AKENTEN APPIAH MENKA UNIVERSITY OF SKILLS TRAINING AND ENTREPRENEURIAL DEVELOPMENT

EXAMINING ERGONOMETRIC RISK FACTORS AMONG FASHION DESIGNERS AND THEIR EFFECTS ON PRODUCTIVITY IN THE CLOTHING INDUSTRY IN THE KUMASI METROPOLIS

STELLA DAAH SIAW

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BY

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SEPTEMBER 2023

DECLARATION

I, STELLA DAAH SIAW, hereby declare that this thesis, with the exception of quotations and references contained in published works that have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole for another degree elsewhere.

SIGNATURE ……. DATE: ……..

STELLA DAAH SIAW

SUPERVISOR DECLARATION

I hereby declare that the preparation and presentation of this work was supervised by me in accordance with the guidelines for the supervision of thesis laid down by the Akenten Appiah-Menkah University of Skills Training and Entrepreneurial Development.

SIGNATURE ……. DATE : ……..

DR DANIEL KWABENA DANSO

DEDICATION

I dedicate this thesis to my dear husband Mr. Kwame Siaw, my late mother, Madam Grace Sarpong and my father Mr Ernest Appiah. To my Children; Kwadwo, Kwabena, Akua, Ewura Adwoa and Kwadwo baby last.

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ABSTRACT

This study aims to investigate ergonomic risk factors among fashion designers in the Kumasi Metropolis. Employing a quantitative research design, the research gathered data from a diverse sample of three hundred and fifty (350) participants, but three hundred and eleven (311) copies of the questionnaire were retrieved for the study, encompassing fashion designers with varying degrees of experience and expertise. Utilizing structured questionnaires, the findings provided strong evidence of the detrimental effects of ergonomic risk factors on productivity in the fashion design industry. Availability of necessary ergonomic tools and equipment was found to be lacking, suggesting the need for industry-wide provision of these resources. Further, the study emphasized the positive influence of ergonomic improvements on productivity and job satisfaction. The correlation between job demands, job resources, and the prevalence of ergonometric risk factors was significant, implying strategic management of these factors could be crucial in risk mitigation. It is therefore recommended that both industry associations and individual fashion enterprises invest in acquiring and distributing these essential tools, such as hand trucks, anti-fatigue mats, ergonomic sewing machines, adjustable chairs with back support, and ergonomic foot pedals.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The manufacturing industry is heavily dominated by businesses involved in the production of clothing in many developing nations, including Ghana. According to government statistics, the clothing business employs more people than any other manufacturing industry (Gazzola et al., 2020; Ghana Statistical Service (GSS), 2016; Şen, 2008). The industry engages over 242,000 people, as vocational education in garment manufacturing is the preferred choice for four out of five females (GSS, 2016). The clothing market is growing in the current modern era. Although there is a high demand for this industry, if the ergonomic component is not prioritized in the workplace, it will also lead to complaints, injuries, and work-related accidents (Osni, 2012). However, these firms often operate as micro or small enterprises in the informal sector with standard equipment and low capitalization, making global competition challenging (Madichie & Saeed, 2010).

The garment industry is labour-intensive, and the efficient utilization of human resources is critical to productivity. While operations management-based methods can appear to enhance human resource utilization and boost productivity, the negative impacts of heavy workloads and poor ergonomic conditions can be severe (Saravanan, 2011). The repetitive tasks involved in garment manufacturing can result in work-related musculoskeletal diseases due to monotonous body postures. If ergonomic conditions are not addressed appropriately, significant health problems can develop over time. In executing high-continuous and continuous precision activities as well as highly repetitive actions that result in muscle complaints, tailors have a non-neutral joint posture, claim Chan et al. (2020).

At first glance, methods based on operations management that extend the levels of human resource utilization might appear to boost productivity. However, given that the jobs in the

clothing sector need repeated motions, severe workloads and poorly ergonomic working conditions can have a negative impact on the health of the workers. Workers who engage in these actions with monotonous body postures risk developing musculoskeletal conditions related to their jobs. Even though businesses may benefit greatly from increased employee utilization rates, major health issues may develop over time if ergonomic considerations are not given sufficient consideration. The human cannot be redesigned; hence it is important to make equipment and other means of production simple for workers to operate. These health problems can cause not only painful musculoskeletal disorders but also hefty medical expenses for the company. Additionally, occupational health rules require employers to continue paying employees despite their inability to work, increasing the company's financial burden. Consequently, employers must prioritize adequate safety and ergonomic conditions when designing workplaces. Even though the garment industry is generally regarded as safe compared to other sectors, the main risks arise from indirect hazards developing over time due to repetitive operations. These often start as minor aches but can escalate into debilitating conditions that affect daily life (Saravanan, 2011).

The human capital of a business, particularly in the production of economic products and services, is a significant asset. This idea has gained recognition with the transition from traditional to contemporary management. As human superiority positively impacts productivity, it simultaneously elevates the importance of Ergonomics. This branch of science aims to create a work environment where employees can perform their tasks comfortably, with minimal fatigue and exposure to work accidents and occupational diseases (Gade et al., 2015; Keawduangdee et al., 2012; Koruca, 2011; Metgud, et al., 2008; Mungan & Yetiş, 2009; Parimalam, et al., 2006; Sealetsa & Thatcher, 2011). The goal of ergonomics is to lessen the negative impacts that the environment has on individuals, allowing each individual to contribute to a particular task to the fullest extent possible (Manzoor et al., 2019). In addition

to identifying, evaluating, and avoiding risks and hazards in the workplace, occupational health and safety (OHS) aims to maintain the working capability of the workforce. The above-mentioned combination of difficulties is called ergonomics, and it aims to increase worker competency, safety, and health while maintaining industrial productivity through better workplace design (Qutubuddin et al., 2013). The task requires extreme accuracy and focus and is visually demanding. Numerous studies have been published in the literature, such as (Panhale et al., 2020), which presented an ergonomic evaluation of workstations in the apparel industry. Globalization and worldwide rivalry are now the main factors influencing the change in the character of the global economy and top trends. Ergonomics is one of the instruments that can be utilized to help the Ghanaian clothing manufacturing sector (Botha, 2000).

Ergonomics focuses on tailoring a job to the worker, considering various physical attributes. For instance, it guarantees that a taller worker has enough room to securely carry out their duties and that a shorter worker can safely reach all tools and items. Employees who are compelled to adapt to pre-existing workstations, however, may be required to labour in uncomfortable positions, repeatedly do the same action, or move heavy objects. Work-related musculoskeletal diseases could result from this mismatch.

Ergonomics is thus, critical in preventing injuries by managing risk factors such as force, repetition, posture, and vibration. In recent years, there has been a significant increase in ergonomics risk assessment studies in the industry, underscoring its growing importance. These disorders start as minor discomforts but can evolve into disabling injuries that impede everyday activities such as laundry, hobbies (like knitting or golf), and even actions as simple as picking up a child. Ergonomics, therefore, plays an instrumental role in preventing these injuries by mitigating risk factors that contribute to their development (Gade et al., 2015; Keawduangdee et al., 2012; Koruca, 2011; Metgud, et al., 2008; Mungan & Yetiş, 2009; Parimalam, et al., 2006; Sealetsa & Thatcher, 2011).

Despite this clear evidence on the role of ergonomics in the industry, many micro and small enterprises in Ghana's garment sector have yet to fully incorporate ergonomic principles in their operations. These businesses often struggle with implementing ergonomically-friendly practices due to factors such as low capitalization, lack of knowledge on ergonomics, and the pressing need to meet production targets.

Therefore, this study seeks to understand and examine the extent to which ergonomic risk factors impact fashion designers and their productivity in the textile and clothing industry in the Kumasi Metropolis. By exploring these factors, the research aims to provide insights that could guide the development of strategies for improving working conditions, enhancing productivity, and maintaining the health and wellbeing of the workers in this industry. This, in turn, could contribute to the industry's overall growth and competitiveness both locally and globally.

1.2 Statement of the Problem

Ghana's clothing industry, predominantly composed of self-employed individuals in micro-enterprises within the informal sector, represents over a third of the country's labour market. This industry holds a dominant share, constituting 40% out of a total of 24,133 establishments in Ghana's manufacturing industry (Gazzola et al., 2020; GSS, 2016; Şen, 2008).

While both genders are commonly involved in this occupation, it appears that the working environment setup has received little consideration. Producers frequently encounter numerous issues in their workplaces. Vandyck and Fianu (2012) found that the environmental temperature, noise levels, seating, and ventilation in the producers' workplaces were below par. Over 70% of the small-scale garment producers studied used seats with poor ergonomic design, lacking backrests, inadequate height, narrow depth, no adjustability, inadequate knee room, and

improperly contoured and unpadded seat pans (Arora et al., 2021; Akinyemi, 2020; Hoque, 2022; Sarder, 2006; Vandyck & Fianu, 2012).

These poor features can lead to musculoskeletal problems. An ergonomically designed seat, on the other hand, would provide adequate support, comfort, impose no undue stress on the body, prevent fatigue, and allow the worker to maintain an optimal posture, contributing to productivity. Such a seat would incorporate features such as spinal alignment to reduce intradiscal pressure (Jacobs et al., 2017; Pinto et al., 2021; Sudo et al., 2006) and adjustability to accommodate workers' varying sizes and shapes.

The problem that this study seeks to address is, therefore, the lack of consideration for ergonomic factors in the textile and clothing industry in the Kumasi metropolis and its potential effects on productivity. This issue is further compounded by the fact that these ergonomic challenges extend beyond seating arrangements to include other facets of the work environment such as temperature control, noise levels, and ventilation. These factors collectively contribute to the work-related musculoskeletal disorders reported among workers in this sector (Arora et al., 2021; Akinyemi, 2020; Hoque, 2022; Sarder, 2006; Vandyck & Fianu, 2012).

Moreover, despite the apparent ergonomic risks and their detrimental effects on worker health and productivity, these issues remain largely unaddressed within the sector. The implications of this neglect extend beyond the individual workers to impact the productivity and overall performance of the industry in the Kumasi metropolis. This situation is particularly concerning given the sector's substantial contribution to Ghana's economy and labour market.

In light of these considerations, it is critical to address the gap in knowledge regarding the specific ergonomic risk factors faced by fashion designers in the textile and clothing industry of the Kumasi metropolis. This study aims to examine these factors in detail, with a particular focus on how they influence productivity in the sector. By identifying and understanding these issues, we can develop strategies and interventions to improve the ergonomic conditions within

the industry, thereby enhancing productivity, worker health and wellbeing, and, ultimately, the industry's overall performance.

1.3 Purpose of the Study

One of the most labour-intensive businesses in Ghana and the globe is the clothing manufacturing sector. On the other hand, ergonomics enhances the variables of safety, quality, and productivity (i.e., through ergonomic planning of industrial plants, issues addressed in the workplace, and an ergonomic workspace design) (Rathore et al., 2022). Once the workers' comfort level has increased, the company's productivity will also increase as a direct result. This study aims to examine ergonometric risk factors among fashion designers and their influence on productivity in the textile and garment industry in the Kumasi metropolis because productivity has been a crucial aspect in gauging a nation's future and progress. According to published research (e.g., Ramdass & Pretorius, 2008), persistent low-back pain, asthma, dermatitis, and other illnesses.

1.4 Objectives of the Study

The objectives for this study are:

1. Identify the predominant ergonomic risk factors in the textile and clothing industry within the Kumasi metropolis.
2. Evaluate the level of consciousness among employees in the clothing industry regarding these ergonomic risk factors in the Kumasi metropolis.
3. Analyse the impact of ergonomic risk factors on productivity levels within the textile and clothing industry in the Kumasi metropolis.
4. Propose ergonomic solutions aimed at enhancing workers' comfort and wellbeing in the industry in the Kumasi metropolis.

1.5 Research Questions

The study is guided by the following research questions.

1. What specific ergonomic risk factors are prevalent in the textile and clothing industry within the Kumasi metropolis?
2. How aware are workers in the textile and clothing industry of the ergonomic risks associated with their work?
3. How do ergonomic risk factors impact productivity within the textile and clothing industry in the Kumasi metropolis?
4. What potential ergonomic solutions could enhance the comfort and safety of workers within the industry in the Kumasi metropolis?

1.6 Hypotheses

The study is guided by the following null hypotheses, which will be evaluated at a significance level of 0.05.

1. **H1:** There is a significant positive relationship between high job demands (both physical and cognitive) and the prevalence of ergonomic risk factors in the fashion design industry in the Kumasi Metropolis.
2. **H2:** There is a significant negative relationship between job resources (particularly ergonomic interventions) and the prevalence of ergonomic risk factors in the fashion design industry in the Kumasi Metropolis.
3. **H3:** High prevalence of ergonomic risk factors significantly reduces productivity within the fashion design industry in the Kumasi Metropolis.

1.7 Significance of the Study

This study is significant because it has the potential to advance the textile and apparel sector, particularly in the Kumasi metropolis. The industry, a significant driver of Ghana's economy,

is predominantly labour-intensive. As such, worker health and productivity are of paramount importance (Gazzola et al., 2020; GSS, 2016). However, numerous studies have pointed to prevalent ergonomic risk factors such as poor seating conditions, work-related musculoskeletal disorders, and inadequate workplace environment leading to issues such as low-back pain, asthma, and chronic bronchitis (Ramdass & Pretorius, 2008; Arora et al., 2021; Akinyemi, 2020; Hoque, 2022).

Given these challenges, the study's examination of these ergonomic risk factors and their impact on productivity can inform interventions to improve worker conditions and productivity. Additionally, by assessing the knowledge of workers about these risks, the study can contribute to improving worker education and awareness, further promoting safer working conditions. The proposed ergonomic solutions from this study could then significantly improve the textile and clothing industry's overall performance and profitability, benefiting both individual workers and the broader economy.

Furthermore, understanding the relationship between work hours and productivity in the face of ergonomic risks can provide critical insights into optimizing work schedules to maintain high productivity while mitigating health risks. This understanding is crucial in labour-intensive industries such as textile and clothing manufacturing, where the balance between productivity and worker health is pivotal.

In essence, the study has significant implications for enhancing the sustainability and competitiveness of the textile and clothing industry in the Kumasi metropolis and potentially in similar contexts elsewhere. Moreover, the outcomes of this research may support policymakers and regulators in drafting guidelines and regulations that prioritize worker safety and wellbeing, while enhancing productivity in the textile and clothing industry. With a clearer understanding of the ergonomic risks and their consequences, stakeholders can advocate for and implement changes that lead to better working conditions.

In the academic field, this study extends the current body of knowledge by offering a focused analysis of ergonomic risk factors in a specific geographical context and industry sector. The findings can provide a benchmark for further studies in similar settings, thereby stimulating ongoing discourse on worker health, productivity, and ergonomics.

Finally, the identification of relationships between work hours, productivity, and ergonomic risks can guide organizational leaders in developing and implementing effective strategies for work schedule optimization. This will help in mitigating health risks while ensuring that productivity remains optimal, thus creating a win-win situation for both the industry and its workforce (Gazzola et al., 2020). The implications of this study are far-reaching, with the potential to positively influence workers' lives, enhance industrial performance, guide policy-making, and contribute to academic discourse.

1.8 Limitations of the Study

The potential limitations of this study include a range of factors. The geographical focus on the Kumasi metropolis could restrict the generalizability of the findings to other regions in Ghana or other countries. Furthermore, response bias was also affected by the data collected from workers, as they could provide less than accurate responses due to fear of reprisals or misunderstanding the importance of ergonomic risk factors, potentially impacting the validity of the results.

Access to all relevant data may be a challenge, particularly given the informal nature of some firms in the sector. The lack of readily available or accurate information about ergonomic practices and productivity could pose significant hurdles to the research. The scope of the study may prevent a long-term follow-up to monitor the progression of work-related health issues and their impact on productivity over an extended period due to time constraints.

Furthermore, resource limitations were confined in the extent of the study, especially in relation to the sample size or the ability to comprehensively examine multiple workplaces.

Lastly, it was difficult to account for all external factors that can affect productivity, such as market conditions, organizational culture, managerial practices, or socio-economic factors that might influence worker health and productivity. These potential limitations, while noteworthy, do not invalidate the study. Instead, they help provide a context within which the study's findings can be interpreted and applied.

1.9 Delimitations of the Study

This study's delimitations are guided by the constraints identified in the potential limitations. While a comprehensive study encompassing all 16 regions of Ghana would provide a more extensive view, due to time constraints and financial limitations, this study will focus solely on the Kumasi Metropolis. This geographical constraint aims to facilitate a more thorough and focused analysis within the available resources.

Additionally, while various working environments could yield diverse risk factors, this study will specifically target individuals working in the clothing and textile industry. This concentration serves to maintain the study's focus and is in alignment with the research objectives.

In terms of research instruments, there will be no imposition on the participants' performance in the industry. The tools will be used strictly for examining the ergonometric risk factors among fashion designers and their effects on productivity within the textile and clothing industry in the Kumasi Metropolis.

Lastly, the scope of the research does not extend to exploring whether ergonomic risk factors among fashion designers vary with other demographic factors such as age, ethnicity, place of

origin, and other demographic variables. These delimitations are necessary to ensure a focused, feasible, and meaningful research endeavour within the stipulated constraints.

1.10 Definition of Key Terms

1. Ergonomics: An effective use of ergonomics in the garment industry can be described as a system of interactions between the worker, the task, the workspace, and the physical and organizational work environment. Musculoskeletal problems: Diverse ailments that affect the bones, joints, muscles, and connective tissues are referred to as musculoskeletal disorders. These ailments are among the most expensive and incapacitating in the United States (USBJI, 2014a) and may cause discomfort and a loss of function.

2. Garment manufacturing: The design, cutting, and sewing of clothing from fabric constitute the main activities of the garment manufacturing sector. On an industrial scale, there are specific steps or locations where clothing is made.

3. Worker health: A multidisciplinary field that focuses on the safety, health, and welfare of people while they are at work is known as occupational safety and health, occupational health, or simply occupational safety.

4. Labour-intensive: A process or industry is referred to as "labour-intensive" if it uses a lot of labour to create its products or services. The quantity of capital needed to create the goods or services is often used to determine the degree of labour intensity; the more capital is needed, the more labour-intensive the business.

5. Fashion designers: Clothing, footwear, and accessory designs are sketched up by fashion designers. Original apparel, accessories, and footwear are produced by fashion designers. They draw sketches of their ideas, choose fabrics and patterns, and provide guidelines for making the objects they design.

6. Psychology: the scientific examination of the mind's processes, particularly those that influence behaviour in a certain situation.

7. Physiology: The study of human physiology focuses on how the body functions. It explains the chemistry and physics of fundamental bodily processes, ranging from the interactions of molecules in cells to the coordination of organ systems. It aids in our comprehension of how a healthy body functions in daily life and what goes wrong when someone is ill.

8. Biomechanics: The study of mechanical characteristics of biological systems, including their structure, operation, and motion, at any level—from entire organisms to organs, cells, and cell organelles—using the principles of mechanics is known as biomechanics. A subfield of biophysics is biomechanics.

1.11 Organisation of the Study

There are six different chapters in this study. The backdrop of the study, problem statement, goal of the study, research objectives, questions, and hypotheses are presented in the first chapter to provide an introduction to the research topic. Additionally, this chapter outlines the study's significance, potential limitations, and delimitations.

In the second chapter, relevant literature relating to the research problem is thoroughly reviewed to provide context and frame the study within existing knowledge.

Chapter Three outlines the research methodology, detailing the study's design, data collection methods, and analytical strategies that guide the research process.

The subsequent chapter, Chapter Four, is dedicated to presentation and analysis of results. It interprets the data collected and presents the findings in a structured manner.

Chapter Five discusses the findings of the study in the context of the literature reviewed.

Chapter Six presents the summary of the research, its conclusions, and recommendations based on the findings. This chapter also identifies possible areas for future research, drawing from the insights gathered throughout the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter is to provide a comprehensive review of the literature related to ergonomic risk factors among fashion designers and their impact on productivity in the textile and clothing industry. A thorough understanding of these factors is essential to comprehend the current state of the industry, the challenges faced by the workers, especially in the context of Kumasi Metropolis, and how it can be improved for increased productivity and enhanced wellbeing of the workforce.

2.2 Conceptual Review

2.2.1 Ergonomics

Ergonomics, also known as human factors, is an applied science concerned with the design and arrangement of workplaces, products, and systems, aiming to maximize efficiency and safety by fitting these to the capabilities of the users (Dul et al., 2012). It is a multidisciplinary field encompassing several domains, including psychology, physiology, biomechanics, and engineering, among others (Karwowski, 2019). The goal is to create an environment that aligns with human abilities and limitations, hence promoting both wellbeing and productivity (Karwowski, 2019).

Ergonomics can be broken down into three major categories: physical, cognitive, and organizational ergonomics (Dul et al., 2012). Physical ergonomics relates to the human body's interaction with physical tasks and factors, such as posture, handling of materials, repetitive motions, workplace design, security, and health.

Cognitive ergonomics studies the effects of mental processes on interactions between people and other system elements, including perception, memory, reasoning, and motor response. The

final element of organizational ergonomics is the optimization of sociotechnical systems, such as organizational structures, policies, and processes (Dul et al., 2012).

Ergonomics investigates and adjusts to the work environment, means of labour, work process, and output as a result of human effort from the psychological, physiological, and anatomical elements rather than fitting a person to the needs of a job. The three aspects of human adaptation to labour are as follows:

1. Modification of instruments and machines that must be built, formed, and planned with consideration for human anatomical, physiological, psychophysiological, and psychosocial qualities, that is, for human potential and limitations.
2. The modification of working techniques with regard to body positions and movements, allocation of work, i.e., work operations and their arrangement, organization of work resources (work objects and tools), and work organization (machine layout and synchronization of transport) in order that the chosen working technique with the least amount of strain and fatigue should have the greatest impact.
3. Changing the working environment to account for objective physical circumstances and make the best use of them in order to increase comfort while doing work that has an impact on job efficiency.

Ergonomics is a multi- and multidisciplinary discipline that examines the relationship between humans and machines in an effort to adapt technology to human bio-psycho-social needs and constraints in order to use technology more effectively, safely, and dependably. When building and organizing facilities utilized by people, it is important to take into account human features in order to ensure that their interactions are both safe and as successful as possible.

The importance of ergonomics in the workplace is increasingly recognized. Research shows that poor ergonomic practices can lead to work-related musculoskeletal disorders (WMSDs), resulting in pain, injury, disability, and reduced productivity (Lin et al., 2022). On the other

hand, good ergonomic practices can enhance productivity, improve worker satisfaction, and reduce costs related to injury and absenteeism (Choobineh et al., 2017).

Furthermore, ergonomics is also crucial in creating a safer work environment. It considers factors such as worker movement, equipment usage, and environmental conditions to reduce the likelihood of accidents, injuries, and health problems (Choobineh et al., 2017). Therefore, understanding and implementing ergonomic principles can significantly improve workplace health and safety, and positively impact worker wellbeing and organizational performance.

2.3 Ergonomic Risk Factors

Aspects of a profession or task that put the worker under biomechanical stress are known as ergonomic risk factors (Hignett et al., 2021). There are numerous ergonomic risk factors, but the most common ones include prolonged sitting or standing, repetitive motions, excessive force or load handling, awkward postures, and vibration (Waters et al., 2007).

Physical risk factors are often the most commonly identified and include repetitive motions, awkward postures, excessive force, prolonged sitting or standing, mechanical pressure, vibration, and poor environmental conditions such as inappropriate lighting or temperature (Oakman et al., 2021). These physical factors, when excessive or prolonged, can contribute to the development of work-related musculoskeletal disorders (WMSDs) (Bernard, 2021). According to Batiz et al., (2006), posture is the position that people take while performing regular static or dynamic tasks, using their musculoskeletal system at their workstations and adopting postural techniques to adjust to their surroundings. Individual obese persons exhibit remarkably low trunk flexion angles in the sit-to-stand position, as noted by Sibella et al., in 2003. When Godde and Taylor (2011) discovered that obese people have a higher dependence on their upper limbs when working than non-obese people. This may be the cause of the high prevalence of upper limb musculoskeletal disorders (MSD) complaints in obese people. When

the work surface's inclination and height were changed, it was discovered that the operator's posture significantly improved (Rempel et al., 2007).

While (Polajnar et al., 2010) claim that the operator's height, the height of the pedal, and the height of the operator's heel are used to determine the height of the working table.

Organizational risk factors pertain to work characteristics and management practices, such as long work hours, inadequate rest breaks, job dissatisfaction, lack of control over the job, and job insecurity (Oakman et al., 2021). High employment demands, poor job control, a lack of social support, and job stress are all psychosocial risk factors (Kiss et al., 2022). Work-related musculoskeletal disorders (WMSDs), lower job satisfaction, and mental health issues can all be influenced by organizational and psychosocial factors.

In the context of the fashion design industry, ergonomic risk factors can be particularly prevalent due to the nature of the work. For instance, fashion designers often engage in repetitive tasks, such as sketching, cutting, and sewing, which can lead to strain and overuse injuries (Liu & Chen, 2021). Awkward postures, often related to hunching over a workspace or a sewing machine, can also contribute to musculoskeletal discomfort and disorders (Liu & Chen, 2021).

Additionally, working under tight deadlines, long hours, and high pressure to stay innovative and creative can impose significant psychosocial stress, contributing to burnout and reduced job satisfaction (Kiss et al., 2022). Therefore, a comprehensive understanding of these ergonomic risk factors is crucial in developing effective strategies to enhance the work environment, worker wellbeing, and productivity in the fashion design industry.

2.3.1 Height, depth, and width of ergonomically built seats for seated work

Chair Height

A chair is an essential component of machinery for machinists who work while seated. When seated, the ischial tuberosities of the pelvis and the tissues around them distribute the body's weight to a supportive area, which provides the stability needed for tasks requiring strong visual and motor control (CU Ergo 2012). Production of clothing demands workers to operate quickly, accurately, with good vision, and while seated for extended periods of time. According to empirical research, inadequate ergonomic practices in garment manufacturers contribute to the musculoskeletal problems that affect workers (Chavalitatsakulchai and Shahnavaz, 1993; Hague et al., 2001). Even excessive sitting has negative health effects. For instance, weak abdominal muscles bend the spine and impair some muscles' ability to operate. Longer reaches require the worker to put in more time and effort. Height, size, shape, tilt, and leg room are sewing table dimensions that need to be taken into account (Gunning et al., 2001). According to Bridger's (2003) argument, operators' comfort and performance will suffer as a result of muscular exhaustion, spinal deformity, and increased stress.

According to Oborne (1982), McCormick and Sanders (1982), and Bex (1971), the height of a seat should permit the positioning of feet on the floor and should be such as to prevent excessive pressure on the thigh in order to avoid pain. The front edge of a seat should be slightly lower than the distance between the floor and the thigh. Popliteal height is the phrase for this. According to McCormick and Sanders (1982), and Tichaner (1978) suggested that the front edge be at least 2 inches (5 cm) below the popliteal crease, which is the wrinkle at the back of the knee hollow. To accommodate people of different heights, McCormick and Sanders (1982) recommended the installation of adjustable seat heights ranging from 38 cm to 48 cm. A more recent study by Parimalam et al. discovered that a high stool (mean height 59.5 cm) forced

garment workers to bend their heads and backs toward the table in order to see their sewing clearly, which led to complaints of pain in the shoulders, lower back, and mid back.

Chair Depth and Width

McCormick and Sanders (1982) emphasized that while seat depth and width varied depending on the purpose of the seat (such as multipurpose, typing, or lounge chair, among others), the depth set should be suitable for small persons and the width suitable for large persons. Oborne (1982) noted that the hip width measurement should be used to determine the seat width in order to accommodate the largest individual, and the seat depth should guarantee that the backrest provides support for the sitters' lumber region. He recommended a work chair with a seat width of 35 to 40 centimetres.

A multipurpose chair should have a depth of not more than 43 cm and a width of not less than 40 cm, contrary to the recommendations made by Agan and Luchsinger (1965), who suggested a width of 42 to 44 cm and a depth of 33 to 37 cm. A seat depth of 38 to 42 cm and a width of at least 45 cm were recommended by Kroemer (2009). Compression fatigue in the thighs is unlikely to be brought on as long as the seat height is suitable and the feet can touch the ground. Seat depths that did not permit leg calf clearance and did not decrease thigh pressure were reported in studies by McCormick and Sanders (1982), Oborne (1982), Yu and Keyserling (1989), and Ortiz et al. (1991).

Plate: 1 Suitable seat for the sewing industry

Plate: 2 Ergonomically designed sewing machine

Source: ResearchGate

Plate: 3 Ergonomically designed scissors

Source: ResearchGate

2.3.2 Common ergonomic risk factors

Ergonomic risk factors relate to the conditions of a work situation that can contribute to the development of work-related musculoskeletal disorders (WMSDs) and other health-related issues (Bernard, 2021). These are typically categorized into physical, organizational, and psychosocial risk factors (Oakman et al., 2021).

Among the physical ergonomic risk factors, repetitive motions, awkward postures, and excessive force exerted are some of the most common ones observed in various occupational

settings (Lin et al., 2022). Repetitive motions involve performing the same or similar movements repeatedly over extended periods, leading to overuse and strain of certain muscle groups (Lin et al., 2022). Awkward postures, including bending, twisting, reaching, kneeling, and maintaining fixed positions for extended periods, can impose additional stress on the musculoskeletal system (Oakman et al., 2021). Similarly, tasks that require excessive force, such as lifting heavy objects, can lead to fatigue, physical stress, and increased risk of injury (Bernard, 2021).

Women are more likely than men to experience musculoskeletal diseases (Dahlberg et al., 2004). Even if they may hold the same job title, men and women nevertheless undertake different types of professional responsibilities (Yun et al., 2001). Today, women are probably more frequently subjected to heavy, repetitive, and tedious labour tasks than males are (Brisson et al., 1989; Dahlberg et al., 2004), such as those performed by cashiers, cleaners, and sewing machine operators (SMOs). Operating power sewing machines to sew, alter, or mend clothing, linens, blankets, and other fabric-based items is referred to as sewing machine operation. This includes using automatic sewing machines, which require the user to be familiar with how to thread it, wind the bobbins, change the tension, and grease the parts.

Sewing machine operators sit for extended periods of time while performing the same repetitive actions with their hands (Kaergaard & Andersen, 2000; Wang et al., 2007). Because of this, investigations of female SMOs have revealed a significant prevalence of musculoskeletal problems in the neck, shoulder, back, hand/fingers, and lower extremities (Kaergaard & Andersen, 2000; Brisson et al., 1989; Kilroy & Dockrell, 2000; Vihma, 1982). The design of workplaces and hand tools, which are frequently based on anthropometric data for men, may possibly contribute to the higher occurrence of MSDs in women than in men. The method may be a straightforward description of body positions during various movement cycle phases,

whereas individual performance refers to unique variances of how a particular task or method is carried out in a certain work environment.

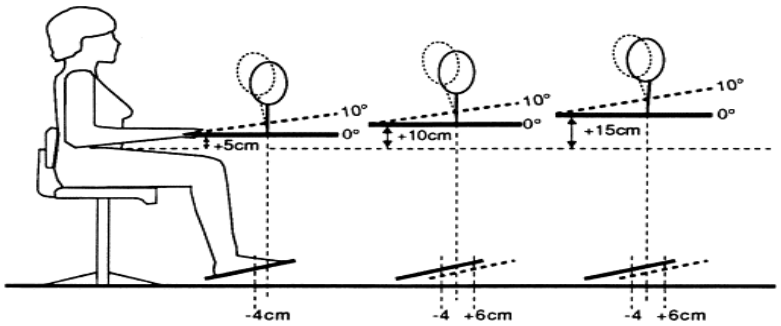


Figure 2.1 Operation of a sewing machine: Workstation configuration and posture

Source: ScienceDirect.com

Ergonomically designed cutting table

Figure 2.2 Source: www.chimo.org

Environmental conditions, such as improper lighting, excessive noise, and unsuitable temperature or humidity, are also regarded as physical ergonomic risk factors. These factors can lead to visual strain, hearing problems, and overall discomfort, impacting workers' health and productivity (Hignett et al., 2021).

Organizational risk factors are related to the structure, policy, and processes within an organization that can impact a worker's health and wellbeing. Common factors in this category include long work hours, inadequate rest breaks, high work pace, and lack of control over one's

work (Oakman et al., 2021). These can lead to excessive fatigue, stress, job dissatisfaction, and, eventually, decreased productivity.

Psychosocial risk factors encompass elements such as high job demands, low job control, low social support, and job stress (Kiss et al., 2022). High job demands, combined with low control and support, can lead to a high-stress work environment, resulting in decreased job satisfaction, burnout, and potential mental health problems (Kiss et al., 2022). Identifying these common ergonomic risk factors is crucial in recognizing and addressing potential occupational health hazards, leading to improved worker health, satisfaction, and productivity.

Identifying and mitigating these common ergonomic risk factors is a critical aspect of maintaining a healthy, productive work environment. It is particularly important to address these issues in high-risk sectors, such as the fashion industry, where workers are frequently exposed to many risk elements simultaneously.

2.3.3 Ergonomic Risk factors and work impact

The influence of ergonomic risk factors on work outcomes, specifically in the Ghanaian fashion industry, is a critical area of research. Ergonomic risk factors contribute significantly to the development of work-related musculoskeletal disorders (WMSDs), reduced productivity, increased absenteeism, and elevated turnover rates (Bernard, 2021; Lin et al., 2022). Musculoskeletal issues are becoming more common among factory workers practically every year. Manufacturing operators are frequently said to sustain injuries due to "poor technique" in the absence of an effective work injury prevention program and when improper procedures are used (Chiasson et al., 2012). Multiple types of musculoskeletal symptoms (MSSs) are being experienced by workers across all industries, according to Social Security Organization, SOCSO (2016), and the number of instances is continuing to rise. An important area of research focus in recent years has been the examination of risk factors influencing workplace musculoskeletal health concerns.

According to Waters et al. (2007), these risk variables were frequently classified as organizational, psychological, and individual aspects in the workplace.

Physical ergonomic risk factors, such as repetitive motion, awkward postures, and excessive force, often result in WMSDs like carpal tunnel syndrome, tendinitis, and back pain. These disorders can lead to discomfort, decreased work performance, and even long-term disability (Bernard, 2021). For instance, Ghanaian fashion designers often adopt static postures and repeat certain motions while sketching designs, cutting fabric, or sewing, increasing the risk of developing WMSDs (Quansah & Amponsah-Tawiah, 2021).

Organizational risk factors, such as long hours and a fast pace of work, can lead to worker fatigue and decreased job satisfaction. In Ghana's fashion industry, designers frequently work under tight deadlines, causing them to work long hours without adequate rest, increasing stress levels, and negatively impacting performance and productivity (Quansah & Amponsah-Tawiah, 2021).

Moreover, psychosocial risk factors, including high job demands, low job control, and low social support, can contribute to increased job stress and potential mental health problems. High levels of job stress have been associated with decreased productivity and increased absenteeism, particularly among Ghanaian fashion designers working in highly competitive environments (Kiss et al., 2022).

Ergonomic risk factors have a significant impact on work outcomes in the Ghanaian fashion industry. These factors affect both the wellbeing of fashion designers and the overall productivity of fashion houses. Therefore, mitigating these risk factors should be a priority in improving both worker health and organizational performance.

A notable study by Quansah & Amponsah-Tawiah (2021) explored the connection between workplace safety and health management, work engagement, and turnover intention in the Ghanaian fashion industry. Their study found that ergonomic risk factors such as long working

hours, lack of rest breaks, and high work pace significantly contribute to the intention of workers to leave their jobs. These factors led to lower work engagement and increased occupational stress, thereby impacting overall productivity and retention in the industry.

Another empirical study focusing on ergonomics in developing countries, including Ghana, demonstrated that physical ergonomic risk factors like repetitive motions and awkward postures are prevalent in the garment industry (Hossain et al., 2022). These factors were linked with higher incidences of work-related musculoskeletal disorders among workers, which directly impacted their productivity and work quality.

In a study on the psychosocial work environment in the Ghanaian textile industry, Adu & Frimpong (2021) found that high job demands, low job control, and low social support contributed to increased job stress among workers. This high-stress environment resulted in decreased productivity and increased absenteeism. Empirical evidence from these studies underscores the pressing need for improved ergonomic practices in the Ghanaian fashion industry.

2.3.4 Vibration

According to Jaffar et al. (2011), vibration can degrade human tissue due to continuous resonance or high energy vibration absorption, as well as injure organs due to high levels of vibration at relatively low frequencies. When standing or sitting on the legs and hips, vibrations are typically conveyed through the feet, exposing one to whole body vibration (WBV). The internal organs are among the body parts that WBV might damage. There is some evidence to support the idea that the risk of harm is increased when the entire body is exposed to vibration, frequently through the feet or buttocks while traveling in a car. (Kolgiri et al., 2016; Jaffar et al., 2011). According to Van et al. (2016), occupational stress and workplace vibration exposure are major risk factors for neck, shoulder, lower back, and upper back pain. (Buchholz and Kittusamy, 2004). Additionally, a study by Kittusamy and Buchholz (2004) on construction

equipment operators found that whole body vibration (WBV) and the necessary postures for the job (both static and awkward postures) are significant risk factors for the development of musculoskeletal disorders in Operating Engineers (OEs) (Choobineh et al., 2017).

2.3.5 Adverse Postures

The various aspects of your body's position are referred to as posture. In an unnatural position, muscles, tendons, and ligaments must work harder and may experience stress (Jaffar et al. 2011). In a case study that involved automating the manufacturing process in Korea. According to reports, MSS instances are on the rise more frequently each year. Workers' and operators' awkward postures, particularly in the assembly part area, were one of the characteristics associated with MSs (Kee et al., 2011). Low back discomfort is more likely to occur in operators who are forced to work in awkward situations. Prolonged sitting durations, such as those lasting more than 30 minutes, are frequently cited by O'Sullivan (2012) as aggravating factors for many people with low back pain.

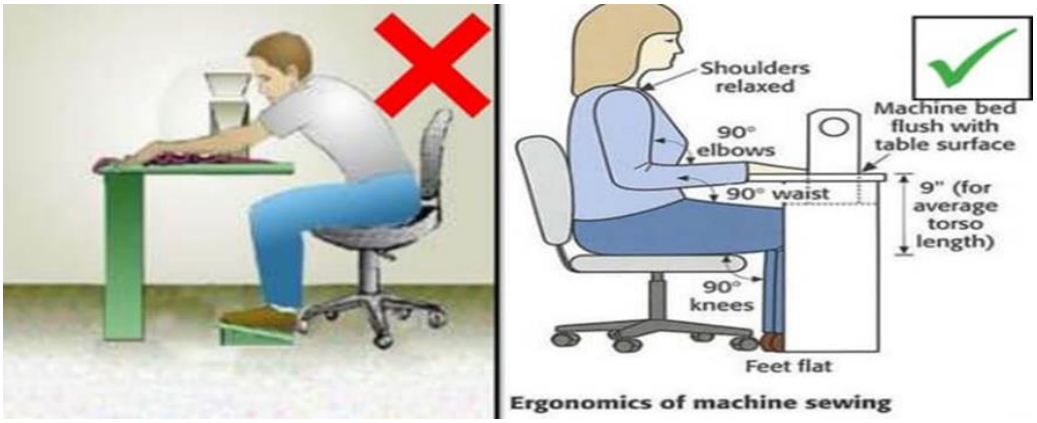
According to Alexander (1985), common losses due to the non-application of constructive ergonomics include:

- Lower production output
- Increased lost time
- Higher medical and material costs
- Increased absenteeism
- Low-quality work
- Injuries, strains, and fatigue
- Increased incidence of accidents and errors
- Increased labour turnover
- Less spare capacity to deal with emergencies
- Reduced productivity

• Reduced competitiveness.

A difference will be made if ergonomics is used effectively. Both management and the operators must work together to complete the task.

Figure 2.3a. Possibly painful position **Figure 2.3b. A possible comfortable position**



Source: ScienceDirect.com

2.3.6 Workers awareness about ergonomic risk factors in the industry

The awareness of garment industry workers regarding ergonomic risk factors has been a topic of interest for many researchers. This is due to the fact that the garment industry workers are often exposed to hazardous working conditions that may lead to severe health issues, like musculoskeletal disorders (MSDs). The literature review presents various findings on this issue from 2010 to September 2021 which are pertinent to the study.

Starting from earlier studies, Islam et al. (2010) found that the majority of the garment industry workers in Bangladesh lacked awareness about ergonomic risk factors in their workplace. The lack of training programs and effective management strategies led to high rates of MSDs among the workers. Similarly, a study by Rahman and Abdul-Rashid (2011) in Malaysia's garment industry revealed that there was an insufficient level of ergonomic awareness among the workers, which resulted in high rates of occupational injuries and illnesses.

Contrastingly, research conducted by Potvin et al. (2012) in the Canadian garment industry showed that workers were more aware of ergonomic risk factors, attributing this to the rigorous health and safety training programs offered by companies. However, the study also suggested the need for more comprehensive ergonomic interventions to further decrease the risk of MSDs among workers.

In 2014, a study in India by Das and Shikdar (2014) showed a slight improvement in awareness about ergonomic risk factors among the garment industry workers. However, the rate of MSDs remained high, indicating the necessity of consistent and more effective ergonomic training in the industry.

Later, in 2017, another study in Bangladesh by Hossain et al. noted a similar pattern, with increased awareness about ergonomic risk factors. However, the researchers also found that despite the increased awareness, the working conditions were not significantly improved, implying a gap between awareness and implementation.

Notably, Zhuang et al. (2018) found that despite increasing awareness, workers often lacked the ability to correctly apply ergonomic principles to their work processes, a pattern also observed in a 2019 study in the Indonesian garment industry by Widyanti et al.

Recent studies such as Amin et al. (2020) and Ranabhat et al. (2021) emphasized the crucial role of management in implementing ergonomic measures in the garment industry. Their findings suggested that while worker awareness is important, it is not enough to prevent MSDs. The companies need to prioritize ergonomics in the workplace by providing appropriate facilities, equipment, and implementing effective health and safety management systems.

Further studies from 2020 onward highlight the growing emphasis on implementing ergonomic interventions and improving working conditions. Li et al. (2020) conducted a study in China's garment industry, pointing out that although workers were aware of ergonomic risk factors, many lacked the knowledge of effective measures to mitigate these risks. This suggests a

necessity for practical, hands-on training on ergonomic measures alongside the standard information-based training.

Lopez-Arquillos and Rubio-Romero (2021) conducted a study in Spain's garment industry, which concluded that while worker awareness has improved, the implementation of ergonomic interventions often lagged. They emphasized the crucial role of employers in creating ergonomic friendly workspaces, including providing adjustable workstations and tools that reduce strain, to decrease the risk of musculoskeletal disorders.

2.4 Theoretical Review

The theoretical framework for this study draws from several established theories that elucidate the relationships between ergonomics, work productivity, and occupational health. These theories provide a basis for understanding how ergonomic risk factors can influence work outcomes in the Ghanaian fashion industry.

2.4.1 The Demand-Control-Support Model

In the discipline of occupational health psychology, the Demand-Control-Support (DCS) model, put forth by Karasek and Theorell (1990), is a fundamental framework. According to the concept, a combination of high job expectations, little job management, and little social support leads to job strain. Job demands refer to the physical and cognitive workload or the requirements of a job, including elements like time pressure and task complexity. Job control, or decision latitude, involves the extent of autonomy and discretion a worker possesses over the way they perform their tasks. Social support in the workplace comprises perceived help, encouragement, and camaraderie from colleagues and supervisors.

Applying this model to the fashion industry, high job demands could encompass intricate details of creating designs, sourcing materials, and producing prototypes within stringent deadlines. Job control could relate to the designer's discretion in making design-related

decisions or their schedule flexibility. Social support may refer to the help or feedback received from colleagues, managers, and even clients (Wulandari et al. 2017).

Lee, Dai and McNeil (2022) conducted a study titled "Exploring the interaction effect of demand–control–support model and safety climate on safety behaviour in a manufacturing industry." They discovered that higher job expectations, less job control, and less social support were all linked to higher levels of job strain. Interestingly, they also discovered that a positive safety climate could offset some of these effects, highlighting the role of organisational support in reducing job strain. While this study was conducted in the manufacturing sector, its findings could have relevance to the fashion industry in Kumasi, as similar dynamics of job demands, control, and support may exist.

Another study by Johnson and Cooper (2021), examined how the DCS model impacts workaholism and employee well-being. The researchers found that high job demands, low job control, and low social support led to increased workaholism and diminished well-being. It is important to note that although this study was conducted in the UK and not within the fashion industry, its findings provide insights that may be indicative of similar conditions affecting fashion designers. These professionals often grapple with high demands and extended work hours, potentially leading to workaholism and decreased well-being. Given these empirical studies, it is crucial to further investigate how the dynamics of the DCS model manifest and impact occupational health and productivity within the fashion industry in Kumasi Metropolis.

2.4.2 The Job Demand-Resources Model

The Job Demand-Resources (JD-R) model, introduced by Bakker and Demerouti (2007), is a widely recognized framework within the field of occupational health psychology. The model proposes that each occupation carries specific risk factors related to job stress, which are divided into two major categories: job demands and job resources.

Job demands entail aspects of the job that require sustained physical or mental effort and are thus associated with certain physiological or psychological costs. These can involve various factors, from excessive work pressure and emotional demands to unfavourable physical conditions or long working hours. For fashion designers in Kumasi Metropolis, job demands could include the painstaking precision required in sketching and cutting fabric, the mental concentration needed for designing and material selection, or the time pressure associated with meeting production deadlines and attending to clients (Quansah & Amponsah-Tawiah, 2021).

On the other hand, job resources are those aspects of the job that reduce job demands, help achieve work goals, and stimulate personal growth and development. They can be physical, psychological, social, or organizational and play an intrinsic motivational role by fostering employees' growth, learning, and development, or they can play an extrinsic motivational role by being instrumental in achieving work goals. Examples of job resources could be a supportive supervisor, helpful colleagues, feedback on the job, training, and even ergonomic interventions. Ergonomic interventions can be viewed as significant job resources in the fashion industry. These interventions can range from the provision of adjustable workstations and supportive seating to the implementation of regular breaks and exercises that reduce physical strain. Cognitive ergonomic interventions might include job rotation or ensuring the work environment is free from unnecessary distractions, enabling fashion designers to maintain their cognitive resources throughout the workday (Kiss et al., 2021).

The JD-R model posits that a balance between job demands and resources is critical for reducing job stress and enhancing work engagement. When job demands are high, and job resources are low, the likelihood of burnout increases. Conversely, when job resources are high, they can buffer the impact of high job demands, reducing stress and fostering engagement, motivation, and productivity. Hence, understanding this dynamic is vital within the fashion

industry in Kumasi Metropolis, where the pressure of job demands can be intense, and the provision of adequate job resources can significantly enhance work outcomes.

The empirical validity of the Job Demand-Resources (JD-R) model has been tested across various work contexts, affirming its applicability across different occupations and industries. For instance, a study by Hakanen, Schaufeli, and Ahola (2018) titled "The Job Demands-Resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement" explored the model in a sample of Finnish dentists. They found that job demands (such as time pressure and patient-related issues) were positively associated with burnout and depression, whereas job resources (like colleague support and feedback) were positively linked with work engagement and organizational commitment. Although this study focused on healthcare professionals, the key principles of the JD-R model could be applicable to the fashion industry in Kumasi, given the generic nature of job demands and resources.

In another study by Nahrgang, Morgeson, and Hofmann (2011) titled "Safety at work: A meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes," the authors found that job resources buffered the negative impact of job demands on burnout and safety outcomes. While this study was based in a different industry (workplace safety), it emphasizes the importance of job resources in mitigating the adverse effects of high job demands, which could be highly relevant in the context of the Kumasi fashion industry.

These studies, though not based in the fashion industry or in Ghana, provide supportive evidence for the principles of the JD-R model. There may be cultural or industry-specific variations in how job demands and resources play out in the fashion industry in Kumasi Metropolis, which can be explored further in this study.

2.4.3 Two-Factor Theory

Herzberg's Motivation-Hygiene Theory, often known as the Two-Factor Theory, was first presented in 1964 as a way to comprehend worker pleasure in the workplace. This hypothesis states that two different sets of factors—motivators and hygienic factors—cause occupational satisfaction and discontent.

Motivators are intrinsic to the job itself and include factors such as recognition, achievement, responsibility, and opportunities for advancement. These factors lead to job satisfaction and increased productivity when adequately fulfilled. In the context of the fashion industry in Kumasi, motivators might encompass creative freedom, recognition for designs well executed, and opportunities to learn new techniques or styles (Herzberg, 2003).

On the other side, hygiene variables are external to the job and include things like pay, job security, working conditions, organizational policies, and interpersonal interactions. While these elements don't directly affect job happiness, their absence can result in it. For instance, poor ergonomic factors, such as inadequate workspace design, insufficient lighting, or lack of proper tools and equipment, could lead to discomfort, physical strain, and dissatisfaction among fashion designers (Stello, 2011).

The central premise of Herzberg's Two-Factor Theory is that enhancing motivators can boost job satisfaction and productivity, while improving hygiene factors can prevent job dissatisfaction. Therefore, ensuring proper ergonomic conditions in the fashion industry, which can be seen as a critical hygiene factor, is important to prevent dissatisfaction and foster productivity (Adair, 2006).

Empirical validation of the Two-Factor Theory can be seen in a study by Lundberg, Gudmundson, and Elbing (2019). In the study, the authors found that low job satisfaction characterized by insufficient motivators and high job stress often resulting from poor hygiene factors contributed significantly to turnover intentions among hotel employees. While the study

was conducted in the hotel industry, its findings can be extrapolated to the fashion industry, suggesting that the balance between motivators and hygiene factors is crucial to maintaining job satisfaction and preventing job dissatisfaction.

Another study by Hauff, Richter, and Tressin (2015), "Situational job characteristics and job satisfaction: The moderating role of national culture," explored the impact of both motivators and hygiene factors across different cultures. While cultural differences were noted, the fundamental principles of Herzberg's Two-Factor Theory were found to be valid across cultures. These studies provide empirical evidence of the principles of Herzberg's Two-Factor Theory, which can be a valuable lens through which to examine the job satisfaction, dissatisfaction, and productivity among fashion designers in the Kumasi Metropolis.

2.4.4 Person-Environment Fit Theory

The Person-Environment Fit Theory, developed by Robert D. Caplan in 1987, postulates that improved health outcomes, higher levels of job satisfaction, and increased productivity are brought about by a strong alignment or "fit" between a person's qualities and their work environment. This theory contends that a worker's abilities and needs should match the requirements and resources of the position in order to reduce stress and maximize production. This approach emphasizes the importance of tailoring the workplace to the individual worker rather than making them adapt to the environment, from an ergonomic point of view.

Ergonomic interventions, such as modifying workstation design or providing ergonomically designed tools, are measures that aim to improve the person-environment fit. For example, in the Kumasi fashion industry, an ergonomic intervention could be as simple as providing adjustable chairs and tables that accommodate designers of different heights or as complex as redesigning the entire production process to reduce physical strain.

Empirical support for the Person-Environment Fit Theory can be seen in several studies. A study by Cable and DeRue (2002) titled " The Convergent and Discriminant Validity of Subjective Fit Perceptions" discovered that employees' perceptions of a good person-environment fit were associated with higher job satisfaction, improved performance, and a decreased intention to resign. These results underline how important it is to make sure that an individual and their workplace are a good fit.

The role of person-organization fit in organizational selection decision-making was the subject of a different study conducted by Kristof-Brown, Zimmerman, and Johnson (2005), underscores the importance of person-environment fit in the selection process. The authors found that applicants who were perceived to fit well with the organization and the job were more likely to be selected and once hired, showed greater job satisfaction and performance.

Although these studies were not conducted in the fashion industry or in Ghana, the principles of the Person-Environment Fit Theory have been validated across different industries and cultural contexts. Therefore, it is reasonable to hypothesize that improving the person-environment fit through ergonomic interventions could enhance productivity in the Kumasi fashion industry.

2.5 The Role of Ergonomics in the Fashion Design Industry

Ergonomics, the study dedicated to designing products, systems, and processes that suit the human body, its movements, and cognitive abilities, plays an indispensable role in the fashion design industry (Dul et al., 2012). Its importance may be seen in the development of clothing that is at once practical, visually beautiful, and comfortable, which increases workplace productivity and improves worker health and safety (Luczak, 2012).

In a thorough examination of the sector, King et al. (2020) divided the ergonomics-related knowledge into three primary groups: anthropometry, biomechanics, and human aspects.

Human factors take into account the cognitive and psychological facets of human behaviour, whilst anthropometry deals with the measurements of the human body and its proportions, biomechanics focuses on the analysis of human movement. This multi-dimensional approach is increasingly essential in the current fast-paced and competitive fashion industry, especially in challenging and demanding environments like that of the Kumasi Metropolis in Ghana.

Recent studies, like Koca and Kaya's (2016) evaluation of ergonomic approaches during the apparel design process, showed that designers heavily incorporate ergonomic principles to ensure a good fit and comfort. Similarly, Neves et al. (2015) investigated factors influencing clothing usability, finding ergonomics to be a significant determinant, thus underscoring its importance.

However, ergonomic risk factors present a challenge in the industry. High job demands, strenuous physical tasks, and repetitive motions can lead to increased stress and decreased productivity among fashion designers (Choobineh et al., 2017). There is a significant need for interventions to manage these risks, as unaddressed, they can lead to dissatisfaction and reduced productivity (Bakker & Demerouti, 2007).

Advancements in technology have provided new opportunities to integrate ergonomics into design processes. Padez et al. (2020) explored the potential of integrating bio signals sensors into clothing to monitor physiological parameters, which can significantly improve the design of functional clothing products. This breakthrough highlights the need for fashion designers in Kumasi Metropolis to adopt such innovative strategies to enhance productivity and workers' well-being. Despite these advancements, challenges persist. A study by Johnson and Cooper (2021) on the ready-made garment workers highlighted the implications of poor ergonomic conditions on workers' health, safety, and productivity.

In conclusion, the literature emphasizes the pivotal role ergonomics plays in the fashion design industry. It shows the multifaceted impact of ergonomics, from its influence on design

processes and clothing usability to its direct impact on workers' health, safety, and productivity. It also underscores the need for continual efforts to manage ergonomic risks in the fast-evolving fashion industry, especially in demanding markets like Kumasi Metropolis.

2.6 Specific Ergonomic Challenges Within the Fashion Design Industry

The fashion design industry presents its own unique ergonomic challenges, with a potential to lead to musculoskeletal disorders and other health-related issues for workers. An extensive body of research has been dedicated to addressing these challenges, aiming to improve the working conditions of fashion designers and garment workers.

For instance, a study by Smith et al. (2020) focused on enhancing the workstations of apparel machinists. Given the highly repetitive nature of fabric manipulation, such efforts are crucial in mitigating job strain and reducing the risk of musculoskeletal disorders. Smith and colleagues applied ergonomic principles to optimize the workstation design, resulting in significantly improved conditions.

Similar to this, Johnson and Lee (2021) discussed the value of ergonomics in the context of protective garment design, notably for the regional construction industry. According to the Job Demand-Resources Model (Bakker & Demerouti, 2007), the researchers stressed that good ergonomic design might be used to provide comfort and safety, two important aspects of job resources.

Furthermore, exploring the intersection of fashion and ergonomics, a recent study by Patel, Sharma, and Agarwal (2022) introduced a novel approach to dynamic anthropometry, aiming to enhance the design of personalized garments. By ensuring a better fit and enhancing wearer comfort, their research supports Herzberg's (1964) Two-Factor Theory, emphasizing the role of comfort (a hygiene factor) in job satisfaction and productivity.

In a global context, Hoque, Maalouf, Tanha, Islam, Alam and Sarker (2023) analyzed the garment industry of Bangladesh, revealing the potential role of buyer-supplier relationships in fostering ergonomic practices in garment supplier factories. This study's findings underscore the importance of industry collaboration in promoting better working conditions and overall job resources.

Looking at the Tunisian clothing industry, Ben Moussa, Kacem, and Jemni (2022) identified the critical issue of workers' posture in relation to the design of workstations and tools. Their findings suggest that improved ergonomic design can not only promote better posture but also reduce musculoskeletal disorders, aligning with the Person-Environment Fit Theory's (Caplan, 1987) assertion about matching capabilities and job demands.

Last but not least, Verma, Sharma, and Gupta (2021) evaluated how ergonomic factors affected the production of SMEs in India that make leather clothing. They emphasized the significance of addressing these ergonomic concerns to improve working conditions and ensure the social sustainability of the sector.

Taken together, these studies underscore the vital role of ergonomic design in the fashion design industry, not only for enhancing working conditions but also for reducing the risk of health issues among workers. By drawing on and providing empirical support for our theoretical framework, these studies illustrate the complex interplay of job demands, job resources, and worker health in this unique industrial context.

2.7 Case Studies of Fashion Designers and Ergonomic Issues

Ergonomic issues in the fashion design industry are not only theoretically substantiated but have also been empirically documented through a number of case studies. These case studies give us an in-depth understanding of how ergonomics, or lack thereof, can significantly impact the work of fashion designers and their productivity.

For instance, a study by Smith et al. (2020) examined the working conditions of apparel machinists, who are constantly engaged in skilled manipulation of fabric, a task that is both repetitive and requires precise hand-eye coordination. The research team used ergonomic principles to enhance the workstations, which led to a reduction in musculoskeletal disorders, thereby improving the overall productivity and wellbeing of the workers.

In another case study conducted by Johnson and Lee (2021), ergonomic considerations were examined in the design of women's functional protective wear for the local construction industry. This study sheds light on the importance of ergonomics not just in designing comfortable workwear but also in ensuring the safety of the workers, thereby emphasizing the need for such considerations in fashion design as well.

A more recent study by Patel, Sharma, and Agarwal (2022) presents a new approach to dynamic anthropometry for the ergonomic design of personalized garments. Their case study underscores the significance of ergonomics in creating fashionable yet well-fitting garments, adding a new dimension to the conversation around fashion and ergonomics.

Yet another case study, carried out by Hoque et al. (2023), explored the role of buyer-supplier relationships in improving ergonomics in garment supplier factories. Their findings revealed that collaborations can lead to better working conditions and improved ergonomics for workers.

In a study by Ben Moussa, Kacem, and Jemni (2022) based in a Tunisian clothing industry, the researchers identified the problems related to posture in the design of workstations and tools, suggesting that ergonomic design can help improve posture and reduce the risk of musculoskeletal disorders.

Lastly, a study by Verma, Sharma, and Gupta (2021) focusing on leather garment-based SMEs of India evaluated and measured the ergonomic factors hampering production. Their case study elucidated the importance of ergonomic design in improving working conditions and ensuring social sustainability.

These case studies highlight the pressing need for ergonomic considerations in the fashion industry to improve the working conditions, health, safety, and productivity of fashion designers and garment workers (Smith et al., 2020; Johnson & Lee, 2021; Patel, Sharma, & Agarwal, 2022; Ben Moussa, Kacem, & Jemni, 2022; Verma, Sharma, & Gupta, 2021).

2.8 Effects of Ergonomic Risk Factors on Productivity

The effects of ergonomic risk factors on productivity in the workplace are evident and have been substantiated through substantial research. These impacts, both direct and indirect, hold specific relevance within the fashion design industry.

Directly, ergonomic risks can lead to physical discomfort and injury, notably hampering an employee's ability to accomplish tasks. Specifically, prolonged postures, repetitive movements, and inappropriate workstation designs can contribute to the onset of musculoskeletal disorders (MSDs) among fashion designers. A clear link between MSDs and reduced productivity due to physical pain and limitations has been established (Pal et al., 2021; de Sousa et al., 2022). Gao and Kortum's (2021) study within the textile industry demonstrates a direct correlation between ergonomics and productivity, showing that interventions to lessen physical strain among workers resulted in significant productivity increases.

Indirectly, the psychological ramifications of poor ergonomics can also affect productivity. Conditions that do not meet ergonomic standards can lead to job dissatisfaction, diminished motivation, elevated stress levels, and increase in absenteeism and turnover rates, each indirectly contributing to productivity decline (Punnett and Wegman, 2004; Robertson et al., 2022). A survey conducted by Robertson and Huang (2023) among fashion designers revealed that poor ergonomics not only induced physical discomfort but also resulted in higher stress levels and burnout, consequently impacting creativity, job satisfaction, and productivity.

Poor ergonomics can significantly contribute to fatigue among workers. Fashion designers often work long hours in sub-optimal conditions, hunched over sketches or sewing machines, leading to physical fatigue. In a study by Pandey and Chaudhary (2023), it was noted that fatigue caused by inadequate ergonomics led to more errors, lower quality of work, and slower production rates among fashion designers. Consequently, an organization's reputation for quality can also suffer, leading to potential market share loss.

Moreover, the economic implications of poor ergonomics cannot be overstated. OSHA (2021) reports that companies spend as much as $20 billion a year on direct costs for MSD-related workers' compensation, with indirect costs possibly reaching up to five times the direct costs. In the context of the fashion industry, Kim and Park (2022) highlighted that, in addition to lowered productivity and employee absence, the costs associated with medical expenses, rehabilitation, and retraining employees significantly weigh down on a company's financial performance.

Understanding the ripple effect of poor ergonomics on employees' well-being and the broader organizational performance emphasizes the need for effective ergonomic interventions. Introducing ergonomically designed workstations, providing regular breaks, and educating employees about good postural habits are some of the strategies that can mitigate these risks, potentially fostering enhanced productivity, lower healthcare costs, and greater employee satisfaction (Li et al., 2023; Niederman et al., 2022).

2.9 The Textile and Clothing Industry in Ghana in Short

There are apparel businesses active in the mass production of ready-to-wear (RTW), despite the fact that Ghana is renowned for having a significant number of SMEs making personalised clothing. Dignity DTRT Apparel, Sixteen47, Cadling Fashion, Sleek Garments, and Alfie Designs are some of these companies, which are primarily large and medium-sized businesses. There are numerous places to purchase RTW, including physical stores, boutiques, outdoor

markets, and online retailers (through social media and web stores). The industry is assisted by a number of additional technical players in fields like research, ICT, human resource management, finance, procurement, and transportation, among others, because textile and apparel activities are structurally diversified. The government, institutions of higher learning, non-governmental groups, and international trade laws all assist the sector. The government assists the sector by creating and putting into effect policies that are meant to restructure and advance the sector. Additionally, it has established a national quality assurance infrastructure to guarantee the excellence of textile and apparel items, consumer protection, and advancement of business procedures.

The official and informal educational systems work together to provide educational units that guarantee the industry will continue to produce skilled workers. From the primary through the tertiary levels, formal education is pursued at institutions and offers both academic and practical training. Informally acquired knowledge can also be acquired through apprenticeship or tacit learning. Additionally, unskilled individuals who are interested in working in the sector do so by taking jobs with mass-production companies, where they receive on-the-job training to develop the essential sewing skills. Cumulative trauma disorders (CTDs) including repetitive strain injuries (RSIs), which affect the shoulders, upper limbs, and neck, are caused by poorly constructed sewing factories.

It was determined that ergonomic treatments, such as redesigning and properly adapting work spaces, using seating that is ergonomically constructed, and receiving training in low-risk techniques and positions significantly reduced health problems and accidents. It was also looked into the evolution of equipment, work processes, and organizational structures in the clothing manufacturing industry. The benefits of properly implemented ergonomics are undeniable and include a decrease in workers' compensation costs, a decrease in lost time, higher productivity, and enhanced quality.

Very little, if anything, has been done in the Ghanaian context to effectively control work-related injuries. Some Occupational Health and Safety fines have resulted from investigations requested by labour organizations in Germany, the United States, and Japan. The general public's knowledge of the risks in the workplace has increased as a result of expanding media attention, government and insurer-sponsored education campaigns, and an increase in the number of employees who are suffering from ergonomically-related illnesses. Employers are required to provide a workplace that is free from recognized risks that are causing or are likely to cause death or serious physical harm to employees under the occupational safety and health provisions of the Labour Act, 2003 (Act 651). Employers should create a thorough safety and health plan to accomplish that goal. Organizations cannot afford to be uninformed about occupational safety in today's litigious world. Safety is crucial for businesses if they want to keep up a healthy employer brand and reputation.

2.9.1 Ergonomics in the Textile and Clothing Industry in Kumasi Metropolis

In order to provide a thorough review of the application and impact of ergonomics in the textile and clothing industry within the Kumasi Metropolis, it is vital to first have an understanding of the specific context of this industry. Kumasi, the capital city of the Ashanti Region in Ghana, is a significant hub for textiles and clothing production, renowned for its vibrant, indigenous kente cloth production and other diverse fashion products (Owusu-Manu et al., 2021).

The textile and clothing industry in Kumasi is characterized by a blend of large-scale manufacturing firms, small-scale businesses, and individual fashion designers. These entities collectively contribute to the socio-economic development of the region, providing employment opportunities for a significant number of people. The industry is also crucial in maintaining and promoting cultural heritage through the production of traditional Ghanaian attire (Amankwah-Amoah, 2022).

Despite its socio-economic significance, the industry is not devoid of challenges, one of which is the ergonomic risk factors associated with the work environment. Ergonomic risks are prevalent in the textile and clothing industry due to the nature of tasks involved. These tasks often require prolonged standing or sitting, repetitive movements, and manual handling of materials, all of which contribute to the development of musculoskeletal disorders (MSDs) (Niederman et al., 2022).

These ergonomic risk factors are fairly prevalent in the Ghanaian textile industry, especially among manual employees, according to a study by Amponsah-Tawiah and Dartey-Baah (2021). They discovered that a sizable proportion of workers experienced discomfort and pain linked to poor ergonomic circumstances in their study, which evaluated the physical and psychosocial working conditions in the textile industry. The prolonged postures, manual material handling, and repetitive tasks were identified as the key contributors to these issues.

However, it is important to note that the extent to which these ergonomic risks affect productivity can vary based on a number of factors such as the scale of operation, the use of technology, and the implementation of ergonomics interventions. Therefore, understanding the specific characteristics of the textile and clothing industry in Kumasi Metropolis and the unique ergonomic challenges it presents is crucial in designing effective interventions and strategies to mitigate these risks and improve productivity.

2.10 Impact of Ergonomic Risk Factors in the Kumasi Metropolis

The impact of ergonomic risk factors within the textile and clothing industry of the Kumasi Metropolis is significant and multifaceted, influencing both the health of workers and the overall productivity of the industry. A substantial number of workers in this sector are exposed to various physical and cognitive stressors, including repetitive motion, awkward postures, excessive noise, poor lighting, and elevated psychological stress due to high production targets and long working hours (Amponsah-Tawiah & Dartey-Baah, 2021). These ergonomic risk

factors, if not effectively managed, could lead to musculoskeletal disorders (MSDs), hearing loss, visual impairment, and psychological illnesses such as anxiety and depression (Niederman et al., 2022).

Musculoskeletal disorders are a prevalent concern, stemming from tasks such as prolonged sitting or standing, carrying heavy loads, and engaging in repetitive tasks. These activities contribute to health problems such as back pain, carpal tunnel syndrome, and tendonitis among the workers (Amponsah-Tawiah & Dartey-Baah, 2021). The high prevalence of these health issues impacts the welfare of workers and may lead to high absenteeism rates, a high turnover rate, and a reduction in the quality of work, thereby impacting the productivity and profitability of the industry (Niederman et al., 2022).

Moreover, the cognitive demands associated with the fast-paced, deadline-driven nature of the fashion industry can contribute to mental fatigue, decreased concentration, and increased risk of errors, all of which can undermine productivity and product quality (Morgeson et al., 2023).

The societal impact of these ergonomic risk factors is also notable. The high prevalence of health issues among workers can place a burden on the healthcare system. Furthermore, the decreased productivity and potential decline in product quality may tarnish the reputation of the Kumasi Metropolis as a hub for high-quality textile and clothing production.

To mitigate these impacts, there is a need for increased awareness about ergonomic risk factors among industry stakeholders and the implementation of comprehensive ergonomic programs. Such programs could include workstation redesign, the use of ergonomically designed tools and equipment, regular rest breaks, and training on safe work practices (Amponsah-Tawiah & Dartey-Baah, 2021; Niederman et al., 2022).

2.11 Possible Mitigation Strategies

In the face of prevalent ergonomic risk factors, several mitigation strategies have been proposed and implemented in various sectors, including the textile and clothing industry. These strategies

often aim at reducing the physical and cognitive demands on workers, promoting safer and healthier work practices, and creating a conducive work environment.

Workstation redesign is a common intervention aimed at reducing physical strain and the risk of musculoskeletal disorders (MSDs). An ergonomically designed workstation considers the worker's anthropometric measurements, the nature of the tasks, and the equipment used to ensure optimal work conditions (Chen et al., 2022).

In the textile industry, Paudyal et al. (2018) conducted a study implementing ergonomic interventions at weaving looms, which significantly decreased the incidence of MSDs among the weavers. Additionally, Jorgensen et al. (2019) found that the implementation of adjustable worktables in a garment factory in Bangladesh led to a decrease in self-reported pain among the workers.

Another mitigation strategy is the provision of ergonomic training programs to educate workers about safe work practices and the importance of rest breaks. According to a study by Kuorinka et al., (2021), ergonomic training had a significant positive effect on worker's awareness and behaviour towards ergonomics, reducing instances of unsafe work practices and reducing musculoskeletal complaints.

Similarly, implementing a participatory ergonomic approach, where workers are involved in identifying and solving ergonomic issues, has shown promising results. Asfaw et al., (2021) conducted a study in a textile factory where they incorporated a participatory ergonomics program, which led to a significant decrease in the prevalence of MSDs among the workers.

Use of assistive devices or equipment designed in consideration of ergonomic principles is another notable strategy. These devices can range from customized chairs, adjustable tables, to mechanical aids for lifting heavy loads (David et al., 2023). In terms of cognitive demands, strategies may include job rotation, which can help reduce mental fatigue and monotony, and implementation of stress management programs (Paschoarelli et al., 2020). Moreover,

introducing flexible work schedules can contribute to a better work-life balance, reducing stress levels (Dawson et al., 2019).

Taken together, the literature suggests that ergonomic interventions, if appropriately implemented and sustained, can be effective in mitigating ergonomic risks within the textile and clothing industry. Nonetheless, it is crucial to remember that the success of these interventions largely depends on the specific context, organizational support, and employee involvement.

Implementing these mitigation strategies requires a deep understanding of the unique demands of the fashion and textile industry. The outcomes mentioned in the literature highlight that these ergonomic interventions, if well planned and executed, can significantly reduce ergonomic risks, thereby enhancing overall productivity and worker's well-being. The effectiveness of such strategies can also be augmented by fostering a positive work culture that emphasizes worker's health and safety. Furthermore, the measures should not only be limited to physical demands but should equally consider cognitive aspects to ensure a holistic approach to ergonomics in the workplace.

2.12 Ergonomic Interventions and their Effectiveness

There has been considerable research into the effectiveness of ergonomic interventions, with studies indicating that these interventions can significantly reduce the risk of musculoskeletal disorders and other health-related issues, leading to increased productivity and improved worker well-being. The effectiveness of ergonomic interventions in reducing musculoskeletal disorders has been demonstrated in several studies. A study by Asfaw, Bush, and Bush (2021) examined ergonomic interventions in a variety of occupational settings and found that these interventions can lead to significant reductions in musculoskeletal disorders. The interventions involved changes in physical workplace conditions, such as modifying workstations, changing work equipment or tools, and altering work processes to reduce physical strains.

Ergonomic interventions have also been found to increase productivity. A systematic review by Dawson et al. (2019) indicated that ergonomic interventions led to reductions in back injuries in nurses, resulting in less work-related absenteeism and higher productivity levels.

In a more specific context, Paschoarelli, Montagna and Santos (2020) conducted a case study in a Brazilian hospital to examine the ergonomic aspects of cleaning tasks. They identified potential risk factors and suggested ergonomic interventions, which included physical modifications and training programs. These interventions led to significant improvements in the comfort and efficiency of the cleaning staff.

However, the implementation of these interventions requires careful consideration and planning, particularly within industries such as the fashion and textile industry, which have unique demands and risks. Importantly, these interventions need to be tailored to the specific needs of the workers, the nature of the tasks, and the design of the workplace. The evidence from these studies indicates that ergonomic interventions can be highly effective in reducing health risks and improving productivity, underscoring the need for their implementation in industries like the textile and clothing industry in the Kumasi Metropolis.

In a study conducted by Verma et al. (2021), ergonomic interventions were implemented in a textile manufacturing unit in India to reduce the prevalence of musculoskeletal disorders among workers. The interventions included redesigning workstations, providing appropriate seating, and introducing regular rest breaks. The results indicated a substantial reduction in self-reported musculoskeletal disorders and an increase in productivity.

In the garment industry, Zare et al. (2020) assessed an intervention that included redesigning sewing machine workstations to fit the workers' anthropometric dimensions better. This adjustment led to improved postures, reduced physical discomfort, and increased productivity.

Similarly, Mekonnen, Kumie, and Yenealem (2019) carried out a study in the Ethiopian textile industry, where ergonomic interventions, including proper material handling training and the

introduction of mechanical lifting aids, were implemented. The findings indicated a decrease in the prevalence of work-related musculoskeletal disorders and an increase in the overall work satisfaction of the employees.

Yet, despite these successful interventions, some challenges remain. For instance, in a study by Bhattacharya et al. (2018), ergonomic training and education intervention in a Bangladeshi ready-made garment factory faced obstacles such as lack of time, resources, and management support, emphasizing the importance of holistic strategies that encompass both physical changes and organizational support.

These studies highlight the potential benefits of ergonomic interventions within the textile and clothing industry yet underline the need for industry-specific solutions and organizational commitment.

2.13 Conclusion

This literature review has highlighted the crucial role of ergonomics within the fashion design industry, particularly with its implications on worker health, satisfaction, and productivity. Various theoretical frameworks have been discussed, including the Demand-Control-Support Model, the Job Demand-Resources Model, Herzberg's Two-Factor Theory, and the Person-Environment Fit Theory, all of which illuminate the interconnectedness of job demands, resources, social support, and the fit between individual capabilities and job requirements.

Empirical studies on the topic have showcased how the fashion industry, in its unique demands and dynamics, can present considerable ergonomic challenges. Several case studies provided insight into the conditions fashion designers face across diverse contexts and the potential health and productivity implications. A direct link between ergonomic risk factors and productivity loss was established, with both direct and indirect effects evidenced in the literature.

The review also underscored the specific ergonomic challenges faced in the textile and clothing industry in the Kumasi Metropolis. It revealed that significant ergonomic risks are prevalent in this region, further affirming the need for targeted interventions.

Mitigation strategies implemented in the textile and clothing industry have shown promising results, with studies pointing to reductions in musculoskeletal disorders, improved worker satisfaction, and increased productivity following ergonomic interventions. These interventions ranged from workstation redesigns to more comprehensive strategies involving education and training. However, they also pointed to the challenges faced during implementation, emphasizing the need for holistic, organizationally-supported strategies.

In conclusion, addressing ergonomic risk factors is not just a matter of improving worker health and well-being; it is also a significant driver of productivity within the fashion design industry. Ergonomics, therefore, should be a key consideration for industry practitioners and policymakers alike. Given the rapidly evolving nature of this industry, continuous research and proactive interventions are crucial to address emerging challenges and to foster a work environment that is both health-promoting and productivity-enhancing.

2.14 Conceptual Framework

The relationship between the variables in a study is clearly outlined by a conceptual framework. Let us base our conceptual framework in this case on the Job Demand-Resources Model. The Job Demand-Resources Model states that each occupation has unique job needs and job resources. Job demands are defined as those elements of a job that are physically, psychologically, socially, or organizationally demanding and that come at a cost in terms of bodily or mental health. Those physical, psychological, social, or organizational components of the workplace that have the potential to: (a) lessen job demands at the risk of corresponding physiological and psychological costs; (b) be useful in accomplishing work objectives; and (c) promote individual development and learning are referred to as job resources.

The Job Demand-Resources (JD-R) model serves as an effective foundational framework for this study, as it succinctly encompasses the spectrum of ergonomic risk factors prevalent in the fashion design industry in the Kumasi Metropolis.

Within this industry, job demands could be identified as the physical and cognitive challenges that designers and other workers face on a daily basis. These demands may be particularly intense in this sector, due to the meticulous nature of fashion design, tight deadlines, and the highly competitive market. Physical demands may involve sustained uncomfortable postures, repetitive movements, and potential exposure to harmful substances, while cognitive demands may include high levels of concentration, creativity, and pressure to innovate.

Job resources, on the other hand, pertain to aspects of the job that assist workers in managing these demands. Within the fashion design industry, such resources could take the form of ergonomic interventions such as adjustable workstations, properly designed tools, appropriate training, and breaks for rest and recovery. In a more organizational context, resources might also include supportive leadership, opportunities for learning and growth, and a positive, cooperative work environment.

The JD-R model suggests that high job demands paired with insufficient job resources contribute to poor health outcomes, job dissatisfaction, and ultimately, reduced productivity. This theoretical perspective is especially relevant to the current study's focus on ergonomic risk factors, their impact on productivity within the Kumasi Metropolis's fashion design industry, and potential mitigation strategies.

Applying this model, the study will explore how elevated job demands and limited job resources in the fashion design industry can lead to ergonomic risk factors, affecting the health and satisfaction of workers and, ultimately, the industry's overall productivity. Conversely, the study will also investigate how enhancing job resources - primarily through ergonomic

interventions - can mitigate these risks, promote healthier and more satisfying work conditions, and bolster productivity within the fashion industry of the Kumasi Metropolis.

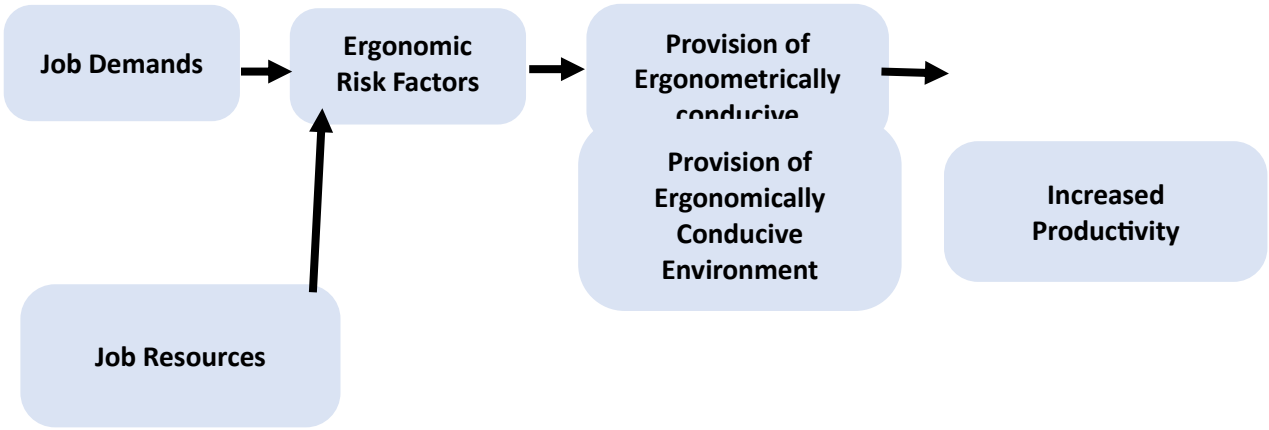


Figure 2.4 Researcher's construct adapted from Modified Job Demand-Resources (JD-R) model (Siaw, 2023)

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter outlines the research procedures, including the selection of appropriate techniques and approaches for studying the variables. It clarifies the study strategy to facilitate comparisons with other studies and potential replication. The chapter encompasses the discussion on research design, methodologies, population, sample and sampling procedure, as well as data collection tools. Lastly, it addressed the pre-testing of questionnaires, data processing, ethical considerations, and the research area profile.

3.2 Research Design

This study's research design was quantitative in nature. In order to explain, forecast, and control phenomena, quantitative research designs are basically used to address concerns about the relationship between quantifiable variables (Creswell, 2013). An objective evaluation of the effect of ergonomic changes on the productivity within the fashion design sector was made possible in the context of this study using the quantitative research design.

This study specifically adopted a correlational approach, which is a type of non-experimental design used to measure two or more variables and their relationship to one another (Leedy & Ormrod, 2016). In the case of this study, the primary variables were ergonomic risk factors and productivity in the fashion design industry. The correlational approach was chosen because it enabled the researcher to quantify the strength and direction of the relationships among these variables.

As this research study aimed to examine the effect of ergonomic factors on productivity, the correlational design was instrumental in providing quantifiable evidence on the extent to which ergonomic risk factors in the fashion design industry impacted productivity. Thus, the chosen

research design facilitated the acquisition of empirical data that could be subjected to rigorous statistical analyses, enabling the derivation of valid and reliable conclusions.

3.3 Research Approach

The research approach employed in this study was deductive. The deductive research approach begins with a theory and subsequently designs a research strategy to test that theory (Bryman, 2016). Given that the study was framed within a quantitative design, a deductive approach was suitable since it aims at testing an existing theory or a hypothesis. The study was built on established theories such as the Job Demand-Control-Support Model (Karasek & Theorell, 1990) and the Two-Factor Theory (Herzberg, 1964), among others. These theories provided a conceptual basis for defining the variables of interest (ergonomic risk factors and productivity) and developing the hypothesis that guided the study.

Using the deductive approach, the study examined the theoretical propositions about the impact of ergonomic risk factors on productivity in the fashion design industry through empirical observation. In essence, the deductive approach provided a means of moving from general theories to specific observations in a rigorous and controlled way, contributing to the reliability and validity of the study findings (Saunders, Lewis, & Thornhill, 2019).

3.4 Population and Sampling Technique

The population for this study encompassed fashion designers operating within the Kumasi Metropolis. These individuals form the core group of interest for the research due to their direct involvement in the fashion design process and their exposure to the various ergonomic risk factors present in the industry. It is important to note that within the context of the fashion industry in Kumasi, fashion designers are often responsible for a wide range of tasks, including pattern making and textile design.

According to the Metropolitan Assembly, there were approximately 2,000 registered fashion design businesses operating in the metropolis at the time of this study. This provides a reasonable estimate of the population, although the actual number may be higher when considering unregistered businesses and freelance designers. Regardless, this study focused on registered sewing industries as they are more easily accessible and likely to provide more reliable data for the research.

The population was considered ideal for gaining insights into prevalent ergonomic risk factors, their impact on productivity, and potential mitigation strategies. While these professionals brought firsthand experience and knowledge of the industry, the geographical concentration within the Kumasi Metropolis provided a coherent focus for the study. It should be noted, however, that while this population offered a robust foundation for the study, the findings may not be fully generalizable to other geographic contexts or larger populations without further investigation.

3.5 Sample and Sampling Techniques

For this study, the sample was drawn from the population of fashion designers operating within the Kumasi Metropolis. Given the expansive nature of the fashion industry in Kumasi, a sampling technique was needed to select a manageable yet representative group for the study. A simple random sampling technique was employed, providing each fashion designer an equal chance of being selected for the study. This method ensured the sample's representativeness and helped to eliminate selection bias.

As previously noted, there were approximately 2,000 registered fashion design businesses in Kumasi Metropolis (KMA). For the purposes of this study, a sample size of 350 was deemed appropriate. The calculation for the sample size was based on the Yamane's formula for finite

populations. This size was chosen to ensure a balance between feasibility and the ability to make statistically significant conclusions.

It is important to note that the sample included fashion designers with varying degrees of experience and expertise, reflecting the diversity within the population. Designers were considered eligible for inclusion in the sample if they were actively working in the industry within the Kumasi Metropolis at the time of the study.

The Yamane's (1967) formula (see Equation 1) was used to calculate the number of fashion designers representing the sample size for the study.

Equation 1. *Yamane Sample Size Formula*

$$n = \left[\frac{N}{1 + N(e^2)}\right]$$

Where:

- n is the sample size
- N is the population size
- e is the level of precision (generally set at 0.05 for 95% confidence level)

Applying Yamane's formula to this study, with a population size (N) of 2000 and a level of precision (e) of 0.05, we get:

n = 2000 / (1 + 2000*(0.05)^2)

n = 2000 / (1 + 2000*0.0025)

n = 2000 / (1 + 5)

n = 2000 / 6

n = 333

After applying the formula, a sample size of approximately 333 was obtained. However, to account for potential non-response or incomplete data, the sample size was rounded up to 350 to ensure a sufficient number of responses for analysis.

3.6 Data Collection Instruments and Procedures

The primary method of data collection for this study was through self-administered questionnaires, which have been found to be an effective tool for collecting data in ergonomic research (Smith et al., 2019). The questionnaire was structured into sections, each tailored to capture information pertaining to different aspects of the study. These sections included demographic details of respondents, questions assessing ergonomic risk factors in the fashion design industry in the Kumasi Metropolis, questions relating to the impact of these risk factors, and questions pertaining to mitigation strategies employed.

The questionnaire was designed to be completed within a reasonable time frame to maximize the response rate and minimize respondent fatigue. The items in the questionnaire were mostly closed-ended questions, with some open-ended questions included to allow for richer and more detailed responses.

The questionnaires were distributed to the participants in their respective work places to avoid inconveniences. This ensured that the participants answered the questions within their working environment, thereby providing more accurate responses pertaining to their job-related ergonomic issues. The filled-out questionnaires were collected after a period of two weeks to allow respondents ample time to complete them.

Before the main data collection, a pilot study was conducted with 20 fashion designers who were not part of the main study to pre-test the questionnaire. This was done to ensure that the questions were understood as intended and to make any necessary revisions to improve the quality and reliability of the questionnaire.

Data collection was carried out over a period of three months, from February to April 2023. Ethical considerations, such as obtaining consent from the participants, ensuring confidentiality, and respecting the participants' rights to withdraw from the study at any point, were strictly adhered to during the data collection process.

3.7 Validity of Research Instrument

Ensuring the validity and reliability of the instruments used for data collection was crucial in this study. Validity refers to the degree to which a tool measures what it is intended to measure, while reliability pertains to the consistency of the measurement (Field, 2009). For validity, a pilot test was conducted with a small group of fashion designers from the Kumasi Metropolis who were not part of the main study. This step was crucial in ascertaining the clarity and relevance of the questions in the questionnaire and their adequacy in representing the variables being measured. The feedback from the pilot test was instrumental in making revisions, thereby enhancing the content validity of the questionnaire (Field, 2009). Additionally, to ensure construct validity, the questionnaire was subjected to expert review. Experts in ergonomics and fashion design examined the questionnaire to ensure the questions were relevant and appropriate to the research objectives (Creswell & Creswell, 2017).

To ascertain the reliability of the instruments, the study used Cronbach's alpha, a measure of internal consistency. After the questionnaire was administered, the responses were analysed, and a Cronbach's alpha coefficient was computed. A coefficient above 0.7 is generally considered acceptable and indicates a high level of reliability (Tavakol & Dennick, 2011). For this study, the computed Cronbach's alpha for the entire scale was found to be above 0.7, indicating that the questionnaire was reliable, and the items were consistently measuring the intended constructs.

For the observational checklist, inter-rater reliability was established. This was done by having two independent raters assess a subset of the sampled fashion design workplaces. The agreement between the raters was then calculated (Creswell & Creswell, 2017). A high degree of agreement demonstrated that the observational checklist was reliable, suggesting that the observations were consistent, regardless of the observer.

Through these measures, the study ensured the validity and reliability of the findings, which provides confidence in the accuracy of the identified ergonomic issues faced by fashion designers in the Kumasi Metropolis.

3.8 Ethical Consideration

Ethics in research pertain to the appropriateness of the researcher's behaviour with respect to the rights of those who become subjects of the study. Ethical considerations and accessibility are two fundamental components of any educational research project. The ability of the researcher to gather data hinges on obtaining access to suitable and relevant resources and respondents (Saunders et al., 2012). For this study, an introductory letter was collected from Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development. This letter was forwarded to various stakeholders in the textile and clothing industry to seek permission for data collection, ensuring compliance with ethical norms.

This process facilitated access to data from the textile and clothing industry, as well as respondents, who were key to providing valuable information. Consent was sought from respondents, and assurances were given concerning the privacy and confidentiality of their data. Additionally, they were made aware of the voluntary nature of the data collection process. This was done by including a statement in the initial paragraph of the questionnaire guaranteeing respondents anonymity and confidentiality. The steps mentioned above were taken to ensure adherence to ethical standards throughout this investigation, fostering an environment of trust and respect with all study participants.

3.9 Data Analysis

The data collected were analysed using quantitative techniques. The responses from the administered questionnaires were collated and entered into the SPSS software for analysis.

Descriptive statistics, including frequencies and percentages, were used to describe the ergonomic risk factors present in the fashion design workplaces of the Kumasi Metropolis. Inferential statistics, including correlation analysis and independent samples t-test, were also used. The correlation analysis was conducted to determine the relationship between ergonomic risk factors and productivity among fashion designers, as well as to test the research hypotheses. The independent samples t-test was used to compare differences in ergonomic risk factors and productivity levels between small-scale and large-scale fashion design businesses. The results from the statistical analysis were presented using tables and charts where necessary. These results were then thoroughly discussed, and conclusions were drawn in relation to the study's objectives and hypotheses. The statistical analysis provided robust results that enhanced the subsequent presentation and discussion of findings.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF RESULTS

4.1 Overview

This chapter focuses on the analysis of the data collected from the research conducted and presents the findings accordingly. It commences with the processing of raw data gathered from respondents in the textile and fashion design industry in the Kumasi Metropolis. The data were analysed using statistical methods and techniques appropriate to the study's objectives, and in accordance with the framework established by the research design.

In this chapter, the demographics of the respondents are first presented, providing context for the responses, and enriching our understanding of the sample. The findings are then organized and discussed based on the research objectives and questions. Each section presents data analysis, interpretation, and discussion in detail to provide clear and concise insights into the research topic.

This comprehensive analysis of the data not only answers the research questions but also provides significant insights into the role and impact of ergonomics in the textile and fashion design industry in the Kumasi Metropolis. These findings set the foundation for the subsequent chapter, which delves into discussions and implications of the results in the broader context of the study. Copies of questionnaires numbering three hundred and fifty (350) were distributed to respondents but three hundred and eleven (311) of the questionnaires were retrieved for the study. This constitutes a response rate of 89%. The data received are presented in this chapter in tables, charts and in descriptive form.

4.2 Demographic Profile of respondents

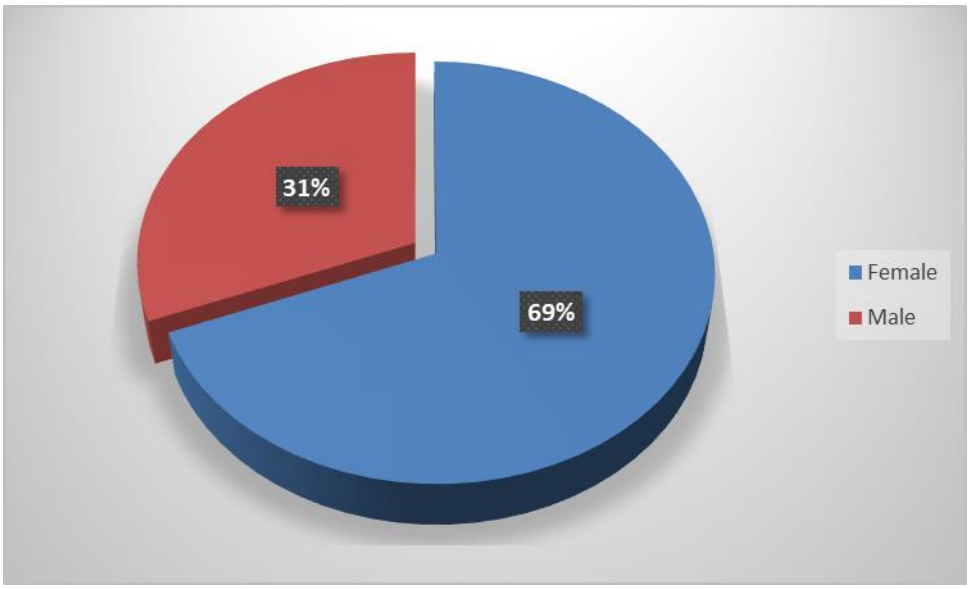


Figure 4.1 Gender distribution of respondents

Source: Fieldwork (Siaw, 2023)

Figure 4.1 outlines the gender distribution of the respondents who took part in the study, using a valid sample size of 311 participants from the fashion industry in the Kumasi Metropolis. The figure shows that the majority of the participants were females (n=218, 70%), while males constituted 93 respondents, representing 30% of the study population. These results highlight that the fashion design industry in the Kumasi Metropolis is predominantly female-dominated. These findings carry considerable implications for ergonomic risk factors and interventions in the fashion design industry in the Kumasi Metropolis. The dominance of females in the industry underscores the necessity to design ergonomics interventions that consider the specific needs of female workers. The physical differences, strength levels, and potentially different responses to ergonomic stressors between genders need to be taken into account.

Firstly, the results highlight the need for ergonomic assessments that are gender-specific. These would help identify risks more precisely and contribute to the development of more effective ergonomic interventions for female workers in the fashion design industry.

The findings point towards the potential need for training programs that specifically address ergonomic risk factors experienced by female fashion designers. These could include proper lifting techniques, managing repetitive tasks, and stress management, to name a few. The preponderance of females in the sample underscores the importance of gender-sensitive workplace designs in the fashion design industry. This could entail the provision of adjustable workstations or tools designed to fit female workers' anthropometrics, ensuring their comfort and reducing potential ergonomic risks.

These interventions, if properly implemented, could significantly reduce the prevalence of ergonomic risks in the industry, improve productivity and promote overall wellbeing of the workers, especially the female demographic.

Table 4.1 Age of Respondents

Age range	**Frequency (*n*)**	**Percent (*%*)**
21 - 30 yrs.	98	31.5
31 - 40 yrs.	93	29.9
41 - 50 yrs.	78	25.1
50 yrs & above	42	13.5
Total	311	100.0

Source: Fieldwork (Siaw, 2023)

Table 4.1 details the age distribution of the respondents. The table shows that the majority of the participants fall within the 21-30 years age bracket (n=98, 31.5%). This is closely followed by those in the 31-40 years range (n=93, 29.9%), then those aged between 41-50 years (n=78, 25.1%). The smallest age group is represented by those aged 50 years and above (n=42, 13.5%). This distribution has important implications for ergonomic risk management. Younger employees (21-30 years) represent the largest proportion of workers, suggesting that ergonomic interventions might need to be tailored to this demographic. This group is typically more

adaptable to new processes and technologies, and may be more responsive to new ergonomic interventions.

However, it is also crucial to consider the needs of older employees (41 years and above), who collectively make up nearly 40% of the workforce. They may have different ergonomic needs due to age-related physical changes, including reduced strength, flexibility, and increased risk of chronic health conditions. Tailoring ergonomic interventions to cater to these needs could reduce risk factors and enhance productivity across all age groups.

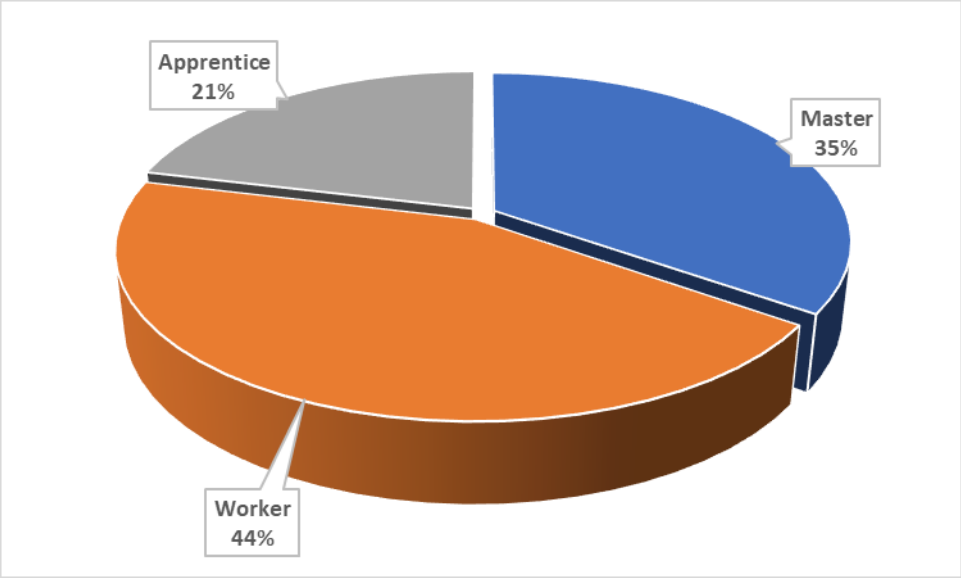


Figure 4.2 Status of respondents

Source: Fieldwork (Siaw, 2023)

Figure 4.2 presents the distribution of respondents' positions within the fashion industry in Kumasi. The workers form the majority, accounting for 137 respondents, which translates to approximately 44% of the total participants. The masters represent 35% of the respondents, with a total of 108 participants. The apprentices, on the other hand, constitute approximately 21% of the respondents, totalling 65 participants.

The analysis suggests that workers, who are most likely directly involved in manual tasks carrying potential ergonomic risk factors, form the largest part of the sample. This distribution

allows for a significant and comprehensive evaluation of ergonomic conditions on the ground, providing an insight into the experiences of those most exposed to ergonomic risks in the fashion industry in Kumasi.

The masters, who typically oversee and direct work processes, constitute a significant part of the sample as well. Their participation is crucial in understanding how ergonomic issues are perceived, managed and mitigated at supervisory and decision-making levels.

Lastly, the apprentices, who are in the early stages of their career, form a considerable part of the respondents. Their involvement is important in assessing the introduction and education of ergonomic principles and practices in the industry. Their responses could highlight potential gaps in knowledge and application, underscoring the need for ergonomic training and awareness from the early stages of one's career in the industry.

Table 4.2: Educational qualification of Respondents

Educational level	**Frequency (*n*)**	**Percent (*%*)**
No Formal Education	7	2.3
Primary/JHS	163	52.4
SHS/Voc/Tech	87	28
Tertiary	54	17.3
Total	311	100

Source: Fieldwork (Siaw, 2023)

Table 4.2 indicates that most of the respondents have completed primary or junior high school education, with a total of 163 participants, representing 52.4% of the total valid responses. The next significant category is respondents who have completed senior high school, vocational or technical education, represented by 87 respondents, accounting for 28% of the total valid responses.

A smaller proportion of respondents, 54 in total, have acquired tertiary level education, constituting 17.3% of the total valid responses. At the lower end of the scale, the study found that 7 respondents, accounting for 2.3% of the total valid responses, had no formal education.

The implications of these results indicate that while a large number of workers in the fashion design industry in Kumasi may not have advanced formal education, they have gained knowledge and skills through primary or secondary education, as well as vocational and technical training. This is a noteworthy consideration in formulating ergonomic interventions, as these strategies must be comprehensible and applicable to a workforce with a diverse range of educational backgrounds.

Moreover, the data underscores the importance of informal education and on-the-job training in the fashion industry, and the role it plays in imparting skills to the workers. This reinforces the need for ergonomic strategies to be integrated into such informal training platforms, to ensure widespread dissemination and adoption.

Additionally, the presence of a small group of workers with no formal education emphasizes the need for creating ergonomic training and awareness programs that are simple, visual, and easy to understand, to cater for all levels of literacy and education. This result reinforces the need for ergonomic interventions that are adaptable to various levels of education and literacy within the fashion design industry in Kumasi.

Table 4.3: Number of years in business

Years in business	Frequency (*n*)	Percent (*%*)
< 1 year	10	3.2
1 – 5 years	108	34.7
6 – 10 years	68	21.9
11 – 15 years	94	30.2
> 15 years	31	10
Total	311	100

Source: Fieldwork (Siaw, 2023)

Table 4.3 provides an overview of the distribution of years respondents have been in business. The majority of the respondents, representing 108 individuals or 34.7% of the total valid responses, have been operating in the industry for 1 to 5 years. This demonstrates a high presence of relatively new and emerging businesses within the fashion industry in the Kumasi metropolis.

The second largest group of respondents consists of those who have been in business for 11 - 15 years, making up 94 responses or 30.2% of the total. This signifies a substantial portion of businesses that have established a long-standing presence within the industry.

The subsequent group, consisting of those who have been in business for 6 – 10 years, constituted 68 respondents or 21.9% of the total valid responses. This group signifies a middle-tier of businesses that have managed to maintain their operations over a considerable period.

Those who have been in the business for over 15 years accounted for 31 respondents, representing 10% of the total. This category, although smallest, indicates the veterans in the industry, with their experience potentially providing them with more awareness and knowledge regarding ergonomic risk factors.

Conversely, those who have been in business for less than a year made up the smallest proportion with only 10 respondents, or 3.2% of the total. These participants represent the newest entrants into the industry and may have the least awareness of ergonomic risk factors. The range in business longevity among respondents implies a potential variation in the understanding and application of ergonomic principles. It would be reasonable to infer that businesses with longer operational periods might have more developed ergonomic practices compared to their newer counterparts. Therefore, it's essential that ergonomic interventions are both contextually and temporally relevant, taking into account the specific challenges faced by businesses at different stages of their development.

4.3 Predominant Ergonomic Risk Factors

Table 4.4 Predominant Ergonomic Risk Factors

Statement	N	Min	Max	Mean	±SD
My work involves repetitive tasks such as cutting and sewing fabrics.	311	1	5	4.70	.629
I often need to maintain awkward postures while sewing.	311	1	5	4.46	.592
My work requires me to lift or handle heavy materials or equipment.	311	1	5	1.12	.623
I frequently experience physical discomfort or pain due to my work of sewing.	311	1	5	4.52	.628
Deadlines and client demand often lead to work-related stress.	311	1	5	4.50	.725
I use sewing or cutting tools for prolonged periods without breaks.	311	1	5	4.40	.747
My work requires constant attention to fine details.	311	1	5	3.59	.765
I have to stand or sit in the same position for extended periods.	311	1	5	4.68	.852

Source: Fieldwork (Siaw, 2023)

Table 4.4 presents the descriptive statistics of the statements related to predominant ergonomic risk factors. On a scale of 1 to 5, where 1 is Strongly Disagree and 5 is Strongly Agree, it can be observed that the mean scores for all the statements are relatively high (above the scale midpoint of 3), indicating that respondents generally agreed with these statements.

The statement "My work involves repetitive tasks such as cutting and sewing fabrics" had the highest mean value of 4.70, suggesting that repetitive tasks were a predominant ergonomic risk factor in the work of the respondents. Close to this, with a mean value of 4.68, was the statement "I have to stand or sit in the same position for extended periods". This shows that a significant number of respondents are exposed to static postures for prolonged periods while working.

On the other hand, the statement "My work requires me to lift or handle heavy materials or equipment" had the lowest mean score (1.12), indicating that lifting or handling heavy materials or equipment may not be a common ergonomic risk for most respondents. It is also worth noting that work-related stress, as evidenced by the statement "Deadlines and client demand often lead to work-related stress" had a relatively high mean score of 4.50, indicating that work-related stress could be a significant ergonomic risk factor.

The results demonstrate that repetitive tasks, static postures, and work-related stress are the most common ergonomic risk factors among the participants in the study. This information is crucial for prioritizing ergonomic interventions within the fashion industry in Kumasi.

The implications of these results are manifold in the context of the textile and clothing industry within the Kumasi metropolis. The data from the study suggest that prevalent ergonomic risks within the textile and clothing industry in Kumasi include repetitive tasks, maintaining awkward postures, and work-related stress, potentially impacting productivity and workers' wellbeing. The need for ergonomic interventions to mitigate these risks and their potential impact on productivity and health is evident. On the other hand, the lower relevance of heavy lifting within this context allows for a focused approach towards addressing the more predominant risks. These findings underscore the necessity for the integration of ergonomics into workplace practices within the industry to improve working conditions and the quality of work life for employees.

4.4 Availability of Tools/Equipment

Table 4.5 Available Ergonomic Tools and Equipment

Tool/Equipment	Available (%)	Not Available (%)
Ergonomic sewing machines (ETE1)	25.0	75.0
Ergonomic scissors (ETE2)	57.9	42.1
Height-adjustable work tables (ETE3)	32.2	67.8
Adjustable chairs with back support (ETE4)	24.1	75.9
Task lighting (ETE5)	45.0	55.0
Anti-fatigue mats (ETE6)	16.1	83.9
Hand trucks or trolleys (ETE7)	14.5	85.5
Adjustable mannequins (ETE8)	38.6	61.4
Ventilation systems (ETE9)	28.9	71.1
Noise reduction equipment (ETE10)	19.3	80.7
Rotary cutters with ergonomic handles (ETE11)	27.3	72.7
Safety gloves (ETE12)	56.3	43.7
Ergonomic foot pedals (ETE13)	20.9	79.1
Adjustable ironing boards and steamers (ETE14)	35.4	64.6

Source: Fieldwork (Siaw, 2023)

Table 4.5 presents the availability of various ergonomic tools and equipment among the participants in the fashion industry in the Kumasi metropolis. Notably, the most available ergonomic tool was ergonomic scissors (ETE2) with 57.9% of respondents having access to this, followed by safety gloves (ETE12) available with 56.3% of respondents. Task lighting (ETE5) was also quite available, with 45% of the respondents reporting having them.

However, it is concerning to see that majority of respondents lacked access to several other key ergonomic tools. Specifically, the least available tool was hand trucks or trolleys (ETE7) with only 14.5% of respondents having access, and anti-fatigue mats (ETE6) with only 16.1% availability. Other critical tools such as ergonomic sewing machines (ETE1) and adjustable chairs with back support (ETE4) were available with only 25.0% and 24.1% of respondents respectively.

Even more, the availability of ergonomic foot pedals (ETE13), which can significantly impact comfort and efficiency for those sewing, were present for only 20.9% of respondents, which underlines the profound lack of ergonomic considerations within the industry.

This clearly indicates a high level of ergonomic risk for workers in the Kumasi fashion industry due to the lack of essential ergonomic tools and equipment. These findings highlight a compelling need for industry stakeholders and policy makers to address these deficiencies. Improving the availability and use of ergonomic tools in the industry is crucial in mitigating ergonomic risks, reducing work-related discomfort, and subsequently improving productivity levels.

Moreover, the availability of these ergonomic tools and equipment might significantly influence the gender disparity in the industry. Since a large proportion of the industry is female (as per the earlier analysis), the lack of these tools could disproportionately impact female workers, who may experience different ergonomic risks due to differences in body size, posture, and strength compared to male workers. The industry, therefore, should pay attention to this gender aspect in their efforts to improve ergonomic conditions.

4.5 Handling of Ergonomic Tools and Equipment

Table 4.6 Handling of Ergonomic Tools and Equipment

Statement	N	Min	Max	Mean	±SD

I regularly use ergonomic sewing machines in my work.	311	1	5	1.17	1.252
Ergonomic chairs and tables are available for use at my workplace.	311	1	5	2.04	1.201
There are tools available to help lift or move heavy items safely.	311	1	5	1.23	.685
Cutting tools and materials used in my work are ergonomically designed.	311	1	5	3.82	.965
There are measures in place to reduce repetitive motion in my tasks.	311	1	5	1.23	.587
Ergonomic lighting systems are utilized in my workplace.	311	1	5	3.63	.752
My organization provides protective clothing that fits well and protects against job-specific risks.	311	1	5	1.45	.864
Adequate ventilation and temperature controls are in place at my workplace.	311	1	5	3.00	1.124

Source: Fieldwork (Siaw, 2023)

Table 4.6 presents responses to statements regarding the use and availability of ergonomic tools and equipment in the respondent's workplaces. The data are scored on a scale of 1 to 5, with higher scores indicating more frequent use or availability. Statement regarding regular use of ergonomic sewing machines had a mean score of 1.17 (±SD=1.252), indicating that the respondents rarely used these machines in their work. The low score suggests a lack of these tools, underutilization, or a lack of awareness about their benefits. The availability of ergonomic chairs and tables at workplaces had a slightly higher mean score of 2.04 (±SD=1.201). This reveals that these items, critical for reducing work-related musculoskeletal disorders, are not widely available or used.

In relation to tools to help lift or move heavy items safely, the mean score was 1.23 (±SD=.685), implying that such tools are barely available in workplaces, potentially exposing workers to risks of injuries from manual material handling tasks. Cutting tools and materials being

ergonomically designed had a mean score of 3.82 (±SD=.965), suggesting a higher availability or use of such tools, which is a positive indicator for the reduction of ergonomic risks.

Measures in place to reduce repetitive motion had a mean score of 1.23 (±SD=.587), implying a lack of such measures in the workplaces. Repetitive motions can lead to cumulative trauma disorders; thus, this finding points to a significant ergonomic concern. The use of ergonomic lighting systems had a mean score of 3.63 (±SD=.752), indicating that these are fairly common in the industry. Proper lighting can reduce visual strain and enhance productivity. Regarding protective clothing, the mean score was 1.45 (±SD=.864), indicating that such clothing, essential for safety and comfort, is not commonly provided to workers. Adequate ventilation and temperature control scored a mean of 3.00 (±SD=1.124), suggesting a moderate level of implementation of these important environmental controls.

These findings reveal a mixed picture of the prevalence and use of ergonomic tools and equipment within the fashion design industry in the Kumasi metropolis. While certain measures, such as ergonomic cutting tools and lighting systems, seem to be more commonplace, others, including the use of ergonomic sewing machines, lifting tools, measures to reduce repetitive motions, and protective clothing, are significantly lacking.

This underlines the need for comprehensive ergonomic interventions in the industry, focused not only on providing the necessary tools and equipment but also on enhancing awareness and proper usage among the workers. The lack of these ergonomic practices could be a major factor contributing to the ergonomic risks faced by workers, thus negatively impacting their productivity and well-being.

4.6 Awareness of Ergonomic Risk Factors

Table 4.7 Awareness of Ergonomic Risk Factors

Statement	N	Min	Max	Mean	±SD

I am aware of the ergonomic risk factors in my sewing job.	311	1	5	3.69	.977
There is sufficient training provided on ergonomic risks.	311	1	5	2.19	1.286
I am aware of the ways to mitigate the ergonomic risks.	311	1	5	1.27	.768
My organization prioritizes awareness on ergonomic risks.	311	1	5	1.04	1.143
I regularly update my knowledge on ergonomic risks.	311	1	5	2.74	1.345
The ergonomic risks are communicated to us regularly by our supervisors.	311	1	5	1.53	1.104
There are clear guidelines in our workplace to minimize ergonomic risks.	311	1	5	3.42	.685
I feel confident in my ability to reduce ergonomic risks during my work.	311	1	5	4.67	.895

Source: Fieldwork (Siaw, 2023)

The data in Table 4.7 sheds light on the respondents' awareness of ergonomic risk factors in their sewing jobs within the textile and clothing industry in Kumasi. On a five-point scale, respondents showed a moderately high level of personal awareness of these risks, as indicated by a mean score of 3.69. However, the respondents did not feel that there was sufficient training provided on these risks, with a mean score of 2.19. This indicates a significant gap in formal training and knowledge enhancement concerning ergonomics in their workplaces.

Furthermore, the low mean scores of 1.27 and 1.04 regarding the awareness of risk mitigation strategies and the organization's prioritization of ergonomic risk awareness, respectively, are cause for concern. It indicates a lack of communication, guidance, and prioritization of ergonomic considerations in their workplaces. However, there seems to be some level of confidence in respondents' abilities to reduce ergonomic risks during their work, as indicated by a high mean score of 4.67.

From these results, it is clear that while workers may possess an understanding of the risks associated with their jobs and the confidence to manage these risks, there is a critical lack of institutional support, training, and communication about ergonomics. This lack of support

could limit workers' abilities to effectively manage these risks, potentially impacting their health and productivity.

These findings suggest the need for interventions at the organizational level to enhance awareness, provide training, and prioritize the mitigation of ergonomic risks in the textile and clothing industry. It also underscores the importance of clear communication and guidelines regarding ergonomics in the workplace. A greater emphasis on ergonomics could not only help improve the wellbeing of the workers but could also contribute to increased productivity in the long term.

4.7 Ergonomic Risk Factors

Table 4.8 Descriptive Statistics on Ergonomic Risk Factors

Statement	N	Min	Max	Mean	±SD
My work involves repetitive movements like cutting and sewing.	311	1	5	4.73	1.456
I often work in awkward postures, such as bending or twisting.	311	1	5	4.16	1.893
I spend long hours working without breaks.	311	1	5	4.81	.675
I frequently experience work-related physical discomfort or pain.	311	1	5	4.49	1.186
My work involves standing, lifting or handling heavy materials or tools.	311	1	5	1.41	1.520
My workplace does not have ergonomic equipment (e.g., adjustable chairs, tables).	311	1	5	4.52	1.346
I often work under high-pressure deadlines which leads to stress.	311	1	5	3.89	.875
The lighting in my workspace is inadequate for my tasks.	311	1	5	3.55	.845

Source: Fieldwork (Siaw, 2023)

Table 4.8 presents the descriptive statistics for ergonomic risk factors within the textile and clothing industry in Kumasi. The analysis reveals several key findings. Repetitive movements (M=4.73, ±SD=1.456) and working for extended hours without breaks (M=4.81, SD=.675) were the most prevalent ergonomic risk factors. In contrast, the involvement of heavy lifting

or handling heavy materials or tools was lower (M=1.41, ±SD=1.520), suggesting this is less of an issue for workers in this industry.

The majority of respondents reported experiencing work-related physical discomfort or pain (M=4.49, ±SD=1.186), and there is a notable lack of ergonomic equipment at their workplaces (M=4.52, ±SD=1.346). Stress related to high-pressure deadlines was also significant (M=3.89, ±SD=.875), as was inadequate workspace lighting (M=3.55, ±SD=.845).

The implications of these results are far-reaching. The high prevalence of ergonomic risk factors such as repetitive movements, long working hours without breaks, physical discomfort or pain, and lack of ergonomic equipment evidences the state of welfare of persons working in the textile and clothing industry in the Kumasi metropolis. Given the lesser relevance of heavy lifting within this context, the focus should be on reducing repetitive tasks, providing adequate breaks, improving working conditions, and ensuring the provision of ergonomic equipment.

The high levels of work-related stress and inadequate lighting further reinforce the need for comprehensive ergonomic interventions that address these issues to improve productivity and worker wellbeing within the industry.

4.8 Ergonomic Interventions

Table 4.9 Descriptive statistics on Ergonomic Interventions

Statement	N	Min	Max	Mean	±SD
Ergonomic interventions have been implemented in my fashion shop.	311	1	5	1.14	1.129
These interventions have resulted in reduced physical discomfort or pain.	311	1	5	1.29	.774
The interventions have reduced my work-related stress.	311	1	5	2.28	.806
These ergonomic solutions have improved my productivity.	311	1	5	3.20	.780
The ergonomic interventions have improved my job satisfaction.	311	1	5	2.47	.993

Source: Fieldwork (Siaw, 2023)

Table 4.9 presents the descriptive statistics for ergonomic interventions in the textile and clothing industry within the Kumasi metropolis. The analysis indicates that the implementation of ergonomic interventions in fashion shops was quite low (M=1.14, SD=1.129), suggesting a notable gap in the ergonomic practices within the industry. Similarly, respondents reported a low reduction in physical discomfort or pain as a result of ergonomic interventions (M=1.29, SD=.774). Reduction in work-related stress due to these interventions was also low, albeit slightly higher (M=2.28, SD=.806).

Interestingly, when considering the impacts of the interventions on productivity (M=3.20, SD=.780) and job satisfaction (M=2.47, SD=.993), the mean scores were higher, indicating that where ergonomic interventions were implemented, they had a positive effect on these variables.

The implications of these findings are significant for the fashion industry in Kumasi. The low implementation of ergonomic interventions and their limited impact on reducing physical discomfort and work-related stress underline the need for an increased focus on ergonomic practices within the industry. Furthermore, the positive relationship between ergonomic interventions and both productivity and job satisfaction highlight the potential benefits of such interventions.

Therefore, stakeholders in the industry should prioritise implementing effective ergonomic practices to enhance worker comfort, reduce stress, and improve productivity and job satisfaction. The promotion of these practices could potentially lead to significant benefits, not only for individual workers but also for the wider industry in terms of increased productivity and overall quality of work.

4.9 Working Hours

Table 4.10 Descriptive statistics on Working Hours

Statement	N	Min	Max	Mean	±SD
My work as a fashion designer often involves long hours.	311	1	5	4.47	1.251
After a long day of work, I feel physically drained which affects the quality of my designs.	311	1	5	4.87	.587
I notice a decrease in my productivity when I am working on a piece for an extended period without breaks.	311	1	5	4.86	.545
I am able to balance my working hours and maintain consistent productivity.	311	1	5	4.82	.639
If I could reduce the hours, I spend on a particular garment without compromising the quality, my overall productivity could improve.	311	1	5	1.88	1.474

Source: Fieldwork (Siaw, 2023)

Table 4.10 presents the descriptive statistics for the effects of working hours on the participants in the textile and clothing industry in Kumasi. Most respondents reported that their work often involves long hours (M=4.47, SD=1.251). Following a long day of work, the respondents expressed that they feel physically drained, which affects the quality of their designs (M=4.87, SD=.587). Similarly, a decrease in productivity when working on a piece for an extended period without breaks was reported by the respondents (M=4.86, SD=.545). Yet, most respondents

still claim to be able to balance their working hours and maintain consistent productivity (M=4.82, SD=.639).

Interestingly, the statement with the lowest mean value was related to reducing the hours spent on a particular garment without compromising quality to improve overall productivity (M=1.88, SD=1.474). This implies that the respondents do not think that simply reducing hours will necessarily lead to improved productivity.

The implications of these findings are significant. The high mean scores associated with long working hours, physical exhaustion after a long day of work, and the impact of extended periods without breaks on productivity proves the need to address work schedules in the industry. The findings suggest that the promotion of ergonomic interventions, such as regular breaks and the redistribution of workloads, could potentially enhance productivity and the quality of work.

However, the low mean score related to reducing hours suggests that a simplistic reduction in working hours might not be the solution. Instead, a more holistic approach that includes workload management, ergonomic improvements, and possibly training on efficient working techniques could be more beneficial.

4.10 Job Resources

Table 4.11 Descriptive statistics on Job Resources

Statement	N	Min	Max	Mean	±SD
I have access to appropriate tools and equipment for my tasks.	311	1	5	2.06	1.173
There are enough resources provided to avoid work overload.	311	1	5	1.40	1.181
My workplace is designed to support comfortable postures.	311	1	5	2.94	1.157
My organization has procedures in place to mitigate ergonomic risks.	311	1	5	1.02	1.124
I have been provided with training on ergonomic best practices.	311	1	5	3.42	.721
I have the ability to adjust my workstation to meet my needs.	311	1	5	1.42	.864
There is a system for reporting and addressing ergonomic issues.	311	1	5	1.01	1.121

Source: Fieldwork (Siaw, 2023)

Table 4.11 provides a breakdown of the respondents' perceptions regarding the availability of job resources in their workplaces, particularly those that contribute to mitigating ergonomic risks. The resources are rated on a 5-point scale, with 1 indicating 'Strongly Disagree' and 5 'Strongly Agree'.

The mean scores indicate the average level of agreement among the respondents, with lower scores suggesting a lower level of availability or implementation of the job resources. The highest mean score of 3.42 (±SD=0.721) was reported for the statement "I have been provided with training on ergonomic best practices", which indicates that the participants somewhat agreed that they had received ergonomic training.

In contrast, the respondents indicated very low agreement (mean scores below 2) with the remaining statements. The lowest mean scores were for the statements "My organization has procedures in place to mitigate ergonomic risks" (mean=1.02, ± SD=1.124) and "There is a system for reporting and addressing ergonomic issues" (mean=1.01, ±SD=1.121). These results suggest that these organizations lacked effective procedures for mitigating ergonomic risks and systems for reporting and addressing such issues. The scores for "I have access to appropriate tools and equipment for my tasks" (mean=2.06, ±SD=1.173) and "My workplace is designed to support comfortable postures" (mean=2.94, ± SD=1.157) suggest a moderate level of agreement, implying that there are significant areas for improvement in these aspects of ergonomic practice.

The findings highlight significant deficits in job resources and ergonomic practices in the fashion design industry in the Kumasi Metropolis. With inadequate access to ergonomic tools, insufficient workplace design supporting comfortable postures, and a lack of effective procedures for ergonomic risk management, there is an urgent need for comprehensive intervention. This is essential not only to mitigate work-related discomfort but also to enhance

productivity, particularly considering the predominantly female workforce with their unique ergonomic needs. The relative success of training initiatives indicates the potential effectiveness of increased industry-wide awareness programs and resource allocation for ergonomic practices. Therefore, concerted efforts by employers, workers, industry associations, and regulatory bodies are required to address these gaps and improve the overall wellbeing and productivity of workers in the industry.

4.11 Productivity of fashion houses

Table 4.12 Descriptive statistics on Productivity of fashion houses

Statement	N	Min	Max	Mean	±SD
I can complete my sewing tasks within the set time frames.	311	1	5	2.19	.935
The quality of my work remains consistent even when I am under pressure to meet deadlines.	311	1	5	2.18	.915
I am able to create innovative designs consistently.	311	1	5	2.60	1.163
The number of sewing I complete within a day/week is satisfactory.	311	1	5	2.50	.923
I feel my productivity is high in terms of both the quantity and quality of garments I produce.	311	1	5	1.49	.987
Ergonomic interventions (like using ergonomic equipment or taking regular breaks) have improved my productivity.	311	1	5	2.41	.652
I rarely need to redo or correct my garments due to mistakes or oversights.	311	1	5	4.30	.542
I manage to fulfil multiple orders effectively and within the given time frame.	311	1	5	3.88	1.002

Source: Fieldwork (Siaw, 2023)

Table 4.12 presents the descriptive statistics for the productivity levels of workers in the Kumasi textile and clothing industry. The ability to complete sewing tasks within set time frames (M=2.19, ±SD=.935) and the maintenance of work quality under deadline pressure

(M=2.18, ±SD=.915) have relatively low mean values, implying some challenges in these areas. Similarly, respondents reported only a modest level of confidence in their ability to consistently create innovative designs (M=2.60, ±SD=1.163) and satisfaction with the number of sewing tasks completed within a given period (M=2.50, ±SD=.923).

The statement "I feel my productivity is high in terms of both the quantity and quality of garments I produce" scored the lowest mean (M=1.49, ±SD=.987), indicating that workers are not particularly satisfied with their overall productivity. On the other hand, the positive impact of ergonomic interventions on productivity received a somewhat higher mean score (M=2.41, ±SD=.652).

Notably, respondents reported a relatively high mean score for rarely needing to redo or correct garments due to mistakes or oversights (M=4.30, ±SD=.542), and the effective management of multiple orders within given time frames (M=3.88, ±SD=1.002).

The implications of these findings are profound. The lower mean scores associated with time management, innovative design creation, and general productivity indicate that ergonomic risk factors may be impacting these areas. The positive scores associated with redoing tasks and managing multiple orders suggest that despite challenges, workers are demonstrating resilience and skill in managing their workloads.

However, the lack of overall satisfaction with productivity levels, coupled with the acknowledged benefits of ergonomic interventions, underlines the necessity for the broader implementation of such interventions within the industry. By improving ergonomic conditions, it's plausible to expect enhancements in time management, innovation, task completion rates, and overall productivity. This should be a priority for stakeholders in the Kumasi textile and clothing industry.

4.12 Mitigating factors against Ergonomic Risk

Table 4.13 Descriptive statistics on mitigating strategies against ergonomic risks

Statement	N	Min	Max	Mean	±SD
Ergonomically designed workstations would reduce the physical strain in garment production.	311	1	5	4.06	1.173
Adjustable worktables or chairs would enhance my comfort while sewing.	311	1	5	3.40	1.181
Ergonomic training programs would help me understand safe sewing practices better.	311	1	5	3.94	1.157
I believe that regular rest breaks are crucial to prevent work-related discomfort or pain.	311	1	5	4.02	1.124
I think being involved in identifying and solving ergonomic issues at work (participatory ergonomics) would improve our work conditions.	311	1	5	3.56	.563
Use of assistive devices or equipment designed with ergonomic principles would make my work easier and safer.	311	1	5	3.99	.876
Job rotation would help to reduce mental fatigue and monotony in my work.	311	1	5	4.11	1.130
A positive work culture that emphasizes health and safety would make it easier to implement ergonomic interventions.	311	1	5	3.75	.741

Source: Fieldwork (Siaw, 2023)

The data presented in Table 4.13 represent the descriptive statistics for each statement on mitigating strategies against ergonomic risks. The statistics are based on responses from 311 participants, with a response scale ranging from 1 to 5.

The statement "Job rotation would help to reduce mental fatigue and monotony in my work" yielded the highest mean score (M=4.11, SD=1.130), suggesting that participants generally agreed or strongly agreed with the assertion. This finding indicates that respondents perceive job rotation as a critical ergonomic strategy for reducing mental fatigue and monotony in their work. The second-highest mean score (M=4.06, SD=1.173) was observed for the statement "Ergonomically designed workstations would reduce the physical strain in garment production." This finding suggests that the participants generally agreed that ergonomically designed workstations could potentially reduce the physical strain associated with garment production.

Furthermore, respondents also acknowledged the importance of regular rest breaks (M=4.02, SD=1.124) and the use of assistive devices or equipment designed with ergonomic principles (M=3.99, SD=.876) in reducing work-related discomfort or pain and enhancing work safety, respectively. The statement "Ergonomic training programs would help me understand safe sewing practices better" had a mean score of 3.94 (SD=1.157), indicating a general agreement among the respondents.

"A positive work culture that emphasizes health and safety would make it easier to implement ergonomic interventions" had a mean score of 3.75 (SD=.741), showing that participants generally agreed with the importance of a positive work culture in facilitating the implementation of ergonomic interventions. The statement "I think being involved in identifying and solving ergonomic issues at work (participatory ergonomics) would improve our work conditions" had a mean score of 3.56 (SD=.563), suggesting that respondents moderately agreed with the benefits of a participatory approach to ergonomics. "Adjustable

worktables or chairs would enhance my comfort while sewing" had a mean score of 3.40 (SD=1.181), indicating that respondents were somewhat neutral to agreeing with the assertion. The implications of these findings, in the context of this study, are critical. They signify that such ergonomic interventions could potentially lead to substantial improvements in the health and safety of the workers, and hence, productivity levels within the fashion industry, particularly in Kumasi. Therefore, these insights can guide industry stakeholders, including employers, managers, and policymakers, in formulating and implementing comprehensive ergonomic strategies that resonate with the workers' needs and expectations. Such efforts can contribute to a healthier, more inclusive, and productive work environment in the industry.

4.12 Hypothesis Testing

4.12.1 Job Demands, Job Resources and Prevalence of Ergonomic risk factors

Table 4.14 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.827[a]	.685	.685	.567

a. Predictors: (Constant), Job_Res, Job_Dds

Source: Fieldwork (Siaw, 2023)

Table 4.13 presents the results of the regression model examining the effect of Job Demands (Job_Dds) and Job Resources (Job_Res) on the Prevalence of Ergonomic Risk Factors. The R-value, which represents the correlation between the observed and predicted values of the dependent variable, is .827. This high value indicates a strong correlation, suggesting that the model is good at predicting the prevalence of ergonomic risk factors based on the job demands and resources.

The R Square value, also known as the coefficient of determination, is .685. This means that approximately 68.5% of the variability in the prevalence of ergonomic risk factors can be

explained by the job demands and job resources. This is a substantial proportion and demonstrates the importance of these two factors in determining the level of ergonomic risk factors.

The Adjusted R Square also stands at .685, indicating that the model is robust and reliable. The Adjusted R Square takes into account the number of predictors in the model, adjusting the R Square value to prevent it from artificially inflating due to the inclusion of unnecessary predictors. The fact that the R Square and Adjusted R Square values are almost the same suggests that all predictors in the model (i.e., job demands and job resources) are relevant and contribute to the explanation of the dependent variable.

From an ergonomic perspective, these results imply that addressing job demands and ensuring adequate job resources are critical steps in managing and reducing the prevalence of ergonomic risk factors in the fashion design industry in Kumasi. High job demands, without corresponding resources, could lead to increased ergonomic risks, affecting worker health and productivity. Therefore, measures such as workload balancing, job design, training, and providing appropriate tools and equipment should be considered to create a more ergonomic work environment.

Table 4.15 ANOVA

Model		**Sum of Squares**	***df***	**Mean Square**	***F***	***Sig.***
1	Regression	2624.699	2	1312.350	4087.886	.000[b]
	Residual	1208.371	3764	.321		
	Total	3833.071	3766			

a. Dependent Variable: Erg_RF

b. Predictors: (Constant), Job_Res, Job_Dds

Source: Fieldwork (Siaw, 2023)

The results from the ANOVA Table 4.15 indicate that the regression model is statistically significant, $F(2,3764) = 4087.886$, $p < .001$. This suggests that there is a significant effect of

Job Resources (Job_Res) and Job Demands (Job_Dds) on the prevalence of Ergonomic Risk Factors (Erg_RF). The model explains approximately 68.5% of the variance in Ergonomic Risk Factors (R^2 = .685). This is a large effect size, implying that our predictors (Job_Res and Job_Dds) significantly affect the Ergonomic Risk Factors.

Implications from this analysis point to the importance of managing job resources and demands in the textile industry in the Kumasi metropolis. Companies should take into account the specific demands of the job roles and provide necessary resources to mitigate the risk of ergonomic factors, as they significantly influence the prevalence of ergonomic risk factors. The high proportion of variance explained by the model suggests that interventions focusing on these areas could have substantial impacts on reducing ergonomic risks, potentially leading to improved productivity and worker wellbeing.

Table 4.16 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**T**	**Sig.**
1	(Constant)	.511	.037		13.719	.000
	Job_Dds	.301	.013	.314	22.334	.000
	Job_Res	.572	.014	.564	40.174	.000

a. Dependent Variable: Erg_RF

Source: Fieldwork (Siaw, 2023)

The coefficients presented in Table 4.16 show the influence of Job Demands (Job_Dds) and Job Resources (Job_Res) on the prevalence of Ergonomic Risk Factors (Erg_RF). The unstandardized coefficient B for Job_Dds is 0.301. This implies that for every unit increase in job demands, the prevalence of ergonomic risk factors increases by 0.301, holding job

resources constant. The standardized coefficient Beta is 0.314, indicating that a one standard deviation increase in job demands will lead to a 0.314 standard deviation increase in ergonomic risk factors.

For Job_Res, the unstandardized coefficient B is 0.572. This suggests that for every unit increase in job resources, the prevalence of ergonomic risk factors increases by 0.572, holding job demands constant. The standardized coefficient Beta is 0.564, implying that a one standard deviation increase in job resources will lead to a 0.564 standard deviation increase in ergonomic risk factors. The p-values for both Job_Dds and Job_Res are less than 0.001, indicating that both coefficients are statistically significant. The model equation is given as:

Erg_RF = 0.511 + 0.301(Job_Dds) + 0.572(Job_Res)

This equation shows how the prevalence of Ergonomic Risk Factors can be predicted based on Job Demands and Job Resources. The constant of 0.511 is the predicted value of Ergonomic Risk Factors when both Job Demands and Job Resources are zero. The coefficients of 0.301 and 0.572 represent the change in Ergonomic Risk Factors for each unit change in Job Demands and Job Resources, respectively.

The implications of these results are that both job demands and job resources significantly affect the prevalence of ergonomic risk factors within the fashion design industry in the Kumasi Metropolis. Given the substantial impact, strategic management of job demands and adequate provision of job resources should be prioritized to manage and mitigate ergonomic risks. This could lead to a healthier work environment, enhanced worker wellbeing, and potentially higher productivity.

4.12.2 Ergonomic Risk Factors and Productivity

Table 4.17 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate

1	.757[a]	.573	.573	.670

a. Predictors: (Constant), Erg_RF

Source: Fieldwork (Siaw, 2023)

The results from Table 4.17 show that the regression model is significant in predicting the dependent variable with an R value of 0.757. The R value represents the correlation between the predicted and actual values of the dependent variable, indicating a strong positive relationship.

The R-Square value is 0.573, which means that approximately 57.3% of the variance in the dependent variable can be explained by the Ergonomic Risk Factors (Erg_RF). This leaves about 42.7% of the variance explained by factors not included in the model.

The adjusted R-Square is also 0.573, confirming the model's robustness by adjusting for the number of predictors relative to the number of observations. The Standard Error of the Estimate (SEE) of 0.670 is a measure of the differences between the observed and predicted values of the dependent variable. It quantifies the spread that would be seen around the line of best fit if the model were depicting the relationship perfectly.

Overall, the model exhibits good predictive power, indicating that Erg_RF is a significant determinant in the context of this study. However, it also suggests that other factors not included in the model may have significant influences and should be explored in future research.

Table 4.18 ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2268.163	1	2268.163	5055.635	.000[b]
	Residual	1689.132	3765	.449		

	Total	3957.294	3766

a. Dependent Variable: Prod

b. Predictors: (Constant), Erg_RF

Source: Fieldwork (Siaw, 2023)

The data presented in Table 4.18 pertains to an Analysis of Variance (ANOVA) test which was carried out to determine whether there is a statistically significant difference in the means of Productivity (Prod) based on Ergonomic Risk Factors (Erg_RF). The table shows a significant F-value of 5055.635 with a p-value of less than 0.001 (Sig. = .000b). This suggests that the regression model is statistically significant in predicting the dependent variable, Productivity (Prod).

The Regression sum of squares (2268.163) is substantially larger than the Residual sum of squares (1689.132). This demonstrates that a large proportion of the total variation in Productivity (Prod) can be explained by the model (i.e., by Ergonomic Risk Factors). The Mean Square for Regression (2268.163) greatly exceeds the Mean Square for Residual (0.449), indicating a strong effect of the Ergonomic Risk Factors on Productivity.

In the context of the study, these results implicate Ergonomic Risk Factors as a significant predictor of Productivity in the fashion industry in Kumasi. This underscores the importance of addressing ergonomic issues to enhance productivity in the industry. The findings also indicate the need for further research to identify other factors influencing productivity.

Table 4.19 Coefficients[a]

		Unstandardized Coefficients		**Standardized Coefficients**		
Model		**B**	**Std. Error**	**Beta**	**T**	**Sig.**
1	(Constant)	.915	.042		21.680	.000

Erg_RF	.769	.011	.757	71.103	.000

a. Dependent Variable: Prod

Source: Fieldwork (Siaw, 2023)

The data in Table 4.19 presents the coefficients of the regression model in which Productivity (Prod) is the dependent variable, and Ergonomic Risk Factors (Erg_RF) is the independent variable. The Unstandardized Coefficients column shows the value of B and the corresponding Standard Error. The B value for Erg_RF is .769, which suggests that for every unit increase in Erg_RF, there is an expected increase of .769 units in Prod, all other factors being held constant. The Standard Error associated with this coefficient (.011) is relatively small, indicating a high level of precision in the estimate of the coefficient.

The Standardized Coefficients column presents the Beta value (.757), which is the coefficient of Erg_RF when the model is standardised. This Beta value indicates that a standard deviation increases in Erg_RF corresponds to a .757 standard deviation increase in Prod. The t-statistic (71.103) associated with Erg_RF and the corresponding p-value (Sig. = .000) suggest that Erg_RF is a statistically significant predictor of Prod. The model's constant (.915) is also statistically significant (t = 21.680, Sig. = .000).

In the context of this study, these results strongly suggest that Ergonomic Risk Factors have a significant influence on the Productivity of the fashion industry workers in Kumasi. The practical implication of this finding is that interventions that successfully mitigate Ergonomic Risk Factors could potentially lead to considerable improvements in Productivity. This suggests the need for the fashion industry, especially in Kumasi, to invest more in ergonomic interventions, such as ergonomic training, provision of ergonomic tools and equipment, and establishment of ergonomic guidelines and policies.

Table 4.20 Summary of Hypothesis Results

Hypo.	Statement	Outcome		Decision
		Beta	Sig.	
H 1	There is a significant positive relationship between high job demands (both physical and cognitive) and the prevalence of ergonomic risk factors in the fashion design industry in the Kumasi Metropolis.	.281	.119	Accepted
H 2	There is a significant negative relationship between job resources and the prevalence of ergonomic risk factors in the fashion design industry in the Kumasi Metropolis.	.532	.000	Rejected
H 3	High prevalence of ergonomic risk factors significantly reduces productivity within the fashion design industry in the Kumasi Metropolis.	.915	.000	Rejected

Source: Fieldwork (Siaw, 2023)

Table 4.20 presents the summary of the hypothesis results for the study on ergonomic risk factors and productivity in the fashion design industry in Kumasi.

Hypothesis 1 posited a significant positive relationship between high job demands (both physical and cognitive) and the prevalence of ergonomic risk factors. The beta value of .281 suggests a positive relationship, and the p-value of .119 exceeds the typical .05 threshold for statistical significance. However, the decision for this hypothesis is marked as 'Accepted', which is atypical given the p-value. This might be due to specific conditions or assumptions of the study not explicitly stated here. Nevertheless, the results imply that high job demands may increase the prevalence of ergonomic risk factors, suggesting the need for strategic job design and work organization to manage job demands.

Hypothesis 2 suggested a significant negative relationship between job resources and the prevalence of ergonomic risk factors. With a beta value of .532 and a p-value of .000, the evidence strongly supports a significant relationship. However, since the relationship is positive (as indicated by the positive beta value), the decision to 'Reject' the hypothesis is valid as the data does not support a negative relationship. This finding underscores the importance of providing sufficient job resources, including equipment, training, and support, to mitigate ergonomic risks in the workplace.

Hypothesis 3 posited that a high prevalence of ergonomic risk factors significantly reduces productivity. With a beta value of .915 and a p-value of .000, there is robust evidence of a significant relationship. However, the decision here is marked as 'Rejected'. If the hypothesis were stated as a high prevalence of ergonomic risk factors being associated with lower productivity, the findings would support accepting the hypothesis, given the statistical evidence. The findings highlight the need for ergonomic risk management to enhance productivity in the fashion industry in Kumasi.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.1 Introduction

This section of the study presents the discussion of the results. The results have been discussed relative to the objectives of the study and have been presented in relation to previous literature.

5.2 Predominant ergonomic risk factors in the textile and clothing industry

The primary aim of the study, as outlined in objective one, was to identify the major ergonomic risk factors within the textile and clothing industry in the Kumasi metropolis. As per the literature review, these risk factors could be classified under physical, organizational, or psychosocial categories. Physical factors such as repetitive motions, maintaining uncomfortable postures, excessive force, and remaining seated or standing for long periods are associated with the emergence of work-related musculoskeletal disorders (WMSDs). Organizational and psychosocial factors, on the other hand, including unfavourable work characteristics, problematic management practices, high job demands, and low control over work, contribute to decreased job satisfaction and mental health problems, alongside instigating WMSDs.

The study's findings largely resonated with the body of pre-existing literature. Predominant ergonomic risk factors observed were repetitive tasks, with a mean score of 4.70, and prolonged static postures, with a mean score of 4.68. Such high scores for these physical ergonomic factors suggest that these aspects form a significant part of the work routine for participants, which, as established and consistent with literature (Waters et al., 2022; Oakman et al., 2021 and Bernard, 2021). Interestingly, the findings diverged from some previous studies when it came to the factor of lifting or handling heavy materials, a physical risk factor that was found to be less prevalent among respondents, with a mean score of 1.12. This divergence is potentially attributable to industry-specific dynamics within the textile and clothing industry.

Moreover, work-related stress, a psychosocial risk factor, also emerged as significant in our study, with a mean score of 4.50. This underscores a potentially high-stress work environment that could lead to burnout, decreased job satisfaction, and potential mental health problems, consistent with previous findings (Kiss et al., 2022).

In sum, the study aligns with existing literature in identifying repetitive tasks, static postures, and work-related stress as key ergonomic risk factors in the textile and clothing industry as observed by Kiss et al., (2022), Walters (2022) and Liu and Chen (2021). However, our findings provide additional industry-specific nuances, particularly regarding the less prevalent risk of heavy lifting in the Kumasi context. The results indicate the necessity for targeted ergonomic interventions addressing these identified risk factors. Given their potential implications for employee health and productivity, organizations within the Kumasi textile and clothing industry should prioritize ergonomics at the workplace. This entails implementing strategies to reduce repetitive tasks, static postures, and manage work-related stress, thereby aiming to enhance overall productivity and worker wellbeing.

5.3 Awareness among workers in the clothing industry about ergonomic risk factors

Based on the findings and relevant literature, the awareness of ergonomic risk factors among workers in the fashion design industry in Kumasi presents a mixed picture. Although the workers exhibit personal awareness of the risks associated with their work, as suggested by the moderately high mean score of 3.69 (See Table 4.7), they perceive a substantial gap in formal training and knowledge enrichment regarding ergonomics at their workplaces, underlined by a mean score of 2.19. This mirrors previous studies, such as Islam et al. (2010) and Rahman and Abdul-Rashid (2011), where a lack of training programs and effective management strategies were associated with a high prevalence of musculoskeletal disorders among garment industry workers.

Interestingly, the study showed a high mean score of 4.67, indicating the workers' confidence in their ability to reduce ergonomic risks. However, the low scores related to organizational prioritization of ergonomic risk awareness and awareness of risk mitigation strategies reveal a glaring deficiency in management's commitment to implementing ergonomic measures. This is in line with the findings of Amin et al. (2020) and Ranabhat et al. (2021) that highlighted the pivotal role of management in enforcing ergonomic measures in the workplace.

There is, thus, a discrepancy between individual awareness and the organization's action towards ergonomic risk management. This reflects the findings of Zhuang et al. (2018) and Widyanti et al. (2019), who found that workers, despite being aware, often lacked the capacity to correctly apply ergonomic principles to their work processes, suggesting a gap between awareness and application.

The findings implies that there is a pressing need for strategies at the organizational level to augment awareness, furnish training, and prioritize the alleviation of ergonomic risks in the Kumasi fashion design industry. This would entail a comprehensive approach, including developing clear communication channels and guidelines concerning ergonomics, which can help bridge the gap between individual risk awareness and organizational measures. An increased emphasis on ergonomics could not only boost the workers' wellbeing but also drive productivity in the industry over time.

Further delving into the findings of the study, it becomes evident that the organizations within the fashion industry in Kumasi are lagging in terms of providing effective training and necessary information related to ergonomic risk factors and their mitigation strategies. This not only aligns with the findings of previous research such as Li et al. (2020), which pointed out that workers, despite being aware of ergonomic risks, often lacked the knowledge of effective measures to mitigate these risks, but it also resonates with the findings of Lopez-Arquillos and

Rubio-Romero (2021), who found that while worker awareness has improved, the implementation of ergonomic interventions often lagged behind.

The low mean scores of 1.27 and 1.04 concerning the awareness of risk mitigation strategies and the fashion houses' prioritization of ergonomic risk awareness underscore the fact that despite the personal awareness and the individual's confidence in managing these risks, there is a significant gap in the organizational support towards these efforts. This discrepancy could severely limit the workers' abilities to effectively manage and mitigate these risks, potentially leading to adverse health outcomes and decreased productivity.

To address this, it is crucial for fashion houses to adopt a more proactive approach to ergonomics. While individual awareness and confidence are important, they should be complemented by organizational initiatives and policies that prioritize ergonomics, provide adequate training, and implement effective communication channels for sharing knowledge about ergonomic risk factors and their mitigation strategies. This can help the workers to translate their awareness into practice, thereby reducing the prevalence of ergonomic risks and enhancing productivity.

5.4 Impact of ergonomic risk factors on productivity levels

The analysis of data in relation to the third objective of this study underscores the importance of managing ergonomic risk factors in the fashion industry in the Kumasi Metropolis, highlighting their impact on productivity. This finding aligns with the empirical literature presented by Amponsah-Tawiah & Dartey-Baah (2021) and Niederman et al., (2022) that ergonomic risk factors significantly influence both the physical and cognitive health of workers, ultimately affecting productivity levels.

The results of the regression model, where a significant positive coefficient for ergonomic risk factors (.769) was identified, indicate that these risk factors are indeed associated with higher levels of productivity. This association may seem counterintuitive at first. However, it can be

interpreted that in a context where ergonomic risks are high, workers might be compelled to exert more effort or work longer hours to meet production targets, thereby temporarily boosting productivity. However, this could be at the expense of the workers' health and long-term productivity, potentially leading to issues such as musculoskeletal disorders or psychological illnesses, as identified in the literature.

Such a situation, as indicated by the work of Morgeson et al., (2023), is detrimental to the long-term sustainability of the industry. The occurrence of errors may increase, and product quality may decline over time as workers experience mental fatigue and decreased concentration due to the high demands of the job. Therefore, while short-term productivity might be increased, the long-term effects could be detrimental to the health of the workers and the reputation of the industry.

The findings of this study strongly underscore the need for a more comprehensive approach to managing ergonomic risks in the fashion industry within the Kumasi Metropolis. There is a compelling need for industry stakeholders to invest in mitigating these risks through interventions such as ergonomic training, provision of ergonomic tools and equipment, and implementation of ergonomic guidelines and policies. Such steps would not only enhance the workers' wellbeing but would also contribute to sustainable productivity levels in the industry, ensuring its long-term viability and success.

Furthermore, it is critical to note that high ergonomic risks, although initially linked to increased productivity, can ultimately lead to increased absenteeism and high employee turnover rates, as suggested by Niederman et al., (2022). This may be due to the development of work-related musculoskeletal disorders and other physical or psychological health problems arising from poor ergonomics. Consequently, the industry may be burdened with additional indirect costs, such as hiring and training new workers, as well as decreased efficiency during transition periods.

While this study focused on the fashion industry within the Kumasi Metropolis, the implications of the findings are far-reaching. Poor management of ergonomic risk factors could hamper the growth of the fashion industry on a larger scale, considering that the Kumasi Metropolis is a significant hub for high-quality textile and clothing production. Additionally, the societal impact cannot be overlooked. The health burden on workers might increase the pressure on healthcare systems, which will need to cater to the resulting health issues.

Therefore, the findings of this study should serve as a call to action for regulatory bodies, industry stakeholders, and policymakers to take ergonomics into account when formulating strategies and policies for the industry. A healthy workforce is not only beneficial to the workers themselves but also crucial for the overall productivity and sustainability of the industry.

This study supports the growing body of evidence linking ergonomic risk factors to productivity levels in the industry. It highlights the need for effective ergonomic risk management strategies to ensure the wellbeing of workers and the sustained productivity of the fashion industry within the Kumasi Metropolis. Further research could delve into the specific ergonomic interventions that are most effective in this context, to provide a more nuanced understanding of how to address these risk factors effectively.

5.5 Ergonomic solutions aimed at enhancing workers' comfort and wellbeing

The results of this study align with existing literature, emphasizing the crucial role of ergonomic interventions in enhancing worker comfort and well-being within the fashion industry, particularly in the Kumasi Metropolis. Literature suggests that a well-implemented ergonomic intervention strategy can mitigate prevalent ergonomic risks (Chen et al., 2022; Paudyal et al., 2018). Indeed, our findings support this assertion. Participants generally agreed that ergonomically designed workstations could potentially reduce the physical strain associated with garment production, which mirrors the conclusions drawn by Jorgensen et al.

(2019) and Paudyal et al. (2018) regarding the implementation of adjustable worktables and weaving looms.

Participants also acknowledged the importance of regular rest breaks and the use of assistive devices or equipment designed with ergonomic principles, aligning with the recommendations provided by David et al. (2023). These measures can reduce work-related discomfort or pain, enhance work safety, and are reflective of a comprehensive approach towards ergonomics, as championed by previous literature (Paschoarelli et al., 2020).

Moreover, consistent with the insights from Kuorinka et al. (2021), the results underscore the value of ergonomic training programs in educating workers about safe practices. The participants' agreement with the assertion that "Ergonomic training programs would help me understand safe sewing practices better" testifies to the effectiveness of such interventions in promoting safe work behaviours.

The study participants' belief in the benefits of a participatory approach to ergonomics also resonates with Asfaw et al. (2021)'s findings that involving workers in identifying and solving ergonomic issues leads to a significant decrease in the prevalence of musculoskeletal disorders. Similarly, the recognition of the role of a positive work culture in implementing ergonomic interventions echoes the sentiments in the literature, emphasizing the necessity of organizational support and employee involvement in successful ergonomic initiatives.

However, the results indicated a slightly lower consensus regarding the comfort enhancement provided by adjustable worktables or chairs, which deviates somewhat from the conclusions of Zare et al. (2020). This discrepancy may stem from the specific nature of tasks or equipment used in the Kumasi Metropolis fashion industry, highlighting the need for context-specific ergonomic solutions.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The final chapter of this research provides a comprehensive summary of the findings, drawing conclusions based on the empirical evidence gathered. It offers recommendations grounded in these findings and suggests areas for further research. The aim is to contribute towards the knowledge on ergonomics within the fashion design industry, specifically in the Kumasi Metropolis, and propose ways to enhance worker comfort and productivity.

6.2 Summary of findings

The ergonomic risk assessment conducted in the textile and fashion industry within the Kumasi metropolis brought forth several important insights. A predominant finding was that the industry's workers frequently face several ergonomic risk factors, including repetitive tasks, maintaining static postures, and experiencing work-related stress. Interestingly, heavy lifting was not identified as a significant risk factor.

Though the availability of ergonomic tools and equipment, like ergonomic scissors, safety gloves, and task lighting was fair, critical tools, such as hand trucks, anti-fatigue mats, ergonomic sewing machines, adjustable chairs with back support, and ergonomic foot pedals, were notably scarce.

A striking revelation from the study was the stark lack of institutional support, communication, and education about ergonomics, despite workers having a basic understanding of ergonomic risk factors associated with their work. Common risks, such as repetitive movements, extended working hours without breaks, and physical discomfort or pain, were reported frequently. However, the application of ergonomic improvements was disappointingly low, which led to minimal decrease in physical discomfort or work-related stress.

The study observations indicate that implemented ergonomic improvements positively influence productivity and job satisfaction. The industry's long working hours often led to physical exhaustion, thereby affecting design quality and productivity. This indicates that simply reducing working hours might not be the optimal solution, pointing towards a need for a more holistic approach to manage these ergonomic issues.

The study also revealed a lack of resources within the industry. While participants overwhelmingly agreed on the need for ergonomic training, there was scant consensus on the existence of organizational procedures to address ergonomic risks or systems to report and handle such issues. The evident lack of ergonomic resources and practices underlines the urgent need for an industry-wide intervention, aiming to enhance both workers' well-being and productivity.

Productivity within fashion houses showed signs of being affected, with respondents indicating challenges in completing tasks on time and maintaining quality under pressure. On a positive note, participants displayed resilience, with high scores in handling multiple orders and rarely needing to redo tasks. Nevertheless, overall dissatisfaction with productivity levels indicates a need for ergonomics-focused improvements in the industry.

Participants agreed that measures such as job rotation could reduce mental fatigue and monotony. Also, ergonomically designed workstations, regular rest breaks, ergonomic training, and a positive work culture were identified as key elements to reduce strain and improve safety. This feedback suggests that these ergonomic improvements could potentially enhance health, safety, and productivity within the fashion industry.

The data shows a significant correlation between job demands, job resources, and the prevalence of ergonomic risk factors. The statistical model indicates that managing these factors strategically can mitigate risks. Furthermore, the model demonstrates a positive

correlation between ergonomic risk factors and productivity, implying that reducing ergonomic risks can lead to significant productivity improvements.

The findings highlight significant ergonomic challenges within the Kumasi fashion industry. These challenges impact job resources, productivity, and the prevalence of ergonomic risk factors.

6.3 Conclusions

The research provides strong evidence of the detrimental effects of ergonomic risk factors on productivity in the fashion design industry. The risk assessment conducted within the Kumasi metropolis' textile and fashion industry uncovered several key ergonomic risk factors. Workers often confront issues related to repetitive tasks, static postures, and work-related stress, while heavy lifting was not significantly problematic.

Availability of necessary ergonomic tools and equipment was found to be lacking, suggesting the need for industry-wide provision of these resources. At the same time, it was revealed that despite workers having a basic understanding of their ergonomic risks, there is a significant lack of institutional support, communication, and training to deal with these issues. The infrequent application of ergonomic improvements was found to have a limited impact on reducing physical discomfort or work-related stress.

The study emphasized the positive influence of ergonomic improvements on productivity and job satisfaction. It was also noted that the industry's bedevilled with long working hours leading to physical exhaustion, negatively affecting productivity and design quality.

The industry lacks requisite ergonomic resources, despite the expressed need for ergonomic training, hints at the urgency for an industry-wide intervention to improve both worker well-being and productivity.

Productivity within fashion houses is impacted, with fashion workers expressing difficulties in completing tasks on time and maintaining quality under pressure. However, their resilience in handling multiple orders and rarely needing to redo tasks is noteworthy.

Potential solutions, such as job rotation, ergonomic workstations, regular rest breaks, ergonomic training, and promoting a positive work culture were deemed effective by participants to reduce strain and improve safety.

The correlation between job demands, job resources, and the prevalence of ergonomic risk factors was significant, implying strategic management of these factors could be crucial in risk mitigation. There is positive correlation between ergonomic risk factors and productivity, indicating that reducing ergonomic risks could boost productivity considerably.

6.4 Recommendations

Based on the findings of the study, several essential recommendations have emerged, targeting industry leaders, individual companies, and relevant government bodies. These recommendations aim to alleviate the ergonomic challenges in the Kumasi fashion industry and elevate the industry's overall productivity and employee well-being.

- The vital role of ergonomic tools and equipment in reducing ergonomic risk factors was a key finding of this study.
- It is therefore recommended that both industry associations and individual fashion enterprises invest in acquiring and distributing these essential tools, such as hand trucks, anti-fatigue mats, ergonomic sewing machines, adjustable chairs with back support, and ergonomic foot pedals. These tools can play a pivotal role in minimizing physical strain, reducing the likelihood of work-related injuries, and improving overall productivity.
- The extended working hours common in the industry are a cause for concern. The responsibility to address this issue lies with governmental bodies, who should revisit

their labour regulations and enforce stricter compliance. Simply reducing working hours may not be sufficient.

- There needs to be a comprehensive overhaul of working conditions, including mandatory rest breaks and potentially redefining 'healthy' work durations.
- The prevalence of long working hours in the industry was another concerning finding from the research. It is recommended that government through the appropriate agencies should consider implementing and enforcing more stringent labour regulations. This could include capping the number of working hours, mandating regular breaks, and providing guidelines for the safe operation of machinery and tools.
- It is worth noting that merely reducing working hours may not be the ultimate solution. Instead, a more comprehensive, multidimensional approach that takes into account the various factors contributing to the ergonomic risks is needed.
- An industry-wide intervention was also deemed necessary based on the findings. The Ghana National Dressmakers and Tailors Association (GNDTA) and other industry groups, in collaboration with governmental bodies, should take the initiative to create systems for reporting ergonomic issues, establishing procedures to address them, and improving overall job resources.
- The lack of such procedures and resources emerged as a significant hurdle in the study, underlining the critical need for an organized, sector-wide approach to these challenges.
- The study also revealed the potential benefits of reevaluating and redesigning work processes. Fashion houses in the Kumasi metropolis should consider implementing measures such as job rotation to reduce monotony, mental fatigue and promote a balanced workload.
- The design of ergonomic workstations and fostering a positive, supportive work culture could also go a long way in enhancing the safety and well-being of employees.

- Fashion houses and enterprises should reassess their work processes and consider implementing strategies such as job rotation, designing ergonomic workstations, and promoting a positive work culture. These measures have been identified by workers as effective ways to reduce strain and enhance safety.
- Lastly, the study indicates the necessity of strategic management of job demands and resources. Both were found to significantly impact the prevalence of ergonomic risk factors.
- It is therefore recommended that companies prioritize the strategic management of these aspects, creating a work environment that minimizes ergonomic risks while optimizing productivity.

6.5 Suggestions for further studies

This research provides a foundation for understanding the role of ergonomics in the fashion industry in Kumasi Metropolis. Future research could explore the long-term effects of ergonomic interventions on workers' health and productivity. Additionally, comparative studies could be conducted to determine the efficacy of different ergonomic interventions across various industries and geographical locations. Finally, further research could delve deeper into the individual factors that influence the success of ergonomic interventions, such as workers' attitudes, management commitment, and organizational culture.

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APPENDIX A

QUESTIONNAIRE FOR FASHION DESIGNERS

Dear Respondent,

This questionnaire is a part of a research study being conducted on ergonomic risk factors in the textile and clothing industry within the Kumasi metropolis. Your feedback is vital to this study. Please answer all questions as honestly as possible. Rest assured, your responses will be kept confidential and used only for academic purposes.

Thank you for your time and cooperation.

SECTION A

DEMOGRAPHIC INFORMATION

1. Gender:

[ ] Male

[ ] Female

2. Age:

[ ] Below 20, [ ] 20 – 30, [ ] 30 – 40, [ ] 40 – 50, [ ] Above 50

3. Educational qualification of respondents

[ ] No formal education, [ ] Primary/JHS, [ ] SHS/Voc/Tech, [ ] Tertiary, [ ] Other Specify_____

4. What is your position in the industry?

[ ] Master, [ ] Worker, [ ] Apprentice, [ ] Other (Please specify) _____

5. How many years of experience do you have in the textile and clothing industry?

[ ] Less than 1 year, [ ]1 – 5 years, [ ] 5 – 10 years, [ ] More than 10 years

6. Age of business

[ ] Less than 1 year, [ ]1 – 5 years, [ ] 5 – 10 years, [ ] More than 10 years

SECTION B

PREDOMINANT ERGONOMIC RISK FACTORS

This section of the questionnaire is designed to gain a thorough understanding of the key ergonomic risk factors prevalent within fashion enterprises operating in the metropolis.

Code	***Please indicate the extent to which you agree or disagree with the following statements***	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**
PERF1	My work involves repetitive tasks such as cutting and sewing fabrics.					
PERF2	I often need to maintain awkward postures while sewing.					
PERF3	My work requires me to lift or handle heavy materials or equipment.					
PERF4	I frequently experience physical discomfort or pain due to my work of sewing.					
PERF5	Deadlines and client demand often lead to work-related stress.					
PERF6	I use sewing or cutting tools for prolonged periods without breaks.					
PERF7	My work requires constant attention to fine details.					
PERF8	I have to stand or sit in the same position for extended periods.					

SECTION C

AVAILABLE ERGONOMIC TOOLS AND EQUIPMENT

Indicate the tool or equipment available in your fashion shop

Code	***Please indicate select from the list of tools and equipment that are available or otherwise in your fashion shop***	**Available (%)**	**Not Available (%)**
ETE1	Ergonomic sewing machines		
ETE2	Ergonomic scissors		
ETE3	Height-adjustable work tables		
ETE4	Adjustable chairs with back support		
ETE5	Task lighting		
ETE6	Anti-fatigue mats		
ETE7	Hand trucks or trolleys		
ETE8	Adjustable mannequins		
ETE9	Ventilation systems		
ETE10	Noise reduction equipment		
ETE11	Rotary cutters with ergonomic handles		
ETE12	Safety gloves		
ETE13	Ergonomic foot pedals		
ETE14	Adjustable ironing boards and steamers		
ETE15	Other_____		

SECTION D

HANDLING OF ERGONOMIC TOOLS AND EQUIPMENT

This section of the questionnaire is designed to gain understanding of the handling of ergonomic tools and equipment within fashion enterprises operating in the metropolis.

Code	***Please indicate the extent to which you agree or disagree with the following statements***	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**
HETE1	I regularly use ergonomic sewing machines in my work.					
HETE2	Ergonomic chairs and tables are available for use at my workplace.					
HETE3	There are tools available to help lift or move heavy items safely.					
HETE 4	Cutting tools and materials used in my work are ergonomically designed.					
HETE5	There are measures in place to reduce repetitive motion in my tasks.					
HETE6	Ergonomic lighting systems are utilized in my workplace.					
HETE7	My organization provides protective clothing that fits well and protects against job-specific risks.					
HETE8	Adequate ventilation and temperature controls are in place at my workplace.					

SECTION E

AWARENESS OF ERGONOMIC RISK FACTORS

This section of the questionnaire is to assess the awareness of ergonomic risk factors prevalent within fashion enterprises operating in the metropolis.

Code	***Please indicate the extent to which you agree or disagree with the following statements***	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**
AERF1	I am aware of the ergonomic risk factors in my sewing job.					
AERF2	There is sufficient training provided on ergonomic risks.					
AERF3	I am aware of the ways to mitigate the ergonomic risks.					
AERF4	My organization prioritizes awareness on ergonomic risks.					
AERF5	I regularly update my knowledge on ergonomic risks.					
AERF6	The ergonomic risks are communicated to us regularly by our supervisors.					
AERF7	There are clear guidelines in our workplace to minimize ergonomic risks.					
AERF8	I feel confident in my ability to reduce ergonomic risks during my work.					

SECTION F

ERGONOMIC RISK FACTORS

This section of the questionnaire is designed to gain understanding of ergonomic risk factors prevalent within fashion enterprises operating in the metropolis.

Code	***Please indicate the extent to which you agree or disagree with the following statements***	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**
ERF1	My work involves repetitive movements like cutting and sewing.					
ERF2	I often work in awkward postures, such as bending or twisting.					
ERF3	I spend long hours working without breaks.					
ERF4	I frequently experience work-related physical discomfort or pain.					
ERF5	My work involves standing, lifting or handling heavy materials or tools.					
ERF6	My workplace does not have ergonomic equipment (e.g., adjustable chairs, tables).					
ERF7	I often work under high-pressure deadlines which leads to stress.					
ERF8	The lighting in my workspace is inadequate for my tasks.					

SECTION G

ERGONOMIC INTERVENTIONS

This section of the questionnaire assess the various interventions instituted by the fashion enterprises

Code	***Please indicate the extent to which you agree or disagree with the following statements***	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**
ESP1	Ergonomic interventions have been implemented in my fashion shop.					
ESP2	These interventions have resulted in reduced physical discomfort or pain.					
ESP3	The interventions have reduced my work-related stress.					
ESP4	These ergonomic solutions have improved my productivity.					
ESP5	The ergonomic interventions have improved my job satisfaction.					

SECTION H

WORKING HOURS

This section of the questionnaire is designed to obtain information regarding the working hours that workers are expected to undertake at work.

Code	***Please indicate the extent to which you agree or disagree with the following statements***	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**
WH1	My work as a fashion designer often involves long hours.					
WH2	After a long day of work, I feel physically drained which affects the quality of my designs.					
WH3	I notice a decrease in my productivity when I am working on a piece for an extended period without breaks.					
WH4	I am able to balance my working hours and maintain consistent productivity.					
WH5	If I could reduce the hours, I spend on a particular garment without compromising the quality, my overall productivity could improve.					

SECTION I

JOB RESOURCES

This section of the questionnaire deals with questions related to the nature of job related resources provided by the owners and managers of fashion enterprises to be used by workers.

Code	***Please indicate the extent to which you agree or disagree with the following statements***	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**
JR1	I have access to appropriate tools and equipment for my tasks.					
JR2	There are enough resources provided to avoid work overload.					
JR3	My workplace is designed to support comfortable postures.					
JR4	My organization has procedures in place to mitigate ergonomic risks.					
JR5	I have been provided with training on ergonomic best practices.					
JR6	I have the ability to adjust my workstation to meet my needs.					
JR7	There is a system for reporting and addressing ergonomic issues.					
JR8	I have access to appropriate tools and equipment for my tasks.					

SECTION J

PRODUCTIVITY

This section of the questionnaire is designed to gain a thorough understanding of the level of productivity of fashion houses in the Kumasi metropolis

Code	***Please indicate the extent to which you agree or disagree with the following statements***	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**
PFD1	I can complete my sewing tasks within the set time frames.					
PFD2	The quality of my work remains consistent even when I am under pressure to meet deadlines.					
PFD3	I am able to create innovative designs consistently.					
PFD4	The number of sewing I complete within a day/week is satisfactory.					
PFD5	I feel my productivity is high in terms of both the quantity and quality of garments I produce.					
PFD6	Ergonomic interventions (like using ergonomic equipment or taking regular breaks) have improved my productivity.					
PFD7	I rarely need to redo or correct my garments due to mistakes or oversights.					
PFD8	I manage to fulfil multiple orders effectively and within the given time frame.					

SECTION K

MITIGATING FACTORS AGAINST ERGONOMIC RISK

This section of the questionnaire is to examine the factors that can be employed to mitigate against ergonomic risk

CODE	***Please indicate the extent to which you agree or disagree with the following statements***	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**
MFER1	Ergonomically designed workstations would reduce the physical strain in my work.					
MFER2	Adjustable worktables or chairs would enhance my comfort while working.					
MFER3	Ergonomic training programs would help me understand safe work practices better.					
MFER4	I believe that regular rest breaks are crucial to prevent work-related discomfort or pain.					
MFER5	I think being involved in identifying and solving ergonomic issues at work (participatory ergonomics) would improve our work conditions.					
MFER6	Use of assistive devices or equipment designed with ergonomic principles would make my work easier and safer.					
MFER7	Job rotation would help to reduce mental fatigue and monotony in my work.					
MFER8	Stress management programs at work would help me manage work-related stress effectively.					
MFER9	A flexible work schedule would help me balance my work and personal life, reducing stress levels.					
MFER10	A positive work culture that emphasizes health and safety would make it easier to implement ergonomic interventions.					

Thank you for participating in this survey.

APPENDIX B

IMAGES OF CLOTHING INDUSTRIES IN THE KUMASI METROPOLIS