

Precarious Work and its Association With Musculoskeletal Disorders: A Systematic Review

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ABSTRACT

The present study investigated the impact of dangerous work on Musculoskeletal Disorders (MSDs) by examining the 2010 to 2024 literature from four databases: PubMed, Web of Science, Scopus, and PsycINFO. These studies followed quantitative, qualitative, or mixed method designs, evaluating MSD results in relation with employment security, income inadequacy, and lack of rights and protections, as defined by the International Labor Organization (ILO). Of the 6,051 records identified, 11 studies met the pre-defined selection criteria. The results indicated an elevated risk of lower back pain, neck and shoulder strain, and repetitive strain injuries among workers, showing that precarious employment is associated with an increased risk of MSDs. However, the dependence on cross-sectional approaches limits the study's rigid conclusions.

Keywords-precarious work; musculoskeletal disorders; systematic review; social determinant of health

I. INTRODUCTION

The rise of industrialization and globalization has significantly altered the nature and extent of precarious work. Its characteristics vary based on the context of the labor arrangement, according to national and institutional policies. Developed nations are often assumed to have better social and economic conditions that may promote better personal health outcomes [1]. Despite safeguards, precarious working conditions are increasing, affecting over 64% of workers in developed nations [2], while being worse in developing nations. Additionally, this situation has worsened due to the impact of the pandemic on income and job security, which has led to an increase in uncertain work conditions [3]. MSDs are problems targeting muscles, bones, and connective tissues [4, 5]. The former are known to be caused by repetitive movements, poor ergonomics, and inadequate workplace safety practices. Research has revealed a negative correlation between precarious work and MSD rates. High levels of physical strain and workplace injuries have been reported, increasing the risk of developing MSDs. Workers often face high physical demands, low autonomy, and insufficient safety measures, which together increase the risk of developing MSDs [6], along with the psychosocial stress due to job insecurity and economic instability, which can worsen pain and delay recovery from musculoskeletal injuries [7, 8]. The relationship between

physical and psychosocial hazards is rarely examined, and tends to isolate ergonomics from employment-related risk factors. A major limitation of the existing literature is its narrow definition of precarious work, which is often limited to temporary contracts. Although the Employment Precariousness Scale (EPRES) provides a more thorough evaluation, it is not properly used [9]. Despite the growing interest in the connection between precarious employment and MSDs, much of the existing literature defines precarious work narrowly, focusing only on the type of employment contract, such as temporary, part-time, or agency work, overlooking the broader aspects on worker health. Authors in [10, 11] emphasized that precarious work is a multidimensional issue involving job insecurity, inadequate income, lack of control, limited rights, and unstable work schedules. The current study addresses this gap by applying a multidimensional framework of precarious work, along with emerging theoretical models, to analyze evidence of the relationship between distinct dimensions of precarious employment and MSD risk.

II. METHODOLOGY

A. Search Strategy

A systematic review was conducted considering PubMed, PsycINFO, Web of Science, and Scopus. Medical Subject Headings (MeSH) were used to select the search terms for this

review, which focused on occupational health and related literature [12]. Using a wide range of databases may not yield specific results for systematic reviews [13]. The keywords for the search are based on the multidimensional characteristics of precarious work [14].

B. Eligibility Criteria

1) Inclusion and Exclusion Criteria

The studies selected for this review met the following criteria:

- They were based on at least two out of the three dimensions of precarious employment (employment type, income inadequacy, and lack of rights and social protections).
- They reported the negative impact of precarious employment on the prevalence of musculoskeletal disorders.

- They were published between January 2010 and July 2024.
- Studies that were published in English and had full texts available.

C. Screening and Eligibility Assessment

Two independent reviewers conducted the initial search, data extraction, and quality assessment of the found records, using the GRADE quality assessment tool [15] to rate the papers: high, moderate, low, or very low. Each paper was assigned to one of the reviewers. A detailed eligibility criterion was followed for further quality assessment, as shown in Table I, and any discrepancies were resolved by a third reviewer or through mutual discussion. Systematic searches were conducted and the results were imported into the reference management software (EndNote). After removing duplicates, the authors performed title and abstract screening and identified 130 records for full-text review.

TABLE I. ELIGIBILITY CRITERIA FOR SELECTION OF STUDIES

Variable	Inclusion criteria	Exclusion criteria
Population type	Studies focused on working population ≥ 18 years of age	Studies where the population was under the age of 18 or not working were excluded.
Exposure type	Studies focused on "precarious work", "precarious employment", or work conditions that are defined as precarious were included	Studies which did not fall under this study's objective
Comparator type	Not applicable	Not applicable
Outcome type	The primary outcome of interest was musculoskeletal disorder and the results of the included studies were classified for the related outcomes.	
Study design	Included original studies (qualitative and quantitative observational studies) and reviews	Editorial letters, dissertations, commentaries, and expert opinions were excluded
Setting	No restriction by the type of setting	Not applicable
Year of publication	Articles published from 2010 onwards were included	Articles published before 2010 were excluded
Language	Study records written in English were included	-

D. Data Extraction

The following information was compiled into a Microsoft Excel spreadsheet: title of study, first author name, year of publication, study population (sample size, age, and sex), location/country, outcomes, precarious employment factors, and main findings of the study. Publication details, such as journal, author, year of study, and type of publication, were included when extracting data. Additionally, details on the study design, participant demographics, research methods, and eligibility criteria were taken into consideration. Information regarding study participants, including their demographic characteristics, the dimensions of their precarious work, and its impact on their well-being, was also reported. Furthermore, data related to outcome measures, including estimates of the prevalence of precarious work and its associated effects on MSDs, were collected.

III. RESULTS

A total of 6,051 records were identified through database searches, 537 of which were unique studies. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) screening process, only studies that met the inclusion criteria were selected, as depicted in Figure 1.

A. Multidimensional Nature of Precarious Work

Table II presents detailed information and the key findings of each included study. Six of the studies have characteristics of multidimensional nature and focus on major aspects of precarious work, such as employment type, income inadequacy, and lack of rights at work. Furthermore, workers in precarious conditions often experience increased stress and anxiety due to job uncertainty, which can result in negative health consequences, including MSDs [16]. Workers who lack control over their work demands and schedules may be forced to adopt uncomfortable postures or perform physically demanding tasks without sufficient breaks or support [17]. This is particularly evident in sectors with high turnover rates, where inconsistent working conditions, a major dimension of precarity, may increase the risk of musculoskeletal injuries [18]. These dimensions help assess the impact of precarious work on MSDs.

B. Presence of Musculoskeletal Disorders

After a thorough screening process, only 11 studies that met the selection criteria completely were selected, and are presented in Table II. The absence of significant empirical research may result from the different occupational health criteria, e.g., mental health and overall physical health, rather than a social determinant, such as precarious work. Seven studies reported a positive association between precarious employment and an increased risk of MSDs, such as lower

back pain (n = 7), neck and shoulder pain (n = 6), upper limb disorders (n = 4), and generalized multi-site pain (n = 3). Five studies used the Nordic Musculoskeletal Questionnaire (NMQ) to evaluate body pain symptoms. Authors in [18] found that precarious workers in Sweden experienced lower back and shoulder pain at nearly twice the rate of permanent employees, even after considering age, gender, and physical workload. Similarly, authors in [19] stated that Dutch workers with multiple precarious contracts were 23% more likely to report

neck and shoulder pain (PR = 1.23; 95% CI: 1.06–1.45). Three studies controlled for ergonomic exposures, such as manual handling, repetitive motions, awkward postures, and physical exertion. The results remained statistically significant, indicating that the association between job precariousness and MSDs cannot be explained solely by ergonomic risk factors [20]. Authors in [21] found that precarious work can worsen occupational health issues such as MSDs.

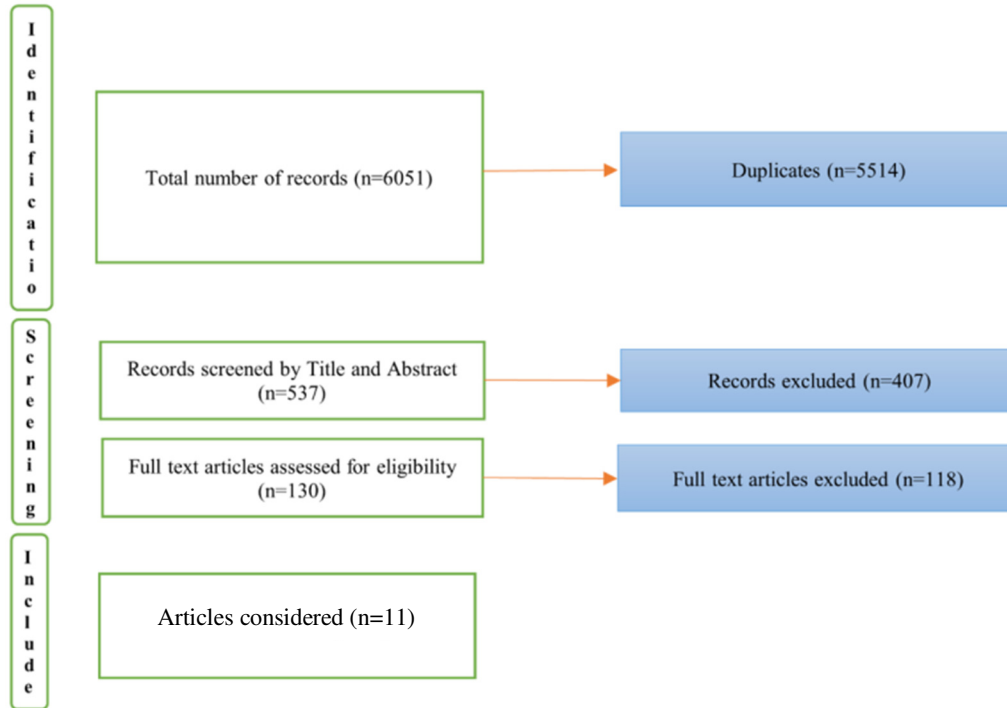


Fig. 1. PRISMA flowchart of the study selection [22].

TABLE II. CONSIDERED STUDIES

Ref	Country	Study design	Population	Precariousness measure	MSD outcome	Key findings
[18]	Sweden	Cross-sectional	415	EPRES	MSD pain and symptoms	No significant link between precariousness and MSD after adjustment
[19]	Netherlands	Cross-sectional	3609	Contract type and multiple jobs	MSD self-report	Multiple job holders: no MSD difference
[20]	Spain	Cross-sectional	10,024 salaried workers	EPRES	General musculoskeletal pain	Precarity linked to higher odds of reporting pain
[21]	USA	Cross-sectional	NHIS data (national sample)	Contractual insecurity	Work-related MSDs	Higher MSD prevalence in contingent workers
[25]	USA	Theoretical and survey	492	Subjective precariousness perception	Wellbeing including physical strain	Theoretical model: precariousness tied to unmet survival and physical needs
[33]	Multiple	Systematic review	33 studies	Various	Various MSDs	Strong evidence linking temporary employment to increased MSDs
[34]	South Korea	Longitudinal	7,070 wage workers	Contract type and insecurity	Back pain, arm/leg pain	Precarity predicted future MSDs, especially in lower back
[35]	Brazil	Cross-sectional	1607 public transport employees	EPRES	Neck/shoulder pain	Strong gradient: more precarious workers had higher MSD risk
[36]	Europe	Cross-sectional	France	Job insecurity and temporality	Shoulder pain	Job insecurity linked with musculoskeletal pain
[37]	South Korea	Longitudinal	21088 fifth Korean working conditions survey	Involuntary nonstandard jobs	Chronic low back pain	Persistent insecurity raised odds of chronic low back pain
[38]	Spain	Cross-sectional	457 nursing aids	Self-reporting questionnaire (multiple)	Low back pain, upper limb pain	Job insecurity and physical workload associated with higher risk of musculoskeletal symptoms

Authors in [20] indicated that precarious workers reported higher rates of MSDs than workers in healthy work environments. For example, a cross-sectional study in South Korea revealed a significant correlation between precarious employment and an increased incidence of musculoskeletal pain among hourly employees, highlighting the urgent need for targeted interventions for this population [23]. Similarly, it was found that precarious work conditions, such as a lack of job security, are associated with an increased risk of MSDs, particularly among populations exposed to higher ergonomic risks [24, 25]. Furthermore, temporary employment is associated with a higher likelihood of developing wrist and hand symptoms due to greater exposure to ergonomic risk factors. The psychosocial effects of precarious work are significant in that psychosocial risk factors can exacerbate physical health problems. For example, authors in [18] found that workers in precarious conditions reported poorer mental health, which was associated with more frequent physical complaints, including MSDs. The ever-changing nature of precarious work, with frequent alterations in tasks and work environments, may also lead to inconsistent biomechanical exposures, increasing the risk of developing MSDs over time [26]. Moreover, the socioeconomic context of precarious employment significantly influences health outcomes. Workers in temporary jobs often lack health insurance and other benefits, which prevents them from seeking timely medical treatment for musculoskeletal problems [27]. This lack of support can lead to a cycle of poor health, causing individuals to continue working despite experiencing pain. This can ultimately create chronic conditions and increased productivity loss [28]. The implications are profound: chronic MSDs diminish the quality of life and have broader economic impacts due to lost productivity and rising healthcare costs [29].

IV. DISCUSSION

Precarious employment has become a significant public health concern, especially considering its connection to physical health issues, such as MSDs [30]. This type of employment is associated with unfair working conditions, such as irregular schedules and limited access to benefits, which contribute to poor health conditions at work [31]. Workers in precarious positions are at a higher risk of developing MSDs due to increased physical strain and psychological stress tied to their work environment. This systematic review clarifies the relationship between the two primary factors affecting health in the occupational health and safety field. The review examined the association between precarious employment and MSDs and found a consistent relationship across multiple studies and geographic contexts. Despite variations in definitions and measurement tools, all of the included studies reported an elevated risk of MSDs among workers exposed to multiple forms of job insecurity [32].

A. Interpretation of Findings

The strongest associations were found for pain in the lower back, neck, and shoulders, which are commonly affected by ergonomic factors [33, 39]. However, several studies found statistically significant associations between job precarity and MSDs even after adjusting for physical workload, suggesting that psychosocial risk factors intrinsic to precarious work (e.g.,

job insecurity, lack of control, and fear of retaliation) may also contribute to MSDs [19, 38]. The chronic stress associated with precarious employment likely triggers biological pathways, such as heightened muscle tension, inflammatory responses, and compromised pain modulation. These pathways may exacerbate or prolong musculoskeletal symptoms [40, 41]. Furthermore, a lack of access to occupational health services, sick leave, and ergonomic arrangements, places precarious workers at risk for delayed recovery or worsening of pre-existing conditions [35]. In contexts where employment protections are weak, workers may be less likely to report symptoms or seek medical care, thereby underestimating the true prevalence of MSDs.

B. Methodological Considerations

This study relies on research that explicitly applies multidimensional measures of precariousness, such as EPRES. This approach increases comparability and analytical accuracy. However, few studies employed multidimensional frameworks, and even fewer examined physical health outcomes such as MSDs. Some unique findings emerged, including the stronger association between displacement-related aspects of precariousness and MSDs among women and younger workers [42], suggesting that demographic factors may moderate these associations. Another asset was the inclusion of occupation-specific contexts in some studies (e.g., healthcare and manufacturing), which provided granular insights, despite limiting generalization. Overall, the variability in study design, population, and precariousness dimensions underscores the complexity of this research area and the necessity of standardized, multidimensional approaches in future researches. Only three studies simultaneously adjusted for physical workload and psychosocial factors, underscoring the necessity of integrated models of occupational exposure that consider ergonomic and structural workplace stressors. Additionally, none of the studies addressed how race, migration status, or gender might compound the effects of precariousness on MSDs.

C. Comparison with Existing Literature

Authors in [43] examined the relationship between precarious work and general health. However, there are only a few studies concerning physical conditions such as MSDs. This study's findings align with research showing that poor job quality leads to work-related physical problems. Additionally, the present work extends this evidence by highlighting the structural nature of employment precarity as an independent risk factor.

D. Theoretical and Policy Implications

From a theoretical standpoint, these results support models such as the Job Demand-Control-Support (JDCS) framework and the Allostatic Load framework. These models explain how physical health is affected by chronic stress resulting from low control and continuous insecurity. Precarious work environments typically involve low decision authority, minimal social support, and continuous exposure to the threat of income loss, all of which are factors implicated in MSD development [42]. Therefore, policymakers and public health professionals must address the underlying causes of employment

precariousness. Interventions should extend beyond ergonomic improvements to include labor protections, fair wages, job stability, and worker empowerment. These structural changes are critical to reducing the burden of MSDs in vulnerable populations.

V. CONCLUSIONS

This systematic review reveals that although precarious employment is widely recognized as a cause of Musculoskeletal Disorders (MSDs), its complex nature is rarely examined in empirical studies. This paper highlights the connection between structural labor vulnerabilities and occupational health by applying a multidimensional framework to assess employment precariousness. The findings suggest that MSDs in precarious workers are not solely caused by ergonomic stressors, but are also influenced by broader contextual factors, including job insecurity, inadequate income, limited worker rights, and a lack of health and safety protections. These results emphasize the importance of considering psychosocial and physical health determinants in occupational risk assessments. Policies aimed at reducing work-related MSDs should move beyond contract stabilization alone. Improving low wages and creating consistent schedules may be equally critical to mitigating the physical burden experienced by precarious workers. Such reforms are essential for addressing the social disparity in health and reducing the disproportionate burden of MSDs among precarious workers. In conclusion, the relationship between precarious employment and MSDs is complex, involving physical, psychological, and socioeconomic factors. Addressing these challenges requires comprehensive policy solutions that improve working conditions, enhance job security, and provide adequate health support for precarious workers. Future research should continue investigating the specific mechanisms linking precarious work to health outcomes and emphasize developing effective strategies to mitigate these risks. While this review found an association, more studies based on strong methodological approaches are needed.

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