

Physical workload in the Teaching Profession: A Theoretical and Analytical Study

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Abstract

This study aims to shed light on the level of physical workload and its physical and psychological impact on teaching and education professionals. The study revealed a moderate level of physical workload among teaching and education professionals and a high level of physical and psychological impact associated with physical workload, particularly among educators in the early stages and in special education as they advanced in age. The study also concluded that given the nature of the profession, the level should logically be low; however, the emergence of moderate levels indicates that the repetition and continuity of professional workloads cannot be disregarded. It further concluded that the impact of physical workload is greater among those who do not engage in sports or physical activities. Finally, the study produced several recommendations.

Keywords: physical workload, physical exertion, physical fatigue, physiological work

Introduction

Physical workload is considered one of the most important occupational phenomena to address extensively, as it has accompanied the development of work, especially in the modern era. This has made it a central concern for all specialists, whether medical and biological specialists, work-design engineers, trade unions concerned with workers' rights and financial compensation, human resource managers, or even employers.

The increase in the level of physical load in manual work, which requires motor skills and the ability to lift and carry heavy objects from one place to another and is associated with a high incidence of occupational accidents and sick leave, was among the most important factors that

contributed to the diversification of studies on physical workload. However, most studies, such as Mebarki (2008) and Helander (2005), indicate that with technological development and the provision of tools and assistive devices for workers, interest in this phenomenon has declined, particularly in technologically advanced countries. If this is the case in occupations considered exhausting and energy-draining, the situation is even more notable within educational organisations, which are theoretically not physically exhausting.

Most studies have focused on the effects of workload and task accumulation on the human body. Abdullah and Md Hassan (2024) reported that the school-level education system is undergoing frequent changes to ensure more appropriate and efficient education. It subsequently became clear that these changes significantly affected teachers' workloads, leading to several negative consequences that may threaten their psychological, physical, and professional health.

Some studies have also indicated that, owing to the demands of their profession, teachers face a range of work-environment-related risk factors and are more vulnerable to musculoskeletal disorders (Tahernejad et al., 2024). In addition, Furuta et al. (2024) reported that a high workload was associated with musculoskeletal pain among public school teachers.

Nevertheless, most studies have neglected the effects of physical exertion during daily tasks. This represents a low, sustained physical workload over a long period, particularly in unexpected postures for which teachers are not physically or psychologically prepared. This is clearly evident in the teaching and education profession across its various categories and stages. The impact of physical workload is particularly apparent among educators of special-needs groups, teachers in the early stages (such as preparatory and first-year classes), physical education and sports teachers, and teachers of subjects that require motor skills (such as art education and music).

To identify the level of physical workload, we review a set of studies conducted under our supervision by a group of students from the University of Mascara within a research framework that includes several studies covering different levels and stages. Through these studies, most aspects of this phenomenon and the extent of its impact on teachers and educators practicing this profession were explored, along with the most important recent studies that addressed the subject. Therefore, this study is concerned with achieving the following objectives:

Research Objectives

The present study aims to achieve the following objectives:

- To identify the level of physical workload among teaching and education professionals.
- To identify the physical and psychological impact of physical workload on teaching and education professionals.

Significance of the Research

- The significance of the study lies in determining the level of physical workload among an important segment of society, namely, teachers, who constitute an integral part of shaping the future and building society.
- It helps to disseminate a culture of awareness among teachers and managers of the educational system to reduce the impact of physical workload on the productivity of teaching and education professionals and to guide them toward the use of strategies for confronting this phenomenon and reducing the magnitude of its impact on teachers' physical and psychological aspects.
- These findings open the door for researchers to study the effects of physical and physiological exertion on teachers' health, particularly among early-stage teachers and special education teachers.
- It strengthens the field of studies and research through a recent study that determines the level of physical workload, particularly in the local environment.

Theoretical Framework

Before addressing the subject of the study, it is possible to begin by understanding the phenomenon of physical workload and its representation in the literature of theoretical research as a physiological phenomenon accompanying human work, beginning with its various physiological and biological aspects and even its psychological effects on the worker. We therefore address the most important sources of energy for human use and the manner in which they are used and then turn to the factors affecting physiological work.

The term physical workload refers to the level of physiological work and the internal physiological processes accompanying human activity, particularly during high-load physical activity. The problem of hard physical work and physical workload lies in the decline in occupational activities when physical loads increase. Mebarki (2008) stated that modern

technology has enabled the development of high-capacity automatic tools and devices that have replaced many manual and intellectual tasks previously performed by workers. Despite this, heavy and muscularly arduous work still exists; even if it is not continuous, it is often temporary. This type of muscular work is found across many sectors, including agriculture, forestry, fishing, construction, transport, and many service activities.

Helander (2005) reported that, in most Western countries, physical workload is no longer as common as it once was. In manufacturing, material-handling tools, mechanical processes, and automation have replaced hard physical labor. Legislation has also established limits on the amount of workload to which employees may be exposed. Nevertheless, in some occupations, such as construction work, commercial fishing, and logging, workers still perform a great deal of physical work. Such work usually involves tasks that are less structured and difficult to mechanise.

According to Olof Åstrand, as cited by Mebarki (2004), the task entrusted to work physiology is to evaluate the strain and pressure imposed by work and its environment on the worker's body. An individual cannot use more than 30% to 40% of their maximal aerobic power during an 8-hour working day without developing objective or subjective symptoms. To alleviate the burdens of occupational activities, recreational activities such as sports, gardening, and leisure should be developed.

Energy Sources

Research into human physiological work focuses on the physiological processes that produce energy by transferring inhaled oxygen to the muscles, where fatty and carbohydrate compounds, namely, glycogen, are broken down to provide the energy required for muscle movement. This process is considered the primary energy source for the worker during ordinary activity. However, it is considered a secondary process preceded by nutritional conversion.

The process by which an organism converts food is, in fact, the primary source for the production of glycogen, carbohydrates, and fatty compounds, which are then stored in the human body. However, it becomes a secondary source of energy during prolonged work, as the process occurs concurrently with physical activity to provide the necessary energy.

Therefore, the carbohydrates that are stored in the liver and muscles in the form of glycogen, together with fatty acids, undergo metabolism, in which sugars and fats are broken down to produce energy used in mechanical work or muscular activity.

Metabolism is defined as the conversion of nutrients into mechanical work and heat, as reported by Åstrand (2003). To be useful to the body, nutrients are converted into a high-energy compound, adenosine triphosphate (ATP), which can release chemical energy to fuel the internal function of the body's organs. Initially, glucose is used, followed by glycogen and, finally, fat and protein. During continuous work, oxygen is available in the blood and is used in the conversion process so that each molecule of glucose produces 36 molecules of ATP. This is an energy-saving process called an aerobic process, which uses oxygen. In general, there are three metabolic processes:

Anaerobic Metabolism Without Lactic Acid: Energy Stored in Muscles

Energy production without lactic acid occurs at the beginning of physical activity, when work begins on tasks that require rapid movement and quick reactions. The energy stored in the muscles is used directly, without breakdown processes or the need for oxygen, owing to the speed required to perform some activities. There is not enough time to produce energy after the use of oxygen; hence, it is called anaerobic, meaning in the absence of oxygen.

Anaerobic Metabolism in the Presence of Lactic Acid: Glycogens in Muscles

This process follows the first process and is considered the second physiological process carried out by the organism to produce energy. In anaerobic metabolism in the presence of lactic acid, the carbohydrate compounds, namely, glycogen, found in the muscles and liver are broken down because they are easy to break down to produce energy despite the absence of oxygen. By this, we mean the organism's inability to wait for oxygen, which results in the secretion of lactic acid, the main cause of subsequent muscular fatigue.

Aerobic Metabolism in the Presence of Lactic Acid: Glycogen and Fatty Acids

This is the third and final stage in the sequence of energy-production processes. It occurs after a relatively long period of physical activity, when the human body breaks down glycogen and the fatty acids present in the liver and muscles by using oxygen to decompose these nutritional compounds, which cannot be broken down without oxygen. This process forms the basis of

physical activity, as it lasts for a long time, aligns with long daily working hours, and responds to the body's needs during prolonged, exhausting physical activity, such as a marathon.

The same phenomenon is also observed in static work with the continuous contraction of some muscles. In this case, for example, carrying a bag, the static contraction of the muscles leads to swelling, which may obstruct the arteries; consequently, oxygen cannot be transported to the muscles. This would create an anaerobic process. Since blood does not circulate and cannot remove waste products, lactic acid builds up. This, in turn, leads to local muscle fatigue and muscle pain (Åstrand, 2003).

The energy consumed for a task can be assessed by measuring the amount of oxygen used. Oxygen consumption is calculated by measuring the volume and oxygen content of exhaled and inhaled air. This analysis is conducted using special instruments, but measuring it is extremely cumbersome. An easier method is to measure heart rate, as heart rate provides an estimate of energy consumption in the middle range. Heart rate is less appropriate for assessing very low and very high rates of physical work (Åstrand, 2003).

Factors Affecting Physiological Work

Perhaps the most important factors affecting physiological work in the organism are the intensity and duration of physical work, as well as the body's capacity to accommodate large physical loads over a long period of time. Physiological work is also affected by various factors, including many internal and external factors, as reported by Mebarki (2004), as follows:

Internal Factors

The ability to perform muscular work depends primarily on the ability of muscle cells to convert the chemical energy of food into mechanical energy to move the muscles, as explained in the previous section. This cellular conversion capacity depends on the functions of internal systems, such as the body's nutritional state, the nature and quality of ingested food, the frequency of meals, and the lungs' ability to use oxygen and vital capacity.

It also depends on the results of the heart's work, the nerves, and the hormonal mechanisms that regulate all these functions. Many of these functions depend mainly on organic and hereditary factors, as well as on other factors such as sex, age, body size, and health status.

In addition, muscular performance is influenced by many psychological factors, such as motivation, attitudes toward work, and the willingness to mobilise all available forces to carry out the work. These, in turn, depend on factors such as training and adaptation.

External Factors

The external environment also has a direct or indirect role in affecting muscular work. Pollution in the external environment doubles the ability of the respiratory system to resist toxic or undesirable substances and may have negative health effects. Noise is also primarily considered a source of pressure on the individual, as it affects not only hearing but also heart rate and many other indicators, such as glandular secretions and nervous system function.

The same can be said of extreme cold or extreme heat. In this context, acclimatisation can reduce their effects to some extent.

Previous studies

To achieve the research objectives, we surveyed the most important studies on the subject across several scientific databases, including Google Scholar, ScienceDirect, and Scopus. We did not find studies that intersected with the research framework we are concerned with, particularly in the research title or abstracts. However, we found some studies that may benefit us in certain respects, especially those related to musculoskeletal disorders resulting from workload among teachers. Therefore, we begin with the local studies we supervised and then move to the most important studies that intersect with our topic in some aspects, even if these are very limited.

Local Studies

Zentisi's (2021) study aimed to identify the level of physical exertion among primary education teachers. The study was conducted with a sample of 19 special education teachers, using an exploratory descriptive method and an instrument developed by the researcher, following methodological procedures that allowed participants to express their opinions freely on the research topic. The results revealed a high level of physical workload. The results revealed a high frequency of movement and circulation among the pupils, at a rate of 94.73%; 52% of the sample members reported an increased heart rate during repeated lesson delivery; all members

of the sample (100%) performed teaching while standing; and 42.10% of them felt pain in the joints and cartilage because of prolonged standing.

Hamdadou and Hamdi (2024) addressed the level of workload among special education teachers in special education institutions in the Wilaya of Mascara. The sample consisted of 93 teachers, and a self-report questionnaire was constructed as a data-collection instrument. The results revealed moderate mental load, psychological load, physiological load, and physical load among special education teachers in psycho-pedagogical centers. However, all arithmetic means were greater than the hypothetical means, indicating statistical significance at all studied loads, with the most significant being the physiological load, which is directly affected by the physical workload, the topic of the present study.

Abed's (2025) study aimed to examine the effect of physical exertion on psychological comfort among first-year and preparatory-class teachers. The study adopted a descriptive method using a questionnaire prepared by the researcher that reflected the sample's viewpoint, consisting of 44 teachers. The results revealed moderate levels of physical exertion and psychological comfort among first-year and preparatory-class teachers and a statistically significant effect of physical exertion on their psychological comfort. The results also revealed statistically significant differences in psychological comfort attributable to practicing physical activity and the number of working hours. Those who practice sport and physical activity have a higher level of psychological comfort, and those with fewer working hours enjoy a better level of psychological comfort.

Foreign studies

Alex et al. (2025) aimed to conduct a multifactorial causal analysis of workplace musculoskeletal disorders and psychological stress among teachers of adult learners. A systematic analysis of recent epidemiological and occupational health studies was conducted to analyse direct and latent determinants across human, workplace, organisational, and socioeconomic dimensions. The results revealed that more than two-thirds of teaching professionals have work-related musculoskeletal disorders, especially in the neck and lower back. Moreover, psychological stress affects more than 70% of these individuals globally. The combined effects of poor ergonomics, prolonged static postures, excessive workload, and lack of organisational support contribute to physical and psychological stress.

Smagulov, Arystanbay, Tykezhanova, and Ageyev's (2025) study aims to assess the body's adaptive responses to professional and pedagogical activity among secondary school teachers and to examine age-related adaptive responses within the context of professional and pedagogical activity among female secondary school teachers. The study sample included female secondary school teachers in the city of Karaganda. Work ability was assessed using the Work Ability Index; personal anxiety, blood pressure, and heart rate were measured; body mass index was calculated; the number of daily steps was recorded; and a social questionnaire was used. Analysis of the study results revealed that female teachers' fatigue increases with age because of work-related stress. High levels of personal anxiety, physical inactivity, and an elevated body mass index accompany fatigue.

Through a systematic review and meta-analysis of their prevalence, Tahernejad et al. (2024) aimed to identify musculoskeletal disorders among teachers. The research followed PRISMA guidelines. Forty-four studies, including 15,972 teachers, were selected for the meta-analysis. The findings revealed that the overall prevalence of musculoskeletal disorders among teachers was relatively high, with neck and lower-back pain being more common among this group of workers than pain in other body regions. The results of this study suggest that periodic medical examinations, training, and the implementation of ergonomic interventions for this occupational group should focus on assessing risk factors for musculoskeletal disorders, particularly in the neck and lower-back regions.

Cavallari et al. (2024) sought to understand the stressors and health effects that teachers in the United States experienced during the 2021–2022 academic year. Thirty-four certified teachers from Connecticut participated in four virtual focus groups. A semistructured focus group script, designed by the research team on the basis of the job demands-resources model, was used to understand stressors and their effects. The data were transcribed and analysed using the constant comparative method to identify the main and subthemes. The themes were summarised according to the number of participants who mentioned them. Qualitative data analysis revealed three main themes related to the effects of stress on mental health: physical health and health behaviors; mental health; and relationships and social well-being. The majority of teachers indicated effects in these areas, and 76% reported effects on physical health and health behaviors, including a lack of sleep, physical exhaustion, a lack of exercise, and an unhealthy diet.

Abdullah and Md Hassan's (2024) study aims to identify the negative effects of workload among teachers. This study used a systematic literature review to identify the negative consequences of teachers' workloads. Thirty research papers from local and international sources were selected, and the selection process followed the PRISMA methodology. The researcher conducted a comprehensive literature review and classified the consequences of workload into three main domains: health, career progression, and daily life management. This study sought to enhance teachers' understanding that a heavy workload can lead to various negative effects.

Markelj, Kovač, Leskošek, and Jurak's (2024) study aimed to compare the level of occupational health disorders among physical education teachers with that among classroom teachers and specialist subject teachers. The study sample consisted of 858 teachers divided into three groups with specific occupational demands: specialist physical education teachers, classroom teachers, and subject teachers. The number of health disorders during the previous 12 months was recorded using the chronic health disorders questionnaire. Differences between the various types of teachers were analysed, controlling for sex and age, using binary logistic regression. The results revealed that specialist physical education teachers are the group most at risk of health problems. Compared with the other two groups of teachers, they are almost twice as likely to suffer from musculoskeletal or auditory disorders. Since the teaching profession is currently experiencing an aging workforce and a shortage of teachers, addressing these challenges is critical to sustaining the well-being of those working in teaching.

Furuta et al. (2024) aimed to analyse the relationship between high workload and musculoskeletal pain according to levels of physical activity among public school teachers. The study was based on a sample of 239 teachers from 13 public schools. Workload was assessed using a Likert scale, through which teachers reported their perceptions of their work routine; musculoskeletal pain and physical activity were assessed using questionnaires; and multivariate logistic regression models were used. The results revealed that a high workload was associated with an increased likelihood of reporting pain in the wrists and hands, knees, feet, and ankles among less active teachers. These associations were not observed among more active teachers. The study concluded that practicing physical activity can be a protective factor against musculoskeletal pain among teachers, even among individuals with a high workload.

Timms, Graham, and Cottrell (2007) aimed to clarify the notable mismatches between the work environment and workload among teachers who participated in a questionnaire exploring

aspects of the work environment. The sample consisted of 298 teachers currently working in independent schools in Queensland, Australia. The measures used in the research included the areas of work life survey, which identifies a match or a mismatch between the employee and the organisation; the Oldenburg Burnout Inventory; and the Utrecht Work Engagement Scale. The results revealed high levels of match in the domains of control, community, fairness, and values in work life and a mismatch with workload. They also reported higher scores on the exhaustion dimension of the Oldenburg Burnout Inventory. The Utrecht Work Engagement Scale results revealed significantly higher levels of dedication and absorption and lower levels of vigour. The participants' comments indicated that teachers working in independent schools in Queensland had reached an unsustainable workload level, posing a serious risk to their psychological and physical health.

Simone, Cicotto, and Lampis (2016) aimed to examine the relationships among occupational stress, job satisfaction, and physical health among Italian teachers. It also examined the role of job satisfaction as a potential mediator between work stress and its effects on teachers' physical health, as well as the direct effects of work stress on teachers' somatic symptoms. The study included a sample of 565 secondary school teachers who were surveyed using a 32-item form measuring perceived occupational difficulties, job satisfaction, and somatic symptoms. The results revealed that workload, perceptions of the work environment, teachers' perceptions of senior management, and attitudes toward change are among the occupational difficulties that teachers perceive. Workload and attitudes toward change also directly affect somatic symptoms, and they do so indirectly through job satisfaction. Job satisfaction contributes to alleviating somatic symptoms.

Analysis of the Research Objectives

First Objective: Identifying the Physical Workload among Teaching Professionals and Education Professionals

The analysis of results related to the first objective, namely, identifying the level of physical workload among teaching and education professionals, revealed that local studies, especially Abed's (2025) and Zentisi's (2021), revealed moderate levels of this phenomenon. Although these results indicate a moderate level of physical workload among teachers and educators, they nevertheless confirm its existence. Given the nature of the profession, the level should logically be low; however, the emergence of moderate levels suggests that the repetition and

continuity of the volume of professional burdens, particularly among educators in the early stages and in special education, indicate a physical workload. Zentisi's (2021) study reported an arithmetic mean physical workload of 2.16 on a three-point Likert scale, indicating that the arithmetic mean was higher than the hypothetical mean. If the researcher had used a one-sample t test and found statistically significant differences, this would have demonstrated that the arithmetic mean obtained in the study reflects the presence of physical workload, even at a moderate level.

The physical workload can be explained by its association with the teacher's daily tasks, which require physical effort. Cavallari et al. (2024) reported low energy among teachers and dissatisfaction with their physical health; teachers reported severe exhaustion and a lack of energy to do things outside work. Studies have also shown that teachers in the early stages are compelled to stand during most of the teaching period and are required to move among rows while performing their duties. Smagulov et al. (2025) measured blood pressure, heart rate variability, body mass index, and the number of daily steps, and their results revealed increases in fatigue, body mass index, and cardiovascular pressure with advancing age.

In addition, De Simone et al. (2016) reported that the high levels of stress reported by teachers are attributable to changes in the teaching profession.

Second Objective: Identifying the Physical and Psychological Impact of Physical Workload on Teaching and Education Professionals

With respect to the analysis of the results related to the second objective, namely, identifying the level of the psychological and physical impact of physical workload among teaching and education professionals, the findings of studies, particularly foreign studies, revealed that workload in general affects the body, especially in relation to musculoskeletal disorders (Tahernejad et al., 2024). Furuta et al. (2024) reported that a high workload was associated with musculoskeletal pain among public school teachers. The results revealed high levels of pain in the wrists, lower back, and neck among most teachers, which appeared after they aged. Alex et al. (2025) reported that more than two-thirds of teachers have work-related musculoskeletal disorders, particularly in the neck and lower back. Timms et al. (2007) reported, through participants' comments, that teachers had reached an unsustainable level of workload, posing a serious risk to their psychological and physical health.

The results of other studies, such as Furuta et al. (2024), also revealed that problems related to teachers' voice disorders and vocal-cord spasms were prevalent at high levels among physical education and mathematics teachers compared with their counterparts teaching other subjects. The researcher attributed these results to repeated poor postures, such as bending, raising the hand, and standing for long periods while writing on the board; continuous movement for the purpose of moving around; and carrying a heavy bag, which affects the hand, especially the wrist. The appearance of the effect of physical workload on teachers' bodies at higher levels among older teachers cannot mean that the effect of the volume of burdens does not exist among younger teachers; rather, the teacher does not complain of it until after its effect has been repeated and has accumulated over a long period of time. This indicates its existence in the profession, but the lack of awareness of it, the failure to anticipate and prepare for it, and its long-term continuation cause its effects to worsen gradually. This was confirmed by the results of Furuta et al. (2024) and Abed (2025), who compared the effect of physical workload between teachers who practice physical activity and those who do not. They reported that the effect of physical workload is greater among those who do not practice sporting activities than among those who do. Furuta et al. (2024) concluded that a strategy for sports activation and physical preparation can be developed to confront workload among teachers, as this study assumes that practicing physical activity can reduce this association. De Simone et al. (2016) also reported that the level of stress and its consequences can be reduced and prevented by accurately identifying its sources, which reflects the health of the individual and the institution positively.

Proposals

Through the results of the analysis of the research objectives, we reached a set of proposals, which are presented below.

*-Adopting a comprehensive and targeted approach within the system that focuses on occupational health for workers in teaching within educational environments.

*-Preparing awareness-raising and motivational programs to reduce physical workload by involving all the actors in the teaching and education sector, including psychologists, counsellors, administrators, and teachers.

*-Holding seminars and study days in the school environment to demonstrate the disadvantages of physical workload, especially after advancing in age.

*-The need to activate and programme physical and sporting activities by specialists in the physical and sports field to prevent the risks of physical workload, especially for teachers working in the early educational stages and in special education.

*-Further in-depth studies are needed to reveal the importance of physical workload in the school environment and the resulting negative effects, which appear at the physical and psychological levels among workers in the teaching and education sector.

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