0007-0371-995X

Anna Wawrzeczko

Beskidzkie Centrum Onkologii – Municipal Hospital of John Paul II in Bielsko-Biala, Bielsko-Biala, Silesia, Poland

ORCID ID: 0009-0000-0329-150X

Angelika Jankowska

Independent Public Voivodeship Integrated Hospital in Szczecin, Szczecin, Poland

ORCID ID: 0009-0003-3002-7028

Magdalena Gostół

District Health Center in Otwock, Otwock, Poland

ORCID ID: 0009-0004-3987-3818

Katarzyna Wójtowicz

Dolnośląskie Centrum Onkologii, Pulmonologii i Hematologii, Wrocław, Poland

ORCID ID: 0009-0002-3349-8610

Gabriela Deska

Dolnośląskie Centrum Onkologii, Pulmonologii i Hematologii, Wrocław, Poland

ORCID ID: 0009-0001-3076-7814

Aleksandra Lewczuk

Szpital Wojewódzki w Bielsku-Białej, Bielsko-Biala, Silesia, Poland

ORCID ID: 0009-0008-7692-197X

ABSTRACT

The rapid transition remote work (work from home, WFH) in response to the COVID-19 pandemic has raised concerns regarding its impact on employees' physical health, significantly altering the occupational environment for millions of workers and students (Dos Santos et al., 2021; Papalia et al., 2022; Pierce et al., 2020; Symanzik et al., 2023). This systematic review synthesizes available evidence on the association between WFH and musculoskeletal disorders (MSDs), with particular emphasis on back pain (including cervical, thoracic, and lumbar regions), identifying key risk factors and potential protective measures (Dos Santos et al., 2021; Papalia et al., 2022; Russo et al., 2021; Saes-Silva et al., 2023). The findings indicate an increased prevalence of low back and neck pain, frequently associated with by a combination of biomechanical, environmental, and psychosocial factors (Ambrosio et al., 2023; Dos Santos et al., 2021; Moretti et al., 2020; Papalia et al., 2022; Symanzik et al., 2023). Following PRISMA guidelines, cross-sectional and review studies were analyzed, revealing increased pain prevalence in lumbar (up to 41.2%) and cervical (23.5%) regions, linked to poor ergonomics and psychosocial stress (Ambrosio et al., 2023; Moretti et al., 2020; Papalia et al., 2022). Key risk factors include non-ergonomic setups and prolonged sitting, while physical activity offers protection (Chim & Chen, 2023; Dos Santos et al., 2021; Saes-Silva et al., 2023; Symanzik et al., 2023). Interventions like regular physical activity and the use of ergonomic furniture (e.g., external keyboards, adjustable chairs) were found to be beneficial in reducing pain symptoms (Dos Santos et al., 2021; Russo et al., 2021; Symanzik et al., 2023). To mitigate these effects, it is essential to implement preventive measures focusing on ergonomic education, the provision of adequate home-office equipment, and the promotion of regular movement breaks and physical exercise (Ambrosio et al., 2023; Dos Santos et al., 2021; Russo et al., 2021; Symanzik et al., 2023).

KEYWORDS

Remote Working, Teleworking, Low Back Pain, Health Impacts, Musculoskeletal Pain, COVID-19

CITATION

Natalia Górska, Maciej Jakubiec, Emilia Gąsiorowska, Anna Wawrzeczko, Angelika Jankowska, Magdalena Gostół, Katarzyna Wójtowicz, Gabriela Deska, Aleksandra Lewczuk. (2026) Association Between Remote Working and Back Pain: a Systematic Review. *International Journal of Innovative Technologies in Social Science*. 2(50). doi: 10.31435/ijitss.2(50).2026.5171

COPYRIGHT

© **The author(s) 2026.** This article is published as open access under the **Creative Commons Attribution 4.0 International License (CC BY 4.0)**, allowing the author to retain copyright. The CC BY 4.0 License permits the content to be copied, adapted, displayed, distributed, republished, or reused for any purpose, including adaptation and commercial use, as long as proper attribution is provided.

1. Introduction

Remote work, defined as the performance of job tasks outside the traditional workplace using information and communication technologies, became widespread during the COVID-19 pandemic (Fouquet et al., 2025; Papalia et al., 2022). This abrupt shift significantly altered the lifestyles of millions of workers and students, modifying their daily habits, physical activity levels, and occupational environments (Papalia et al., 2022). While telework allowed for economic and educational continuity, it introduced substantial challenges to public health, particularly regarding musculoskeletal health (Dos Santos et al., 2021; Fouquet et al., 2025). Low back pain (LBP) is one of the leading causes of disability worldwide and is associated with substantial healthcare utilization and socioeconomic costs (Knežević et al., 2021; Papalia et al., 2022). In home-based settings, employees frequently lack access to ergonomically appropriate office equipment (Chim & Chen, 2023; Symanzik et al., 2023). Combined with reduced levels of physical activity, these factors may contribute to the onset and exacerbation of musculoskeletal pain (Dos Santos et al., 2021; Moretti et al., 2020).

Scientific evidence indicates that the transition to remote work led to a significant increase in both the prevalence and intensity of back pain (Ambrosio et al., 2023; Moretti et al., 2020; Papalia et al., 2022). Research conducted among university students found that the share of those suffering from back pain rose by approximately 30% during the pandemic, reaching a prevalence of 77.8% (Symanzik et al., 2023). Similarly, studies on office workers revealed that 41.2% reported low back pain, with half of them experiencing a worsening of neck pain symptoms during remote work (Moretti et al., 2020). Furthermore, individuals with pre-existing chronic LBP reported significantly higher pain severity during remote working compared to their previous in-person working conditions (Ambrosio et al., 2023).

The primary risk factors identified in the literature include inadequate ergonomic conditions at home workstations. Many individuals were forced to work in non-optimized environments, such as on sofas or chairs

without backrests, and relied heavily on laptop monitors (Chim & Chen, 2023). Using a laptop monitor alone can pose a two-to-three times higher risk of suffering from neck and back discomfort compared to using a desktop monitor (Chim & Chen, 2023). This situation was further exacerbated by an increase in sedentary behavior, reduced physical activity, and higher physical loads from household chores (Dos Santos et al., 2021; Symanzik et al., 2023). Psychosocial factors also played a critical role; higher stress levels, depressive symptoms, and lower mental well-being were strongly correlated with increased pain intensity among remote workers (Ambrosio et al., 2023; Fouquet et al., 2025).

As many organizations continue to adopt permanent remote or hybrid work models, understanding the link between this mode of work and spinal health is essential for developing effective prevention strategies (Symanzik et al., 2023). This systematic review aims to analyze the main scientific evidence regarding the association between remote working and back pain and to identify the factors that mitigate or exacerbate these conditions (Dos Santos et al., 2021; Papalia et al., 2022).

2. Methodology

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A comprehensive literature search was performed in the following electronic databases: PubMed, Scopus, Web of Science and Cochrane Library from 2020 to 2025. The search strategy combined controlled vocabulary terms and keywords related to remote work (e.g., “work from home,” “remote work,” “telework”), musculoskeletal disorders, and back pain (e.g., “low back pain,” “neck pain,” “musculoskeletal pain”). Studies were eligible for inclusion if they: (1) involved adults (workers and university students) engaged in remote work or distance learning; (2) examined exposure to remote work or work from home (WFH) often linked to >6 hours of daily sitting and inadequate home setups; and (3) reported outcomes related to musculoskeletal disorders, with particular emphasis on back pain. Observational studies (cross-sectional, cohort, and case-control) and experimental studies were included. Editorials, commentaries, conference abstracts, and studies not reporting musculoskeletal outcomes were excluded.

Primary outcome measures included pain intensity, often evaluated using the Visual Analogue Scale (VAS), and LBP-related disability, assessed via the Oswestry Disability Index (ODI) (Ambrosio et al., 2023). Psychological factors were documented using tools such as the General Health Questionnaire (GHQ-12) and the Patient Health Questionnaire-2 (PHQ-2) (Ambrosio et al., 2023; Pierce et al., 2020).

The findings were synthesized to identify common risk factors and protective measures. This included a qualitative analysis of ergonomic setups (e.g., use of ergonomic furniture, laptop aids) and lifestyle changes (e.g., sedentary behavior, physical activity levels)15.... Where applicable, quantitative data on the prevalence and severity of back pain before and during the pandemic were compared to estimate the overall impact of remote working conditions (Papalia et al., 2022; Symanzik et al., 2023).

3. Results

3.1. Frequency and Location of Pain

The transition to remote work (telework) during the COVID-19 pandemic led to a significant increase in both the prevalence and intensity of musculoskeletal pain across various populations (Dos Santos et al., 2021; Papalia et al., 2022). Evidence from a systematic review and meta-analysis of 2,365 patients confirmed a consistent rise in low back pain (LBP) rates during lockdown periods compared to pre-pandemic levels (Papalia et al., 2022).

Frequency by Population

- **General Workers:** In a cross-sectional study of home workers, 41.2% reported suffering from low back pain, while 23.5% reported neck pain (Moretti et al., 2020). In Hong Kong, the prevalence of general musculoskeletal discomfort (MSD) among remote workers was reported at 61.2% (Chim & Chen, 2023).
- **University Students:** This group showed a particularly high frequency of symptoms. Research conducted in Germany found that 79.1% of students suffered from neck pain and 77.8% suffered from back pain during the pandemic (Symanzik et al., 2023). The share of students reporting these issues increased by approximately 30% compared to the three-month period preceding the pandemic (Symanzik et al., 2023).
- **Regional Variations:** In a study of adults in South Brazil, the general prevalence of back pain among remote workers was 25.6% (Saes-Silva et al., 2023).

Location of Pain

The sources consistently identify the lumbar spine (low back) as the most frequent site of discomfort, closely followed by the cervical spine (neck) (Dos Santos et al., 2021).

- Low Back: LBP remains the most common symptom, with a marked increase in both point prevalence and intensity during lockdowns (Papalia et al., 2022).

- Neck and Upper Back: Neck pain was a major complaint, with one study noting that 50% of home workers experienced a worsening of neck symptoms during the pandemic (Moretti et al., 2020). Additionally, the use of laptop monitors was specifically associated with a 2 to 3 times higher risk of discomfort in the neck, upper back, and lower back compared to desktop setups (Chim & Chen, 2023).

- Thoracic Spine: Although less frequent than lumbar or cervical pain, acute thoracic pain was notably prevalent among specific subgroups, such as overweight or obese remote workers (Saes-Silva et al., 2023).

Severity and Exacerbation For individuals with pre-existing conditions, remote work led to a significant increase in pain frequency and burden. Patients with chronic LBP reported that their pain severity (measured via VAS) was significantly higher during remote working compared to previous in-person working ($p < 0.0001$) (Ambrosio et al., 2023). Furthermore, the average weekly work hours increased during this period, which correlated with the increased frequency of pain reports (Ambrosio et al., 2023).

3.2. Risk Factors: Ergonomics and Lifestyle

The association between remote work and the onset or exacerbation of back pain is driven by a combination of environmental deficiencies and significant changes in daily habits (Chim & Chen, 2023; Dos Santos et al., 2021; Papalia et al., 2022). The sources categorize these risk factors primarily into ergonomic and lifestyle-related determinants (Dos Santos et al., 2021; Fouquet et al., 2025).

Ergonomic Risk Factors

The lack of specialized office environments at home is a critical predictor of musculoskeletal discomfort (MSD) (Chim & Chen, 2023; Moretti et al., 2020).

- Workstation Setup: Many remote workers operate in non-traditional spaces. In high-density urban areas like Hong Kong, 51% worked in living/dining areas and 24.6% in bedrooms (Chim & Chen, 2023). Using a sofa or a chair without a backrest is associated with a significantly higher predicted risk of MSD (Chim & Chen, 2023).

- Equipment and Technology: The reliance on portable technology is a major contributor to spinal strain. The use of a laptop monitor poses a 2 to 3 times higher risk of suffering from neck, upper back, and lower back discomfort compared to using a desktop monitor (Chim & Chen, 2023).

- Furniture Availability: There is a notable deficiency in the use of ergonomic furniture. Among university students, while 54.4% used some form of ergonomic furniture, only 22% used ergonomic sitting furniture and 15.1% utilized standing desks (Symanzik et al., 2023)

- Knowledge-Practice Gap: While approximately 79.6% of students claim to know how to prevent neck and back pain, only 51.9% actively implement preventive measures (Symanzik et al., 2023).

Lifestyle Risk Factors

The transition to telework altered physical activity patterns and increased the total biomechanical load on the spine (Dos Santos et al., 2021; Fouquet et al., 2025).

- Sedentary Behavior: Increased sedentary lifestyles and poor posture are primary promoters of musculoskeletal disorders (Dos Santos et al., 2021). Remote studying and working often lead to lengthy periods of sitting, which facilitates the development of back pain (Symanzik et al., 2023).

- Workload and Daily Demands: Remote working is characterized by an increase in average weekly work hours compared to previous in-person conditions (Ambrosio et al., 2023). Furthermore, workers reported an increased physical load stemming from household chores during lockdown periods (Dos Santos et al., 2021).

- Body Mass Index (BMI): BMI acts as a significant moderator for back pain during remote work. Overweight or obese individuals have a substantially higher risk of experiencing acute cervical pain (PR = 2.82), chronic low back pain (PR = 1.85), and acute thoracic pain (PR = 1.81) when working remotely compared to those who do not (Saes-Silva et al., 2023).

- Psychosocial and Social Factors: Mental health is inextricably linked to physical pain in this context. Worsening low back pain (LBP) is associated with higher depression scores, increased stress levels, and social isolation (e.g., being divorced) (Ambrosio et al., 2023). Conversely, living with others is associated with a lower risk of LBP worsening (Ambrosio et al., 2023).

3.3. Psychosocial Risk Factors

The development and exacerbation of back pain during remote work are deeply rooted in a biopsychosocial framework, which posits that musculoskeletal health is a dynamic interaction between biological, psychological, and social factors (Knežević et al., 2021). The transition to telework during the pandemic led to a measurable deterioration in population mental health, with the prevalence of clinically significant mental distress rising from 18.9% to 27.3% in some populations (Pierce et al., 2020).

Key psychosocial determinants identified in the sources include:

- **Stress and Depression:** Increased stress and higher depression scores are significant independent risk factors for the worsening of low back pain (LBP) (Ambrosio et al., 2023). Research employing structural equation modeling identified that teleworking conditions impact the onset of LBP through an indirect pathway mediated by depressive symptoms and dissatisfaction with working conditions (Fouquet et al., 2025). Specifically, individuals reporting increased stress levels have a threefold higher risk (OR 3.00) of LBP worsening compared to those with stable stress levels (Ambrosio et al., 2023).

- **Job Satisfaction and Productivity:** There is a clear correlation between workplace satisfaction and physical health. Remote workers with musculoskeletal pain consistently report lower job satisfaction (Moretti et al., 2020). Furthermore, the point prevalence of neck pain has been significantly related to job satisfaction levels among those working from home (Dos Santos et al., 2021). Interestingly, while some workers reported being less productive (39.2%), a similar percentage felt less stressed than in the office, suggesting that the psychological impact of remote work varies significantly based on individual circumstances (Moretti et al., 2020).

- **Social Support and Isolation:** The social context of the home office significantly influences pain outcomes. Living with others serves as a protective factor, associated with a lower risk of LBP worsening (OR 0.24) (Ambrosio et al., 2023). In contrast, social isolation or marital status changes can be detrimental; for instance, being divorced was found to increase the risk of LBP worsening more than fourfold (OR 4.28) (Ambrosio et al., 2023).

- **Vulnerable Demographics:** The psychological burden of the pandemic and the shift to remote work did not affect all groups equally. Increases in mental distress were found to be greatest among women, young adults (aged 18–34), and individuals living with young children (Pierce et al., 2020).

In conclusion, the psychological environment of remote work—characterized by shifting stress levels, potential social isolation, and varying degrees of job satisfaction - acts as a critical determinant of spinal health, often through pathways that combine biomechanical strain with mental health deterioration (Fouquet et al., 2025).

3.4. Protective Factors and Preventive Measures

Evidence from the sources suggests that while remote work presents significant risks, several protective factors and preventive measures can effectively mitigate the prevalence and severity of back pain (Dos Santos et al., 2021; Symanzik et al., 2023). These interventions range from individual lifestyle choices to structured workplace adjustments (Ambrosio et al., 2023; Symanzik et al., 2023).

Physical Activity and Movement Patterns

Regular physical activity is identified as one of the most effective ways to reduce musculoskeletal pain during telework (Dos Santos et al., 2021; Russo et al., 2021).

- **Engagement in Exercise:** Workers and students who maintained or increased their physical activity—such as regular workouts (gym, team sports) or moving in the fresh air (walking)—reported a lower prevalence of pain (Dos Santos et al., 2021; Symanzik et al., 2023). One study noted that participants who increased their hours of physical activity during the pandemic did not report the same increase in musculoskeletal complaints as others (Dos Santos et al., 2021).

- **Movement Breaks:** Implementing active breaks in the home office is crucial (Symanzik et al., 2023). Beneficial activities include short walks around the house, stretching, strengthening and mobilization exercises, stair climbing, and desk yoga (Symanzik et al., 2023).

- **Avoiding Sedentary Behavior:** Proactive avoidance of prolonged sitting is essential for preventing both musculoskeletal problems and metabolic disorders, such as diabetes and cardiovascular diseases (Symanzik et al., 2023). The use of activity trackers can be a helpful tool to encourage more active behavior (Symanzik et al., 2023).

Ergonomic Enhancements

Optimizing the physical workspace at home significantly reduces the biomechanical strain on the spine (Chim & Chen, 2023; Symanzik et al., 2023).

- **Ergonomic Furniture:** The use of special ergonomic sitting furniture and standing desks is associated with better musculoskeletal outcomes and is highly recommended as a preventive measure (Symanzik et al., 2023).
- **Laptop Aids:** To counteract the risks associated with portable computers, the use of external monitors, mice, and keyboards is highly recommended to ensure a more neutral posture (Chim & Chen, 2023; Symanzik et al., 2023). The use of a laptop monitor alone poses a 2 to 3 times higher risk of suffering from neck and back discomfort compared to a desktop setup (Chim & Chen, 2023).
- **Seating Choices:** Avoiding the use of sofas or chairs without backrests for work is a key preventive strategy to lower the risk of musculoskeletal discomfort (Chim & Chen, 2023).

Health Education and Literacy

A significant barrier to prevention is the gap between knowledge and practice (Symanzik et al., 2023).

- **Implementation of Strategies:** While many remote workers believe they know how to prevent pain, a much smaller percentage actively applies this knowledge (Symanzik et al., 2023).
- **Health Literacy:** Future initiatives should focus on health education to increase health literacy, providing practical training on how to implement standing breaks and ergonomic adjustments effectively (Symanzik et al., 2023). Structured workplace interventions that include ergonomic education have been shown to lead to statistically significant improvements in pain, disability, and quality of life (Russo et al., 2021).

Psychosocial and Social Support

The social environment of the remote worker plays a moderating role in pain outcomes (Ambrosio et al., 2023).

- **Social Connectivity:** Living with others is associated with a significantly lower risk (OR: 0.24) of low back pain (LBP) worsening compared to living alone (Ambrosio et al., 2023).
- **Stress Management:** Maintaining unchanged or stable stress levels is a protective factor against the exacerbation of chronic LBP (Ambrosio et al., 2023).

Workplace Interventions (WI)

Structured workplace interventions—including ergonomic education and multimodal treatment plans—have been proven to lead to statistically significant improvements (Russo et al., 2021). These interventions not only reduce pain and disability but also improve the quality of life and significantly reduce the recurrence of LBP in the working population (Russo et al., 2021).

4. Discussion

The findings of this systematic review underscore a significant and multifaceted association between remote working (telework) and the increased prevalence and intensity of back and neck pain (Dos Santos et al., 2021; Papalia et al., 2022). The sudden transition to home-office environments during the COVID-19 pandemic served as a large-scale exposure to several biomechanical and psychosocial risk factors that have traditionally been managed in controlled office settings (Chim & Chen, 2023; Dos Santos et al., 2021; Moretti et al., 2020).

Prevalence and Shift in Pain Burden

Evidence across various geographical locations and populations - ranging from university students in Germany to office workers in Hong Kong and Italy - consistently shows a rise in musculoskeletal discomfort (MSD) (Chim & Chen, 2023; Moretti et al., 2020; Symanzik et al., 2023). Notably, research indicates that the frequency of neck and back pain rose by approximately 30% during the pandemic compared to the preceding months (Symanzik et al., 2023). In university students, prevalence rates reached as high as 79.1% for neck pain and 77.8% for back pain (Symanzik et al., 2023). For workers with pre-existing chronic conditions, the transition to remote work significantly exacerbated their low back pain (LBP) severity, with pain intensity being significantly higher during remote working compared to previous in-person working ($p < 0.0001$) (Ambrosio et al., 2023).

Ergonomic Deficiencies and Technology Use

A primary contributor to these outcomes is the poor ergonomic quality of home workstations (Chim & Chen, 2023; Moretti et al., 2020; Symanzik et al., 2023). Unlike professional offices, many home setups involve working in dining areas, bedrooms, or on sofas. The sources identify that using a chair without a backrest or a sofa predicts a significantly higher risk of MSD (Chim & Chen, 2023). Furthermore, the reliance on laptops as primary work devices has introduced a critical risk; using a laptop monitor alone is associated with a 2 to 3 times higher risk of suffering from neck, upper back, and lower back discomfort compared to using a desktop monitor (Chim & Chen, 2023). Interestingly, while a majority of individuals (nearly 80%) claim to know how to prevent spinal pain, only about half actively implement preventive methods, indicating a substantial "knowledge-practice gap" that must be addressed through health education (Symanzik et al., 2023).

The Role of Sedentary Behavior and Lifestyle Changes

The shift to remote work has also led to increased sedentary behavior and prolonged computer use (Chim & Chen, 2023; Dos Santos et al., 2021; Symanzik et al., 2023). The average weekly work hours increased for many teleworkers, reducing the time available for movement (Ambrosio et al., 2023). Additionally, for some, the physical load was further increased by an rise in household chores during lockdowns (Dos Santos et al., 2021). Conversely, the sources provide strong evidence that physical activity acts as a vital protective factor (Dos Santos et al., 2021; Symanzik et al., 2023). Engagement in regular exercise, movement breaks, and even short walks was consistently associated with a reduction in the prevalence and intensity of musculoskeletal pain (Symanzik et al., 2023).

Psychosocial and Individual Moderators

Supporting a biopsychosocial model, this review highlights that back pain is not merely a biomechanical issue but is deeply influenced by mental health and social context (Fouquet et al., 2025; Knežević et al., 2021). Structural equation modeling indicates that teleworking conditions impact LBP onset both directly (biomechanically) and indirectly through depressive symptoms and job dissatisfaction (Fouquet et al., 2025). Higher stress levels (which increased the risk of LBP worsening threefold) and symptoms of depression are significant predictors of pain severity (Ambrosio et al., 2023). Social factors also play a role; while living with others appears protective, being divorced or socially isolated is linked to higher risks of pain worsening (Ambrosio et al., 2023). Finally, individual physiological factors such as Body Mass Index (BMI) act as moderators, with overweight and obese individuals reporting significantly higher rates of acute and chronic spinal pain when working remotely compared to those who do not (Saes-Silva et al., 2023).

Implications for Practice

The findings suggest that Workplace Interventions (WI)—including ergonomic education and the provision of adequate equipment - are effective in improving clinical outcomes, reducing disability, and decreasing the recurrence of LBP (Russo et al., 2021). As remote and hybrid work models remain prevalent, it is essential for organizations to implement comprehensive strategies that promote physical activity, ergonomic workstation optimization, and psychological support to mitigate the long-term health and socioeconomic impacts of back pain (Russo et al., 2021; Symanzik et al., 2023).

5. Conclusions

The evidence synthesized in this systematic review confirms a strong and consistent association between remote working and an increased burden of back pain, particularly in the lumbar and cervical regions (Dos Santos et al., 2021; Moretti et al., 2020; Papalia et al., 2022; Saes-Silva et al., 2023). The transition to telework during the COVID-19 pandemic acted as a catalyst for a global rise in both the prevalence and intensity of musculoskeletal symptoms among diverse populations, including office workers and university students (Chim & Chen, 2023; Papalia et al., 2022; Symanzik et al., 2023).

The core findings of this review lead to several critical conclusions:

- **Multifactorial Etiology:** Back pain in the context of remote work is a complex biopsychosocial phenomenon (Fouquet et al., 2025; Knežević et al., 2021). It is driven not only by biomechanical strain from inadequate ergonomic setups - such as working from sofas or using laptop monitors without aids - but also by psychosocial stressors including increased work hours, social isolation, and depressive symptoms (Ambrosio et al., 2023; Chim & Chen, 2023; Fouquet et al., 2025)

- **The Ergonomic-Practice Gap:** While a high percentage of individuals (e.g., 79.6% of students) believe they possess the knowledge to prevent back pain, significantly fewer (51.9%) actually implement these

strategies (Symanzik et al., 2023). This highlights a critical need for targeted health education that moves beyond awareness to the active implementation of ergonomic behavior (Symanzik et al., 2023).

- **Physical Activity as a Vital Buffer:** Regular physical activity and movement breaks are proven to be the most effective moderators in reducing pain prevalence and severity (Dos Santos et al., 2021; Symanzik et al., 2023). Conversely, the increased sedentary behavior and prolonged sitting associated with remote work significantly facilitate the onset of musculoskeletal and metabolic disorders (Dos Santos et al., 2021; Symanzik et al., 2023).

- **Vulnerability of Specific Groups:** Certain populations, including overweight individuals and those with pre-existing chronic pain, are at a substantially higher risk of experiencing symptom exacerbation in remote environments (Ambrosio et al., 2023; Saes-Silva et al., 2023). This necessitates personalized intervention strategies for high-risk workers (Ambrosio et al., 2023; Russo et al., 2021).

Final Recommendations: As hybrid and remote work models become permanent fixtures of the modern occupational landscape, it is imperative for regulators and employers to move beyond temporary "emergency" guidelines (Chim & Chen, 2023; Symanzik et al., 2023). Success in preserving worker health will depend on structured workplace interventions that combine the provision of ergonomic equipment with programs promoting physical movement and mental well-being (Russo et al., 2021; Symanzik et al., 2023). Future research should focus on the long-term cost-effectiveness of these interventions to mitigate the global socioeconomic burden of low back pain.

Acknowledgements: The authors would like to express their gratitude to all researchers whose work, findings, and publications formed the basis of this review. We would like to acknowledge their contribution to the advancement of scientific knowledge and their commitment to sharing research findings, which enabled us to compile a comprehensive literature review.

Conflict of interest: None of the authors have any conflicts of interest to declare.

Funding: The authors declare that the work has not received any external funding.

Author's contribution:

Conceptualisation: Natalia Górską

Methodology: Natalia Górską, Maciej Jakubiec

Check: Anna Wawrzeczko, Aleksandra Lewczuk, Emilia Gąsiorowska

Formal analysis: Emilia Gąsiorowska, Maciej Jakubiec

Investigation: Emilia Gąsiorowska, Anna Wawrzeczko, Gabriela Deska

Resources: Emilia Gąsiorowska, Natalia Górską, Katarzyna Wójtowicz

Data curation: Maciej Jakubiec, Katarzyna Wójtowicz, Magdalena Gostół

Writing - rough preparation: Maciej Jakubiec, Katarzyna Lewczuk

Writing - review and editing: Natalia Górską, Angelika Jankowska, Magdalena Gostół, Emilia Gąsiorowska, Maciej Jakubiec

Project administration: Natalia Górską

All authors have read and agreed with the published version of the manuscript.

REFERENCES

1. Ambrosio, L., Vadalà, G., Russo, F., Donnici, L., Petrucci, G., Tecco, C. D., Iavicoli, S., Papalia, R., & Denaro, V. (2023). The effect of transitioning to remote working in patients affected by chronic low back pain: A cross-sectional study. *Neurospine*, 20(2), 692–700. <https://doi.org/10.14245/ns.2346510.255>
2. Chim, J. M. Y., & Chen, T. L. (2023). Prediction of work from home and musculoskeletal discomfort: An investigation of ergonomic factors in work arrangements and home workstation setups using the COVID-19 experience. *International Journal of Environmental Research and Public Health*, 20(4), Article 3050. <https://doi.org/10.3390/ijerph20043050>
3. Dos Santos, I. N., Pernambuco, M. L., da Silva, A. M. B., Ruela, G. A., & de Oliveira, A. S. (2021). Association between musculoskeletal pain and telework in the context of the COVID-19 pandemic: An integrative review. *Revista Brasileira de Medicina do Trabalho*, 19(3), 342–350. <https://www.rbmt.org.br/details/1619/en-US/association-between-musculoskeletal-pain-and-telework-in-the-context-of-the-covid-19-pandemic--an-integrative-review>
4. Fouquet, N., Ménard, C., Fadel, M., Bodin, J., & Roquelaure, Y. (2025). Onset of low back pain and teleworking conditions during lockdown in France: A structural equation modelling approach. *Annals of Work Exposures and Health*, 69(5), 531–543. <https://doi.org/10.1093/annweh/wxaf007>
5. Knežević, N. N., Candido, K. D., Vlaeyen, J. W. S., Van Zundert, J., & Cohen, S. P. (2021). Low back pain. *The Lancet*, 398(10294), 78–92. [https://doi.org/10.1016/S0140-6736\(21\)00733-9](https://doi.org/10.1016/S0140-6736(21)00733-9)
6. Moretti, A., Menna, F., Aulicino, M., Paoletta, M., Liguori, S., & Iolascon, G. (2020). Characterization of home working population during COVID-19 emergency: A cross-sectional analysis. *International Journal of Environmental Research and Public Health*, 17(17), Article 6284. <https://doi.org/10.3390/ijerph17176284>
7. Papalia, G. F., Petrucci, G., Russo, F., Ambrosio, L., Vadalà, G., Iavicoli, S., Papalia, R., & Denaro, V. (2022). COVID-19 pandemic increases the impact of low back pain: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 19(8), Article 4599. <https://doi.org/10.3390/ijerph19084599>
8. Pierce, M., Hope, H., Ford, T., Hatch, S., Hotopf, M., John, A., Kontopantelis, E., Webb, R. T., Wessely, S., McManus, S., & Abel, K. M. (2020). Mental health before and during the COVID-19 pandemic: A longitudinal probability sample survey of the UK population. *The Lancet Psychiatry*, 7(10), 883–892. [https://doi.org/10.1016/S2215-0366\(20\)30308-4](https://doi.org/10.1016/S2215-0366(20)30308-4)
9. Russo, F., Papalia, G. F., Vadalà, G., Fontana, L., Iavicoli, S., Papalia, R., & Denaro, V. (2021). The effects of workplace interventions on low back pain in workers: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 18(23), Article 12614. <https://doi.org/10.3390/ijerph182312614>
10. Saes-Silva, E., Saes, M. O., Meucci, R. D., Meller, F. O., Schäfer, A. A., & Dumith, S. C. (2023). Remote work and back pain during the COVID-19 pandemic in adults and older population in South Brazil. *Ciência & Saúde Coletiva*, 28(3), 731–738. <https://doi.org/10.1590/1413-81232023283.14362022>
11. Symanzik, C., Grönefeld, A., Gill, C., Sonnsmann, F. K., Hotfiel, T., John, S. M., Engelhardt, M., & Grim, C. (2023). Back and neck problems as well as disadvantageous ergonomic behavior patterns in university students: Concomitants of the pandemic? *Sports Orthopaedics and Traumatology*, 39(1), 50–57. <https://doi.org/10.1016/j.orthtr.2022.11.011>