# AN EXPLORATION INTO THE SELF-REPORTED EXPERIENCES OF MUSCULOSKELETAL PAIN IN FEMALES DIAGNOSED WITH LONG COVID WITHIN THE ETHEKWINI MUNICIPALITY

By

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I, Karisa Pillay, do declare that this dissertation is entirely my own work in both conception and execution (except where acknowledgments indicate to the contrary)

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# DEDICATION

I dedicate this study to my beloved grandfather, Mr Gnaprakasam Munuswami (George) Pillay, who always encouraged me to be ambitious and follow my dream to pursue a healthcare career. I am truly grateful for all that you have done for me throughout my academics and I know that you will always be with me, in spirit.

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# ABSTRACT

## BACKGROUND

The COVID-19 pandemic caused a worldwide health crisis that prompted an increase in the output of research targeted at expanding the knowledge available about COVID-19, the symptoms experienced and its consequences.

Post-acute sequelae of SARS-CoV-2 infection is described as the persistence of symptoms since the initial diagnosis of COVID-19 for more than four weeks and, in most cases, lasting for months at a time. It is also referred to as Long COVID. Musculoskeletal pain (MSP) in relation to this condition is associated with tenderness, discomfort and stiffness of the joints, bones or muscles. Amidst the various reports of symptoms experienced by those affected by Long COVID, MSP has been identified as the most prevalent and debilitating manifestation, common in patients diagnosed with Long COVID.

Despite current literature detailing the prevalence of various symptoms associated with Long COVID, a gap in the literature remains in the understanding of the experiences of individuals affected by MSP. Research has identified that women are more likely to endure symptoms of Long COVID, especially MSP, as compared to males. Given that women share a disproportionate burden of Long COVID, it is imperative to get a better understanding of the unique difficulties and lived experiences of women suffering from MSP.

A thorough exploration into the various factors that play a role in the onset, development, persistence, and consequences of this symptom is required to fully grasp the experiences women have had whilst enduring MSP. Various factors play a vital role in the influence of an individual's experiences of MSP throughout their Long COVID journey; these include pre-existing musculoskeletal conditions, the severity of the illness itself, biological changes because of COVID-19, psychological stresses, social determinants of health and health-seeking approaches.

This qualitative investigation aimed to address this gap in the literature by conducting in-depth interviews amongst women with Long COVID experiencing MSP. This approach was to capture the rich perspectives of the participants, detailing daily life experiences, and methods of coping and challenges associated with MSP as a result of Long COVID.

The benefits of a deeper understanding of the MSP experiences in women with Long COVID include interventions and support services specifically designed to address the unique challenges and needs that women encounter, resulting in a better quality of life and overall well-being.

## AIM OF STUDY

The aim of this study has been to explore the experiences of MSP as a clinical manifestation of long COVID in women.

## METHODOLOGY

A qualitative, exploratory, descriptive approach was utilised in this study~~(McLeod 2017).~~ The purpose of a qualitative approach is to obtain a greater understanding of the experiences and perspectives of individuals who provide rich data without the use of quantitative and statistical methods. The sampling strategy utilised in this study was purposive sampling with the snowball method to obtain data. In this study, MSP was explored through the first-hand experiences of women with Long COVID to further understand how this clinical manifestation has affected their quality of life. This study involved conducting individual in-person interviews with a sample size of 12 women with Long COVID, with the purpose of providing personal, engaging interactions to obtain rich, reliable data. The benefit of conducting personal interviews is that it gathers the personal perspectives of individuals and explores responses to questions, which adds reliability to the study. Data was collected until saturation was attained. Data saturation was reached after interviewing the eighth participant, but four additional participants were interviewed thereafter to confirm saturation was reached.

## RESULTS

The data were analysed using Tesch's method to identify themes and subthemes. This involved the transcription and review of the participant responses, coding the responses according to themes and further categorizing similar themes into subthemes. The main themes that were identified in this study were the common clinical presentation of MSP experience due to Long COVID, negative effects of MSP on the quality of life and the varied and limited choice of healthcare treatment options. The participants shared a commonality with regard to the clinical presentation MSP, as most of them experienced back pain, neck pain, shoulder pain and headaches. The participants reported that they led a poor quality of life due to the extent of MSP which negatively affected their ability to perform daily tasks and resulted in constant fatigue. A high prevalence of anxiety, depression and frustration was experienced by the participants as they were exhausted from trying to find an effective treatment to resolve their pain. Most participants were highly reliant on pain medication to find some type of relief. Others sought alternate methods of care in the form of chiropractic treatment and lifestyle changes. This helped them better manage their pain and improve their general well-being.

## CONCLUSION

The results of this study revealed that MSP is a prevalent and debilitating symptom amongst women with Long COVID. It affects various major aspects of lives, such as physical functioning, socialisation and mental health. A multi-disciplinary approach is imperative to provide efficient and effective health care to patients. Therefore, it is imperative that not only chiropractors but all health care practitioners who come into contact with affected women are able to create well-rounded treatment plans for those patients and converse easily with them to find a solution to their pain.

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1. **COVID-19:** Coronavirus disease 2019 (COVID-19) is a highly contagious infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It is thought to spread from person to person through droplets released when an infected person coughs, sneezes, or talks. The most common signs and symptoms of COVID-19 are fever, cough, and trouble breathing (Cascella *et al.* 2020).

2. **Long COVID:** Post-acute sequelae of SARS-CoV-2 infection, or long COVID, is defined as a condition where people have constant symptoms for consistent weeks or months following the end of the acute phase of COVID-19 infection (Davis *et al.* 2023: 133)

3. **Musculoskeletal Pain:** MSP has been defined and described as an "acute or chronic pain starting from musculoskeletal structures within the body such as bones, ligaments, muscles, joints and even nerves" (Khoja *et al.* 2022).

4. **Quality of Life:** Quality of life (QoL) is a concept which aims to capture the well-being, whether of a population or individual, regarding both positive and negative elements within the entirety of their existence at a specific point in time (Teoli and Bhardwaj 2023).

5. **Chiropractic:** Chiropractic is a health profession concerned with the diagnosis, treatment and prevention of mechanical disorders of the musculoskeletal system, and the effects of these disorders on the function of the nervous system and general health. There is an emphasis on manual treatments including spinal adjustment and other joint and soft-tissue manipulation (Hartivigsen and French 2020)

# CHAPTER ONE

# SCOPE OF THE STUDY

## 1.1 INTRODUCTION

COVID-19 is an ever-evolving pandemic that had begun in December 2019, in the city of Wuhan, China. The pandemic was a result of the rapidly spreading SARS-CoV-2 virus throughout the world (Singh *et al.* 2021). It can inhibit the adequate functioning of the bodily systems, especially the respiratory system, resulting in respiratory failure (Omar *et al.* 2022). However, in the past three years, it has been a common finding that these symptoms have become persistent, resulting in "Long COVID".

Long COVID is described as the presence of symptoms for more than four weeks after the initial onset of the acute illness (Bai *et al.* 2022). Since then, several variants have arisen because of mutations to adapt to the various environments. The five main variants of concern include: Alpha (B.1.1.7) detected in the United Kingdom in September 2020, Gamma (P.1) detected in Brazil in December 2020 and Delta (B.1.617) detected in India in October 2020. In South Africa, two variants were discovered: Beta (B.1.351) in October 2020 and Omicron (B.1.1.529) (McLean *et al.* 2022). According to Mabuka *et al.* (2023) the variants of interest include "eta (B.1.525), iota (B.1.526), kappa (B.1.617.1), lambda (C.37), epsilon (B.1.427, B.1.429), zeta (P.2), theta (P.3), and mu (B.1.621)".

COVID-19 has been referred to as a respiratory disease with associated symptoms of fever, coughing and difficulty breathing (Mehta *et al.* 2021). However, recent literature has identified multiple bodily systems affected by the disease, with further symptoms being present such as nervous system (headache, dizziness and confusion), digestive system (abdominal pain and diarrhoea), cardiovascular system (chest pain and cardiac injury) and musculoskeletal system (skeletal muscle, myalgia, atrophy, weakness and fatigue) and bone and joint (arthralgia, bone mineral loss, osteonecrosis and chondrolysis) (Lin-Man, Su and Xue-Qiang 2021).

The prevalence of musculoskeletal pain (MSP) amongst the population has increased drastically since the onset of the COVID-19 pandemic, with reports of the development of MSP three months since the onset of the disease, which persist for a minimum of two months thereafter (Lippi, Sanchis-Gomar and Henry 2023). Based off the literature and current findings, the musculoskeletal manifestations of Long COVID have been muscle pain or spasms, headaches and joint pain.

Women are more likely to present with these Long COVID pain symptoms, with more than 50% of women in the statistics as compared to 40% of men (Fernández-De-Las-Peñas *et al.* 2022b). This suggests that women are more likely to experience Long COVID MSP; however, limited literature has explored this aspect.

Living with MSP can significantly reduce people's quality of life, in terms of limiting their daily capabilities, with the possibility of fluctuating or relapsing over a period. Sufferer's experiences are often overlooked but they can provide vital information to understanding the impact MSP has had on their lives. The impact of enduring MSP amongst women is associated with reduced socialisation and limited ability to carry out ordinary tasks.

COVID-19 has progressed significantly since 2019 with consequential musculoskeletal sequelae that were predominately present in women. This study further explored the lived experiences of MSP symptoms of Long COVID.

## 1.2 CONTEXT OF STUDY

COVID-19 ravaged the world in 2020 with a significant impact on healthcare globally and fundamentally changing the outlook of healthcare (Quah *et al.* 2020). This disease came with various extra-systemic manifestations, one of which was 'Long COVID', with its associated musculoskeletal burdens. Many individuals were affected by not being able to access timely treatment. MSP was aggravated further as the pandemic led to the implementation of lockdown measures, forcing many to work remotely, disrupting daily routines, and resulting in inactive lifestyles and poor ergonomics (Majumdar *et al.* 2022). The burden of the MSP experienced warranted the investigation of this study.

Since early civilisation, MSP has been present and has affected the lives of millions daily by limiting their capabilities and daily functioning (Blyth *et al.* 2019). However, lately, it has progressively increased due to the ever-changing environment we live in and the constant strain that our bodies undergo.

Over the last four years COVID-19 has had a significant global impact on personal health and the overall quality of life that persisted further since the onset of the virus, resulting in Long COVID. Research needs to be done to promote a global understanding of COVID-19. MSP is a multi-faceted problem that is predominant in developing countries and can be associated with various factors (Fernández-De-Las-Peñas *et al.* 2022b).

In this study, understanding the experiences of MSP during Long COVID, in women, contributes to the following factors:

- Establishing the experience of MSP in women during Long COVID can direct medical professionals in making the best decision in terms of the appropriate diagnoses, treatment plan and overall management to the needs of this target group.
- A gender-specific approach to public healthcare intervention would be highly efficient in understanding more about musculoskeletal-related pain. This could help in the establishment of specific programmes and the means to resolve the difficulties faced by women.
- Identifying the trends associated between the genders regarding MSP can focus on possible gaps within the research and encourage further exploration into aetiology and risk factors. In this study, by examining female experiences with MSP, we can further the understanding and knowledge of COVID-19 and its subsequent effects on musculoskeletal health in women.
- The effects of MSP amongst women may be experienced as a result of numerous psychosocial factors, such as being a caregiver, work stress or hormone imbalances. Holistic approaches can be well established in providing pain management and the necessary care required by understanding these psychosocial factors further.
- Preventative measures can be well established by understanding the manifestations of MSP of COVID-19 amongst women. These recommendations can involve lifestyle changes, correcting ergonomics and implementing specific exercises to decrease the possibility of MSP and management of it.
- Through the acknowledgment and identification of gender differences, health equality can be promoted, worldwide. In tailoring these specific approaches to the needs of women, the existing inequalities linked to healthcare can be lessened, while improving the management of healthcare and its outcome.
- Recognising the long-term effects on women enduring MSP during COVID-19, and particularly Long COVID, is imperative in establishing appropriate infrastructures of medical resources, support programmes and rehabilitation facilities to manage possible future chronic conditions.

COVID-19 induces an inflammatory response within the body with the onset of the illness, resulting in multiple bodily systems being affected, especially the musculoskeletal system (Hasan *et al.* 2021). It is associated with various MSP manifestations, such as myalgia, arthralgia and general bone pain, which are seen to be the earliest symptoms. When these symptoms persist, it is a common manifestation of Long COVID (Widyadharma *et al.* 2020).

MSP was further stressed during the COVID-19 pandemic with its effects being both short and long term. These symptoms are debilitating to general health and affect daily living. Although COVID broke out as a pandemic in 2019, researchers continue to explore this topic and the musculoskeletal manifestations endured from the disease.

As of recent, research has indicated that COVID-19 affects genders differently, with men having an overall risk for contracting COVID-19 along with a higher fatality rate compared to women (Wenham, Smith and Morgan 2020). However, women have been found more likely to present with Long COVID symptoms, whilst men have a higher risk of renal sequelae post-COVID (Fernández-De-Las-Peñas *et al.* 2022).

Globally, women engage in care work significantly more than males, which was exacerbated with the further responsibilities resulting from COVID implementations such as at-home quarantine, closing of schools and having to care for high-risk elderly family members, whilst continuing to work from home. This takes not only a physical toll on women but a decline in mental health, with additional stressors such as grief, care-giver burnout, depression and anxiety due to the illness itself (Almeida *et al.* 2020: 748). Women were selected in this study to investigate these MSP manifestations further to provide homogenous and streamline results. Literature based on the impact of Long COVID MSP symptoms specifically in women, both psychological and physical aspects, are under-reported and further research is required to analyse this. This study will aid a wide variety of specialists, such as epidemiologists, psychiatrists and psychologists, in better understanding the effects of Long COVID.

Pain is highly subjective and varies in each individual. Therefore, by looking into the personal experiences of MSP amongst women with Long COVID, this research will help provide practitioners with a better understanding on how to assist patients more efficiently in the future by educating them about MSP. It will also help identify MSP symptoms quicker and administer the most effective treatment plan adapted to their particular symptoms through exercise, spinal manipulation and modalities (Turolla *et al.* 2020).

The impact these MSP symptoms have had on their activities of daily living both physically and mentally has been explored. By engaging more with patients in enquiring about their lived experience with Long COVID-19, compassion and essential doctor-patient relationships are fostered, which makes treating patients easier, with more successful outcomes. In terms of patient benefit, individuals will be more knowledgeable about their MSP and will seek treatment sooner rather than later to prevent the progression of the pain that will impact their daily living activities. This will allow patients to obtain the most efficient and effective treatment to help resolve and manage their pain.

Chiropractors are primary health care providers as they are often the first practitioners to be seen when a patient is experiencing MSP; they provide conservative methods to allow the body to heal itself (Johnson *et al.* 2020). Addressing musculoskeletal complaints is the foundation of chiropractors' practice but it is not limited to neurological, emotional and environmental relations in the body (Widyadharma *et al.* 2020). Each individual's pain experience is unique as the definition and rating of pain is almost never the same when compared amongst patients (Joseph *et al.* 2020). It is possible that these individuals may become lifetime patients for chiropractors due to the extent of musculoskeletal complications present in these individuals after their initial diagnosis of COVID-19, leading to chronic MSP. It is, therefore, important that this concept be assessed.

In developing countries such as South Africa, many COVID-19 survivors are unable to receive adequate treatment due to their low economic status, lack of resources and limited access to such care in public hospitals and clinics. This worsens their MSP and limits their ability to carry out daily activities and restricts their working capability, increasing their financial burden as they may not be paid for days off work due to the extent of their pain (Bachtiar, Maharani and Utari 2020). This study will allow not only South African health care services but the World Health Organization (WHO) to deduce, from the experiences of these Long COVID symptoms affected women, the best and most affordable treatment plan. In relation to the Sustainable Development Goals of South Africa (2022), one of the main goals is providing good health and well-being for all ages, therefore a study contributes to the maintaining of good health and preventing chronicity that would otherwise lead to a poor quality of life.

In April 2020, the city eThekwini was regarded as an epicentre of the COVID-19 outbreak in KwaZulu-Natal, South Africa. At the time, eThekwini contributed 77% towards new cases reported as well as having the highest death rate of 4.4% since the onset of the pandemic and having the most amount of contact cases. Therefore, valuable data can be obtained from the eThekwini population (Ngqakamba 2020).

As of May 2023, the WHO released a statement declaring the end of COVID-19 as a pandemic (United Nations 2023). However, this statement was that the current COVID-19 pandemic status has been downgraded but it is still a cause of concern with the ongoing surge in numbers of positive cases with less intense symptoms, globally. This pandemic has become part of history and will be taught in educational institutions, like the many other pandemics experienced in the past. This will provide a greater perspective of the physical and psychological contributions of COVID-19 to public health, further supporting the Sustainable Goals of South Africa (2022) as it encourages community engagement and quality of living and health education.

## 1.3 RESEARCH PROBLEM

“Long COVID, is defined as the continuation or development of new symptoms 3 months after the initial SARS-CoV-2 infection, with these symptoms lasting for at least 2 months” (Bai *et al.* 2022). This variant of the SARS-CoV-2 virus displays a number of symptoms in affected individuals, with some common musculoskeletal manifestations being myalgia, fatigue, arthralgia and general bone pain (Widyadharma *et al.* 2020). Although these symptoms are common amongst those infected, each person’s account of their experience of the character, type, location and intensity varies. The prevalence of these MSP manifestations in general have been studied extensively; however, the effect of Long COVID on female survivors is often overlooked in literature.

Currently, there is a lack of research that takes these self-reported MSP experiences into account and the effect it has on the quality of life of women with Long COVID. This type of insight is important in analysing the influence it has on daily living activities, emotional well-being, social interactions, work and academics, quality of sleep, self-care and use of healthcare. Chiropractors practise in a multidisciplinary approach so it is important to consider all the physiological and biomechanical aspects of an individual’s life in order to achieve optimal health and well-being.

## 1.4 AIM OF STUDY

The aim of this study has been to explore the self-reported experiences of MSP in women diagnosed with Long COVID.

## 1.5 OBJECTIVES OF STUDY

- To explore and describe the MSP experience (duration of symptoms, character of symptoms, type of symptoms and location of symptoms) in women with Long COVID.
- To explore the effect MSP has on quality of life.
- To describe the treatment options employed for MSP due to Long COVID.

## 1.6 SIGNIFICANCE OF STUDY

A human coronavirus was first discovered in 1965 and over the years various strains developed in minor cases (Khan *et al.* 2020). However, in 2019, a global disease outbreak of SARS COV-2 variant occurred with devastating impacts on the world, with over 6.5 million deaths (United Nations 2023). The virus continued to evolve with sub-variants, making it difficult in the management of the health of the population, also in terms of MSP.

Exploring the personal experiences of MSP in women with Long COVID will provide important insights to the burgeoning information and knowledge of Long COVID and its sequelae. MSP is regarded as constant and debilitating and not only lowers quality of life by limiting daily functioning but is impactful on mental health.

The outcomes of this study have the ability to provide key information regarding the specific difficulties women face in the management of their MSP, to primary health care practitioners, chiropractors and stakeholders, allowing the appropriate formation of preventative measures and support strategies to manage MSP and its sequelae. Simultaneously, this study can establish the effectiveness of a multidisciplinary approach in the management of MSP, which entails medical treatment, psychological support, and physical therapy interventions tailored to the various needs of those affected. This avenue of management provides a sense of hope and comfort to sufferers of COVID-19, many of whom are yet to find a solution to their pain. Additionally, it will improve their knowledge and understanding of their MSP associated with Long COVID.

The United Nations and the government of South Africa have worked together to establish Sustainable Development Goals for South Africa specially (United Nations South Africa 2022). One of the main goals entails the provision of good health and well-being for all ages. Therefore, this study contributes to maintaining good health and preventing chronicity of MSP amongst the population. Simultaneously, by aligning this goal to women affected with MSP as a result of Long COVID, social and economic development is promoted by providing an educational component in terms of increasing awareness and knowledge of Long COVID related-MSP and establishing more conducive work environments for women.

## 1.7 STRUCTURE OF STUDY

**Chapter One:** This chapter provided the context of study, research problem, aims, objectives, research questions, significance of the study, limitations and the structure of the overall dissertation.

**Chapter Two:** This chapter provides an extensive review of the current literature available of the topic.

**Chapter Three:** This chapter provides the theoretical framework underpinning the study.

**Chapter Four:** This chapter provides the research methodology used to conduct the study, including the research procedure, data collection process, the principle of trustworthiness and ethical considerations.

**Chapter Five:** This chapter provides the results from the research procedure.

**Chapter Six:** This chapter provides the discussion of the results obtained, identifying the main themes and subthemes.

**Chapter Seven:** This chapter provides the conclusion of the study with further recommendations on studies to be done in the future.

## 1.8 SUMMARY OF CHAPTER

This chapter provided the background and context of the study. Chapter Two will examine the current literature and findings available on the topic of Long COVID, associated with MSP in women, COVID-19 in South Africa, and appropriate treatment interventions.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 INTRODUCTION

This chapter discusses the definition and prevalence of MSP, the definition and prevalence of COVID-19 and Long COVID, musculoskeletal manifestations of COVID and Long COVID in women. It also explored the management and treatment of MSP in COVID and chiropractic care and MSP in COVID.

## 2.2 UNDERSTANDING MUSCULOSKELETAL PAIN

MSP has been defined and described as an “acute or chronic pain starting from musculoskeletal structures within the body such as bones, ligaments, muscles, joints and even nerves” (Khoja *et al.* 2022). The various pain syndromes associated with MSP range from localised to neuropathic pain (El-Tallawy *et al.* 2021). The musculoskeletal systems assist in providing structural support and movement of the body.

The musculoskeletal system is related to pain in the following ways (Wang *et al.* 2022):

- Muscles: Sprains, strains and overuse of musculoskeletal structures leads to muscle pain in the forms of aches, cramps and tenderness.
- Bones: bone degenerative conditions, fractures that can be pathological or traumatic and infectious disease can lead to bone pain.
- Ligaments: Bones are linked together by taut ‘rope-like’ tissue structures, known as ligaments. Weakness and pain arise as a result of inflammation or damage of these structures.
- Tendons: Bones are connected to muscles by tendons. Restricted range of motion and inflammation or degeneration of these structures can result in pain.
- Joints: Degenerative conditions, such as osteoarthritis, and inflammatory conditions, such rheumatoid arthritis, occur because of arthritis which is linked to joint pain that can be localised or diffuse.
- Cartilage: Assists the joint by providing a resistance against forceful impacts, improves the bone rigidity and provides a cushion support around the joint.

The aetiology can vary from injury, with pain associated with dislocations, fractures, strains and sprains; inflammatory conditions such as rheumatoid arthritis or ankylosing spondylitis; strenuous repetitive movements of the joints and muscles; poor body posture over a prolonged times can lead muscle strain and ultimately MSP; degenerative pathologies become predominant during old age contributing to pain, infections that directly impact the musculoskeletal system such as osteomyelitis can lead to pain and MSP experienced secondary to illness as is the case in COVID- 19 and Long COVID (Wang *et al.* 2020).

A thorough examination by medical practitioners, including history taking, imaging studies such as x-rays and MRI scan as well as blood work, is required in the diagnosis and treatment of MSP (Blyth *et al.* 2019). The management of these patients include physical therapy, rest, exercise, medications in the form of anti-inflammatories, pain killers and muscle relaxants and as a final resort, surgery.

Musculoskeletal symptoms are one of the most predominant reasons behind primary care consults as it is a leading cause of musculoskeletal-related disability amongst the population (Blyth *et al.* 2019) The quality of life associated with individuals living with MSP is reported to be low, accompanied by poor psychological, poor physical health and financial strain due to the numerous costs involved with managing MSP (Wang *et al.* 2018).

## 2.3 THE PREVALENCE OF MUSCULOSKELETAL PAIN

### 2.3.1 Global Prevalence of Musculoskeletal Pain

Musculoskeletal pain is a predominant finding in the Western world, affecting approximately 47% of the general population, and amongst that percentage, approximately 39–45% have consistent ongoing MSP (El-Tallawy *et al.* 2021).

The WHO (2022) reported that approximately 20–33% of the world population has experienced some type of MSP, which is approximately 1.75 billion people, globally. The most common type of MSP symptom experienced is back pain with a lifetime prevalence of 84% of the population (Violante, Mattioli and Bonfiglioli 2015). A systematic review and meta-analysis by Hartvigsen *et al.* (2018) stated the global prevalence of lower back pain to be present in approximately 540 million individuals, with an age-standardised prevalence of approximately 7.5%.

El-Tallawy *et al.* (2021) discussed the global prevalence of MSP ranging between of the various forms of MSP as being vast. For example, lower back pain is predominantly experienced by most of the population (between 30–40% of individuals), whereas in rheumatological related conditions with associated MSP elements, such as fibromyalgia and rheumatoid arthritis, are minimal (accounting only 2% of the population). The prevalence of knee pain ranges from 10–15% and neck and shoulder pain ranges from 15–20% of the general population.

MSP is also predominantly experienced more by women. A 2011 study in New Zealand, discussed the prevalence of MSP symptoms amongst 3003 men and women, ages 20–64 years (Widanarko *et al*. 2011). The results from the study revealed that 92% of the participants experienced MSP symptoms. Women had a higher prevalence of lower back pain at 54%, neck pain at 43% and shoulder pain at 42%, as compared to males. Furthermore, the study indicated that the working class citizens of New Zealand experienced significant MSP symptoms and that the exposure to a certain level of workload in the workplace has a significant effect (Widanarko *et al.* 2011).

Studies have shown that being a woman is regarded as a risk factor for MSP. Svebak, Hagen and Zwart (2006) conducted a study investigating the prevalence and severity of musculoskeletal complaints amongst the population of northern Norway. The result of the study identified women having a higher prevalence for MSP compared to men, as 35% of women stated they experience MSP as compared to 23% of males. It was further discovered that the prevalence of MSP experienced by women increases with age and is also most likely to experience chronic pain.

De Oliveira Soares Junior *et al.* (2023) conducted a study in southern Brazil investigating the MSP during and after Covid-19 infection. The outcome of the study found the common areas participants experienced MSP were the lower limbs (13.6%), upper limbs (11.9%), lower back/lumbar (11.5%), neck/cervical (10.3%) and mid-back/thoracic (7.6%). It was further established that at least 28.6% of participants experienced MSP in at least one region of the body, while 20.4% of participants experienced pain in their spine.

### 2.3.2 Prevalence of Musculoskeletal Pain in South Africa

A 2020 study in South Africa investigated the prevalence of chronic pain amongst a large nationally representative sample of South Africans (Kamerman *et al*. 2020). The results of the study revealed approximately that 14%–37% of the adult population experience some form of chronic pain. Chronic pain was predominantly higher in women as compared to males, with rates of 20.1% for women and 15.8% for men (Kamerman *et al.* 2020). The prevalence of chronic pain experienced was increased with age, approximately 11.3% for age ranges 15–24 years and 34.4% for age ranges over 65 years. The most common sites of the body that experienced chronic pain were the limbs at 43.6% and the back at 30.5%. This study also established women were more likely to experience MSP at various sites of the body.

Similarly, an observational study carried out in KwaZulu-Natal revealed results of a prevalence of 50.9% experiencing MSP and a higher prevalence of 60.6% experiencing chronic MSP (Govender and Dlungwane 2018). The most common regions affected with MSP were: lower back (48.1%), neck (48.4%), shoulder (47.5%) and upper back (47.5%). The most common chronic MSP experienced was the neck (57.8%) and lower back

(57.2%). It was further established that the female participants experienced more current MSP (69.6%) or chronic MSP (69.6%) as compared to men (Govender and Dlungwane 2018).

At the University of Johannesburg in South Africa, a study by Hajee (2022) on the “musculoskeletal symptoms experienced during and after COVID-19 infectious stage” determined the prevalence and type of musculoskeletal symptoms experienced pre and post COVID -19. The results revealed the presence of head pain at 11.4%, neck pain at 13.9%, lower back pain at 14.7% and generalised joint pain at 7.6%. Furthermore, 79% of the sample population experienced some form of body aches, indicating a high prevalence of MSP symptoms being experienced.

## 2.4 COVID-19

In March 2020, the WHO announced the COVID-19 outbreak had now become a global pandemic (Lin-Man, Su and Xue-Qiang 2021). This highly contagious respiratory virus, caused by SARS-CoV-2, is spread through droplets passed on from sneezing or coughing from an infected person, targeting the lung parenchyma when breathing (Mehta *et al.* 2021). Since 2020, several mutations of the virus have occurred, with 13 variants of the SARS-CoV-2 virus being detected around the world.

Table 2.1 lists the various variants discovered internationally (Firouzabadi *et al.* 2023).

**Table 2.1: Variants, key mutations and detection of the SARS-CoV-2 Virus globally**

| SARS-CoV-2 VARIANT | MUTATION | PLACE OF FIRST DETECTION | DATE OF DETECTION |
|---|---|---|---|
| **Alpha (B.1.1.7)** | H-69 and V70 Y144, L452r, E484k, N501y, P681h, D614g | United Kingdom | September 2020 |
| **Gamma (P.1)** | K417T, L18F, E484k, N501y, H655y, P681h, D614g | Brazil | December 2020 |
| **Epsilon (B.1.427 and B.1.429)** | L452r<br>D614g | United States of America | July 2020 |
| **Zeta (P.2)** | E484k<br>D614g | Brazil | April 2020 |
| **Eta (B.1.525)** | H-69 and V70 Y144, E484k, Q6777h, D614g | Nigeria | December 2020 |
| **Lota (B.1.526)** | Y144, D253G, S477n, E484k, D614g | United States of America | November 2020 |
| **Theta (P.3)** | E484k, N501y, P681h, D614g | Philippines | January 2021 |
| **Kappa (B.1.17.1)** | L452r, e484q, P681r, D614g | India | October 2020 |
| **Lambda (C.37)** | L452q<br>D614g | Peru | December 2020 |
| **Mu (B.1.621)** | D614g | Columbia | January 2021 |
| **Delta (B.1.617.2) and Delta Plus** | T95I, A222V, G142D, R158G, K417N, V70F, W258L | India | October 2020 |

In South Africa, two variants were Beta (B.1.351) in October 2020, with mutations such as K417N, E484k, N501y and D614g, and Omicron (B.1.1.529). The Omicron variant has the most number of mutations, namely BA.1, BA.2, BA.3, BA.4, BA.5, as well as a recombination of BA.1/BA.2 recognised as XE (Firouzabadi *et al.* 2023). Although the original Omicron variant is no longer circulating, its mutations are currently still in circulation (Tartof *et al.* 2023). All these variants have been found to be more transmissible and less potent than the previous (McLean *et al.* 2022).

Persons infected with COVID-19 present with an array of clinical presentations that range from asymptomatic to life threatening cases (Lin-Man, Su and Xue-Qiang 2021). All bodily systems are affected with the most common symptoms experienced being: respiratory symptoms, such as fever, coughing, and sore throat; neurological symptoms, such as headache, vertigo, and confusion; digestive system symptoms, such as abdominal pain and diarrhoea; cardiovascular system symptoms, such as chest pain, palmus, and cardiac injury; musculoskeletal system symptoms, such as skeletal muscle atrophy, fatigue, and weakness; and bone and joint symptoms, such as arthritis, bone mineral loss, osteonecrosis (ON), and chondrolysis (Lin-Man, Su and Xue-Qiang 2021).

## 2.5 DEFINING LONG COVID

Post-acute sequelae of SARS-CoV-2 infection, or long COVID, is defined as a condition where people have constant symptoms for consistent weeks or months following the end of the acute phase of COVID-19 infection (Davis *et al.* 2023: 133). Research is still ongoing to identify the underlying causes of Long COVID because the exact mechanism is not completely understood. Astin *et al.* (2023) discussed the numerous theories associated with the aetiology behind Long COVID, such as viral persistence, immune system dysregulation, damage to the vascular and microvascular system, impact on the nervous system and individual variability.

### 2.5.1 Viral Persistence

Research showed that post-acute infection phase, the virus may still be present in certain tissues, resulting in constant symptoms being present and a suppressed immune response (Proal and VanElzakker 2021).

### 2.5.2 Immune System Dysregulation

Long Covid can be associated with an atypical immune response in which for a long period after the virus is ‘active’, the immune system remains on guard and due to this chronic inflammatory state, the symptoms may persist (Silberberg *et al.* 2022).

### 2.5.3 Autoimmunity

Long COVID can trigger an autoimmune reaction in which the body's own tissues or cells are unintentionally attacked by the immune system, resulting in numerous symptoms that affect different organs (Polykretis et al. 2023).

### 2.5.4 Damage to the Vascular and Microvascular Systems

A dysfunction in this bodily system has been associated with COVID-19, resulting in long-term manifestations that causes damage to most blood vessels (Shen *et al.* 2022: 386).

### 2.5.5 Impact on the Nervous System

A few people with Long COVID experienced neurological symptoms. A theory is that the virus could possibly affect the nervous system either directly or indirectly, resulting in long-term neurological problems.

### 2.5.6 Individual Variability

Substantial variations are evident in the severity and duration of symptoms in long COVID amongst the affected individuals. Long COVID may result from a combination of genetic factors, pre-existing medical conditions, and the severity of the acute infection, initially.

The National Institute for Health and Care Excellence, located in the United Kingdom described Long COVID as the constant presence of symptoms for four weeks or longer since the initial onset of the acute illness; this became evident after numerous cases of patients reporting the presence of prolonged symptoms for a duration of 6–7 months (Venkatesan 2021). Dryden *et al.* (2022) conducted a study in South Africa investigating the consequences of COVID-19, in which it was reported that 50–78% of the 1873 participants presented with Long COVID, with the most common symptoms experienced being fatigue, loss of smell, shortness of breath, muscle pain, persistent cough and headaches. The prevalence of these most common Long COVID symptoms were exhaustion (72.6%), cognitive dysfunction (69.2%), chest pressure and/or tightness (52.6%), shortness of breath (54.2%), headache (46.0%), muscle aches (44.6%) and palpitations (42.0%) (Ziauddeen *et al.* 2022); the persistence of these manifestations have been recorded since May 2022.

## 2.6 THE PREVALENCE OF COVID-19

Based on the 2024 statistics report from the World Health Organization, approximately 774 million cases of COVID-19 were confirmed, with over 7 million associated deaths, recorded until the 7th of January 2024, globally. By August 2021, an estimated 3.4% of the confirmed COVID-19 cases and 4% of COVID-19-associated deaths were from Africa, home to 17% of the world's population. Statistics show that South Africa, which makes up 4.4% of Africa's population, accounted for 36.7% of confirmed COVID-19 cases and 42.3% of COVID-related deaths on the continent (Madhi and Nel 2021). One of the major contributions to the high rates of COVID-19 cases and its sequelae in South Africa was the limited diagnostic tools available to confirm these cases, leading to South Africa having one of the highest testing rates – 248 per 1000 population (Madhi and Nel 2021).

In April 2021, eThekwini was regarded as an epicentre of the COVID-19 outbreak in the province. At the time, eThekwini contributed 77% towards new cases reported, as well as having the highest death rate of 4.4% since the onset of the pandemic and having the most amount of contact cases. Therefore, valuable data can be obtained from the eThekwini population (Ngqakamba 2020).

The final edition of the weekly epidemiological report provided by the National Institute for Communicable Diseases for SARS-CoV-2 was based on the last data given on the 25th of March 2023 in South Africa. The total number of positive COVID-19 cases had increased to 4 072 533 cases. In that same week, Gauteng reported its highest weekly incidence rate (7 positive cases per 1000 cases) among all the provinces (National Institute Of Communicable Diseases 2023). As of May 5th, 2023, COVID-19 was no longer regarded as a global health emergency, as declared by the Director-General of the World Health Organization (Ikejezie *et al.* 2024).

## 2.7 MUSCULOSKELETAL MANIFESTATIONS OF COVID-19

COVID-19 is primarily diagnosed as a respiratory illness, but it can also produce symptoms related to the musculoskeletal system. People may experience these symptoms as ongoing symptoms or during the acute stage of the infection, depending on their severity.

The aetiology behind these manifestations is difficult to identify but it is likely to be multi-factorial. Omar *et al.* (2022) identified that various musculoskeletal manifestations related to COVID-19 including osseous, muscular, joint and peripheral nerve manifestations.

### 2.7.1 Osseous Manifestations

COVID-19 survivors may experience articular/peri-articular pain, which can develop secondary to osteonecrosis (ON). The direct site of infection by SARS-CoV2 is potentially the cortical bone due to its involvement with the ACE2 receptors (Kerzhner *et al.* 2023). Osteonecrosis is experienced by approximately 5–58% of affected individuals (Jones, Mont and Collins 2022). The suggested mechanism behind the presence of ON through the involvement of ACE 2 receptors involve the use of corticosteroids, hypercoagulability, vascular inflammation and bone resorption (Disser *et al.* 2020).

The administration of corticosteroids, the most likely the cause of ON, is undergone by severely sick patients who need ventilation support to decrease the risk of mortality and morbidity through high dosages over a long period of time (Omar *et al.* 2022). Common location of ON includes the femoral neck, head, knee, humeral head, talus and calcaneus.

### 2.7.2 Muscular Manifestations

Muscle pain and fatigue are common manifestation of COVID-19, irrespective of the severity of the illness. Due to the multi-organ effects from COVID-19, severe muscle damage can occur in the affected individuals (Disser *et al.* 2020). These effects are more susceptible in older patients as well as those with severe comorbidities. Some of the aetiology associated with muscle damage include immune-mediated damage, weakness associated from being in an intensive care unit, toxic myopathy and direct viral damage (Omar *et al.* 2022).

Muscle damage can occur in the following form in these affected patients:

- Myalgia: refers to generalised muscle pain, which is generally self-limiting and can be managed conservatively with the appropriate treatment.
- Myositis: Refers to the inflammation of the skeletal muscle. Subcutaneous oedema, muscle thickening and fascial stranding are evident in COVID-19 patients.
- Myonecrosis: Also referred to as an infarction which is an insufficient supply of blood to the skeletal muscle to ensure adequate muscle functioning (Morrison and Sanders 2008). The associated causes of myonecrosis include radiation therapy, diabetes mellitus, immobilisations, exercise, statin medications and therapeutic "ablation". Some of the effects of myonecrosis include significant pain, muscle ischaemia, muscle oedema.
- Rhabdomyolysis: Refers to severe damage to muscle tissue causing it to release proteins and electrolytes into the blood stream (Cabral *et al.* 2020). This condition predominantly affects the proximal aspect of the lower limbs resulting in significant weakness.

### 2.7.3 Joint Manifestations

COVID-19 patients commonly experience significant arthralgia, commonly associated as the result of synovitis, linked to a post-viral inflammatory arthritis or rheumatological conditions, such as rheumatoid arthritis, systemic lupus erythematous and psoriatic arthritis (Khalil, Hashaad and Tantawy 2022).

Inflammatory arthritis experienced as a result of individuals having COVID-19 is referred to as an aseptic inflammatory arthropathy that is linked to the immune response of the affected individuals (Kerzhner *et al.* 2023). Further findings are in studies of the presence of sacroiliitis, synovial and capsular oedema, sclerosis of joints, subchondral fat deposition and ankylosis associated with the manifestations (Omar *et al.* 2022). These joint manifestations generally present 1–3 weeks since the onset of the illness with the symptoms progressing further into the recovery phase after the illness.

### 2.7.4 Peripheral Nerve Manifestations

In severely ill COVID-19 patients, peripheral neuropathies are a common finding, with possible causes being Guillain-Barre syndrome, toxic neuropathy, critical illness polyneuropathy, compressive neuropathy and position related neuropathy. Current research suggests the mechanism behind peripheral nerve manifestations involve the presence of viral particles in the nerves and cerebrospinal fluid (Omar and Garg 2021: 396).

A systematic review conducted in December 2020, identified Guillain-Barre syndrome as the most common peripheral neuropathy related manifestation amongst individuals severely affected by COVID-19, with symptoms presenting 5–10 days since the onset of COVID-19 symptoms (Finsterer *et al.* 2021). The clinical presentation of these manifestations include muscle oedema, decreased muscle bulk and muscle atrophy.

Globally, the prevalence of MSP amongst the population has increased drastically since the onset of the COVID-19 pandemic, with reports of the development of MSP three months since the onset of the disease, persisting for a minimum of two months thereafter (Lippi, Sanchis-Gomar and Henry 2023). The most commonly affected age group are those between the ages of 20–50 years old. Based on the literature and current findings, the most common musculoskeletal manifestations of Long COVID have been of muscle pain or spasms, fatigue, post exertional malaise, headaches and joint pain. These symptoms are associated as a result of “denervation atrophy, deconditioning and sarcopenia, immune-mediated myopathy, toxic myopathy and nutritional deficiencies” (Omar *et al.* 2022).

## 2.8 LONG COVID IN WOMEN

Women (50%) are more likely to present with these post-COVID-19 pain symptoms than men (40%) (Fernández-De-Las-Peñas *et al.* 2022b). These effects included a prolonged presence of symptoms, as well as functional limitations in activities of daily living. The prevalence of these symptoms were identified in meta-analysis where a sample of 59 254 COVID-19 patients from 11 countries showed that 36% of patients experienced muscle pain, whilst 10–15% experienced joint and bone pain (Borges Do Nascimento *et al.* 2020).

Myalgia and arthralgia symptoms were seen to affect more adult women, particularly the elderly and those with comorbidities, such as hypertension, diabetes, coronary artery disease and chronic lung disease (Widyadharma *et al.* 2020). In these affected individuals with myalgia symptoms, levels of creatinine kinase and lactate dehydrogenase were seen to be higher, indicating severe skeletal injury. Most types of viral infections predispose individuals to arthritis, with symptoms of arthralgia in COVID-19. (Schett *et al.* 2020). The common areas affected include the shoulder, neck, lower back and knee. Some of the factors that increased the susceptibility of women enduring MSP included high levels of anxiety and depression, a change in behavioural patterns in relation to pain response, differentiations in pain processing as well as the effects of menstrual hormones. To a certain extent, in some of the literature, being a woman was regarded as a risk factor for Long COVID (Kerzhner *et al.* 2023). However, limited data are available on the most common MSP manifestation in women.

## 2.9 THE EFFECT OF MUSCULOSKELETAL PAIN ON THE QUALITY OF LIFE

Musculoskeletal pain (MSP), is a prevalent health issue that significantly impacts individuals' quality of life. This pervasive condition transcends age, gender, and socioeconomic status, exerting a profound influence on physical, emotional, and social well-being (Tüzün 2007: 579).

The physical repercussions of MSP are often immediate and tangible. Chronic pain can lead to a marked reduction in physical function, limiting an individual's ability to perform daily activities with ease (Wurz *et al. 2022: 3347*). Simple tasks such as dressing, bathing, or climbing stairs can become arduous and time-consuming, fostering a sense of dependence and frustration. Moreover, MSP frequently disrupts sleep patterns, resulting in fatigue, irritability, and impaired cognitive function. In severe cases, the condition can progress to disability, necessitating reliance on others for basic needs (Dydyk and Conermann 2024).

Beyond the physical toll, MSP exacts a considerable emotional burden. The persistent nature of pain can lead to depression, anxiety, and feelings of hopelessness (Brus *et al.* 2023). The inability to engage in previously enjoyed activities can erode self-esteem and contribute to a sense of isolation. Chronic pain is often accompanied by anger, frustration, and irritability, which can strain personal relationships (Cooper *et al.* 2023). The psychological distress associated with MSP creates a vicious cycle, as emotional turmoil can amplify pain perception, leading to a further decline in quality of life (Ng, Voo and Maakip 2019: 234).

The social implications of MSP are equally profound. Pain can limit social participation, as individuals may withdraw from activities due to physical discomfort or fear of exacerbation (Terai *et al.* 2022: 192). This isolation can lead to feelings of loneliness and a diminished sense of belonging. Moreover, MSP can impact occupational performance, resulting in decreased productivity, absenteeism, and job dissatisfaction (Astin *et al.* 2023: 15). Financial burdens associated with medical treatments, lost wages, and reduced earning potential further compound the challenges faced by individuals with MSP (Bonanni et al. 2022: 2609).

The effects of musculoskeletal pain on quality of life are far-reaching and multifaceted. The condition not only impacts physical function but also has profound psychological and social consequences (Mahase 2020). Addressing MSP requires a holistic approach that considers the physical, emotional, and social dimensions of the condition (Dydyk and Conermann 2024). By understanding the multifaceted nature of this problem, healthcare providers and researchers can develop more effective strategies for prevention, treatment, and management, ultimately improving the lives of those affected by musculoskeletal pain.

## 2.10 MANAGEMENT AND TREATMENT OF MUSCULOSKELETAL PAIN IN COVID-19

Little emphasis has been placed on how musculoskeletal conditions are often the source of disability-adjusted lifestyles and the prevalence of this type of lifestyle will accelerate rapidly now more than ever during this global pandemic due to the increase of MSP and conditions that have become present (Kardeş, Erdem and Gürdal 2021). The occurrence of MSP has been linked to raised inflammatory responses, which the SARS-CoV2 variant initiates, which worsens any aches and pains already being experienced by individuals (Schett *et al.* 2020: 468). Patients who had been hospitalised or self-isolated after being infected with COVID-19 are inclined to be less active, thus leading to weakness, stiffness and pain in the joints and muscle due to being bed-ridden most of the time. This ultimately results in a low quality of life, adverse emotions such as depression, reduced compliance and interruption of treatment plan (Lin-Man, Su and Xue-Qiang 2021). However, with proper recuperation these problems can be improved.

In South Africa, many COVID-19 survivors are unable to receive adequate treatment due to their low economic status and limited access to such care (Wenham, Smith and Morgan 2020: 849). This worsens their MSP and limits their ability to carry out daily activities and working capability, increasing their financial burden as they may not have been paid for days they took off work due to the extent of their pain (Gcelu and Kalla 2015). COVID-19 survivors who experienced this type of MSP were prescribed corticosteroids and analgesics by their general practitioners to help alleviate their pain symptoms post COVID-19 because it was the “quicker” way of resolving their pain but these also have negative effects in the long-term (Disser *et al.* 2020). COVID-19 survivors who developed chronic pain experienced anxiety and depression, which was exacerbated during the lockdown . They tend to suffer a stigma, have worries about finances, and loss of identity due to self-isolation and bereavement, all of which can negatively impact their psychological health, social interaction and current pain. These problems can be addressed through the use of the biopsychosocial model of pain management, which many chiropractors practise to address all aspects of these patients’ lifestyles (Widyadharma *et al.* 2020).

In an review by Lin *et al.* (2020: 6), a list of consistent recommendations across MSP conditions was provided:

1. *“Patient centered care, this includes care that responds to the individual context of the patient, employs effective communication and uses shared decision-making processes.*
2. *Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions.*
3. *Assess psychosocial factors.*
4. *Radiological imaging is discouraged unless:*
    - i. *Serious pathology is suspected.*
    - ii. *An unsatisfactory response is in conservative care or unexplained progression of signs and symptoms.*
    - iii. *It is likely to change management.*
5. *Undertake a physical examination, which could include neurological screening tests, assessment of mobility and/or muscle strength.*
6. *Patient progress should be evaluated including the use of outcome measures.*
7. *Provide patients with education/information about their condition and management options.*
8. *Provide management addressing physical activity and/or exercise.*
9. *Apply manual therapy only as an adjunct to other evidence-based treatments.*
10. *Unless specifically indicated (e.g. red flag condition), offer evidence-informed non-surgical care prior to surgery.*
11. *Facilitate continuation or resumption of work.”*

## 2.11 TREATMENT OPTIONS EMPLOYED FOR MUSCULOSKELETAL PAIN DUE TO LONG COVID

The emergence of Long COVID has presented a complex challenge for healthcare providers, particularly in managing the often-debilitating musculoskeletal pain (MSP) associated with the condition. While research into this relatively new phenomenon is ongoing, a range of treatment options has been explored, combining traditional and innovative approaches (Wang *et al.* 2022).

Pharmacological interventions form a cornerstone of MSP management. Over-the-counter pain relievers such as nonsteroidal anti-inflammatory drugs (NSAIDs) often provide initial relief. For more severe pain, prescription medications like corticosteroids or muscle relaxants may be considered. However, the long-term use of these medications can have adverse effects, necessitating careful monitoring and alternative strategies (Perumal, Shunmugam and Naidoo 2023:5).

Physical therapy is a cornerstone in managing MSP. It focuses on restoring mobility, strength, and flexibility through exercises, stretches, and manual therapies. Specific techniques like aquatic therapy and low-impact aerobic exercises can be beneficial for individuals with Long COVID. Additionally, cognitive-behavioral therapy (CBT) can be integrated into physical therapy to address the psychological aspects of pain, such as fear-avoidance behaviours (Lin et al. 2020).

Complementary and alternative medicine (CAM) therapies have gained popularity in managing chronic pain conditions. Practices like acupuncture, massage, and yoga can offer relief by reducing muscle tension, improving circulation, and promoting relaxation. However, the evidence supporting the efficacy of these therapies for Long COVID-related MSP is limited, and their use should be considered alongside conventional treatments (Bhoi *et al.* 2021: 174)

Lifestyle modifications play a crucial role in managing MSP. Maintaining a healthy weight, engaging in regular physical activity (within tolerance), and ensuring adequate sleep can contribute to pain reduction. Stress management techniques, such as meditation and mindfulness, can also be beneficial in addressing the psychological component of pain (El-Tallawy *et al.* 2021: 466).

It is essential to emphasize that the treatment of MSP in Long COVID is often a multifaceted approach. A combination of pharmacological, physical, and psychological interventions, along with lifestyle modifications, may be necessary to achieve optimal pain management (El-Tallawy *et al.* 2023: 425). Moreover, individual responses to treatments vary, and a personalized approach is essential.

## 2.12 CHIROPRACTIC CARE OF MUSCULOSKELETAL PAIN IN COVID-19

Chiropractors are primary healthcare professionals who provide evidence-based care to treat musculoskeletal disorders (Moore *et al.* 2022). During the pandemic, chiropractic was a sought-after option for many individuals to help manage their MSP; however, this was limited during the early stage of the pandemic due to close contact being banned (Johnson *et al.* 2020).

Practitioners tend to treat symptoms generally experienced in patients, but their pain experience may differ over time, which was especially true during the pandemic when patients' health status could worsen at any moment and severely impact their quality of life or they may have developed chronic pain (Gevers-Montoro *et al.* 2022: 465). If practitioners had a broad spectrum of experiences to gain a better understanding about MSP symptoms, this would improve the management of the patients affected. Clinicians with this knowledge would be able to make a diagnosis if the patient had Long COVID sooner, as it served as a symptom identifier for them, as well as the patient (Lin-Man, Su and Xue-Qiang 2021). Furthermore, practitioners would be able to identify the best management approach for the MSP experienced by women and help improve their quality of life.

The most common MSP that was that treated was spinal pain (cervical, thoracic and lumbar). Chiropractors employed treatment in the form of a multi-disciplinary approach which involved manual therapy (adjustments), modality use, advice on appropriate physical activity, psychological therapy and education rather than the standardised treatment in practise (Lin *et al.* 2020) . In terms of Chiropractic intervention, practitioners would be able to identify what form of soft tissue or manipulation therapy is most effective is helping to resolve MSP amongst females with Long COVID.

## 2.13 GAPS IN LITERATURE

Limited research has been done in understanding MSP among women with Long COVID, the effect on their quality of life after COVID-19 and chiropractic treatment intervention. Therefore, this study aimed to explore these experiences of pain in the affected individuals to provide more information to practitioners and the public. In addition to advancing scientific knowledge and understanding, addressing this gap in the literature will be most beneficial practically in enhancing health outcomes. This will further guide clinical practise through evidence-based practises and alter health policies by ensuring adequate resources are provided by those affected, whilst raising awareness about the difficulties faced by women with Long COVID. This information will help patients to make well-informed decisions with regard to their treatment options and self-management strategies.

Limited literature is currently available on the care given by chiropractors and other healthcare providers to treat MSP in individuals with Long COVID symptoms. This study has provided insight into tailoring specific interventions and treatment plans to healthcare practitioners, based on the personal experiences of women with Long COVID related MSP. Simultaneously, this study shows the need for a multifaceted approach in the management of MSP through the collaboration of various healthcare practitioners to address both physical and psychological aspects that have been impacted. In terms of chiropractic care, this study provides some knowledge in identifying effective chiropractic interventions that will aid in improving pain relief strategies for patients. As patients can describe how the chiropractic care has impacted their pain levels, functional abilities and overall quality of life, as well as compare the effectiveness of the various chiropractic treatments they have received. This qualitative data can further reveal how chiropractic care influences physiological, psychological, or social factors contributing to pain relief.

## 2.14 SUMMARY OF CHAPTER

Musculoskeletal pain is a condition that affects a significant portion of the global population and severely impacts one’s quality of life. The aetiology for this condition ranges from injury, inflammatory condition, poor posture, repetitive movements and now COVID-19. Women that have been diagnosed with Long COVID, were found to be more likely to experience MSP. The appropriate management and treatment of MSP, especially among women with Long COVID, is imperative to improve their quality of life. Chiropractic care in the form of spinal manipulation, lifestyle advice, therapeutic modalities and education, has been sought out by many affected individuals in order to find a solution to their pain. However, there is a need for more research on the full impact of MSP both physically and psychologically on one’s quality of life and activities of daily living.

The following chapter elaborates on the methodology used to conduct this study.

# CHAPTER 3:

# CONCEPTUALISATION OF THEORETICAL FRAMEWORK

## 3.1 INTRODUCTION

This chapter discusses the theoretical framework underpinning the study, which includes a description of the research framework and its importance, and the framework chosen for this study.

## 3.2 DEFINING A RESEARCH FRAMEWORK

A research framework refers to an array of concepts, approaches, and theoretical foundations that guide a study. It entails a manner of systematically organising data and conceptualising the research procedure, such as the research problem, data analysis, data collection and discussion of results. A framework enables researchers to ensure their study is based on rigour, validity and trustworthiness, by guiding their work using the guiding principles of the specific framework.

## 3.3 IMPORTANCE OF A RESEARCH FRAMEWORK

A framework provides a precise and consistent flow in the structure of research. It provides the justification for the decisions made in the research, validates the contributions made and analyses the findings without bias. It further assists in ensuring the research is well understood by any potential reader. The researcher can detect patterns and correlations amongst the variables and to deduce significant findings from the collected data.

## 3.4 THEORETICAL FRAMEWORK:

A theoretical framework as a component of conceptual framework establishes the correlations made throughout the study in to the framework of creating formal theories (Crawford *et al.* 2019). Ravitch and Riggan (2017) elaborated that:

> *"In the case of theoretical frameworks, the 'parts' referred to in this definition are theories, and the thing that is being supported is the relationships embedded in the conceptual framework. More specifically, we argue that the parts are formal theories; those that emerge from and have been explored using empirical work."*

A theoretical framework entails the following information (Crawford *et al.* 2019):

1. Recognising the theory cluster, which refers to a category in the form of a combination of theories; these include theories relating to the "learning style, organisational communication and language acquisition".
2. Isolating particular theories pertaining to that cluster, containing the source, suggestions and hypotheses of the specified theory.
3. Classifying the chosen theory for the study. This entails detailing the specified theory in the cluster that will be explored, the set of suggestions that relate to a particular study from that theory and the reviewing of previous literature with the use of the that theory as the centre focal point.
4. Specifying how the study will add to the current information available related to the theory.

A theoretical framework is established from current theories present in the literature but it is further refined by the researcher based on their own findings and discernment. The ultimate goal for the use of theoretical framework in research is to determine the theory on which the study is based (Agarwal and Chetty 2019).

This study followed the model of theoretical framework following the deductive and abstract reasoning. The objectives of the study are:

- To explore and describe the MSP experience (duration of symptoms, character of symptoms, type of symptoms and location of symptoms) in women with Long COVID.
- To explore the effect MSP had on one's quality of life.
- To describe the treatment options employed for the MSP due to COVID-19

The most prominent variables related to this study include the following intrinsic and extrinsic factors:

- <u>Intrinsic factors:</u> Diet and exercise.
- <u>Extrinsic factors:</u> Work stress, social interaction, stigma attached to being COVID-19 positive, education/knowledge of COVID MSP symptoms.

These prominent variables were identified as an important factor to consider when looking at Long COVID-related MSP amongst females. Knowledge gained about the symptoms and potential causes associated with long COVID based on the articles researched, suggested physical factors such as diet and exercise to be considered as influential. Studies on chronic pain and its associated factors also indicated the importance of psychological and social elements (Blyth *et al.* 2019:39). Researchers in previous studies observed the impact of work stress, social interaction and stigma associated with long COVID patients (Bachtiar, Maharani and Utari 2020: 156).

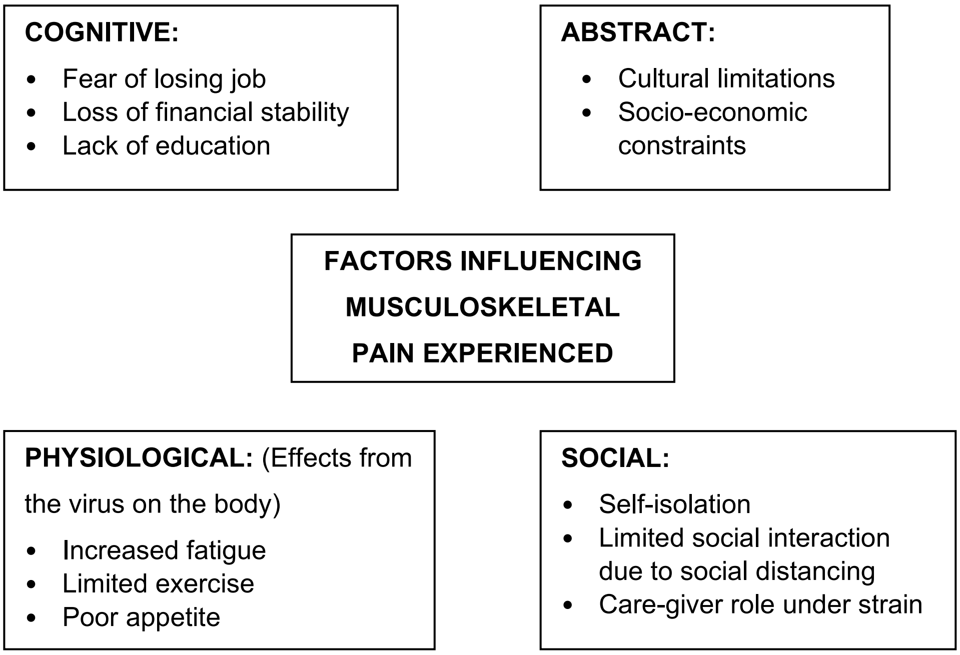


**Figure 3.1: Diagram showing the factors influencing musculoskeletal pain**

**Table 3.1: Table illustrating the influence and affects of variables associated with musculoskeletal pain**

| VARIABLE | INFLUENCED BY | AFFECTS |
|---|---|---|
| **Musculoskeletal Pain** | Diet, Exercise, Stress, Social interaction | Quality of Life |
| **Diet** | | Musculoskeletal Pain |
| **Exercise** | | Musculoskeletal Pain |
| **Stress** | Social Interaction, Stigma | Musculoskeletal Pain |
| **Social Interaction** | | Stress |
| **Stigma** | | Stress |
| **Quality of Life** | Musculoskeletal Pain | |

The table shows how physiological factors such as musculoskeletal pain can be influenced by social factors. For example, stigma and social interaction can both increase stress, which in turn can affect how MSP is experienced. Social factors like social interaction and stigma can contribute to stress. For example, a lack of social interaction or feelings of isolation can lead to stress, while experiencing stigma related to COVID-19 positivity can also be stressful. Stress can contribute to musculoskeletal pain experienced, as people's bodies release hormones that can raise pain sensitivity and inflammation levels. Similarly, Limited social interaction (social factor) can contribute to feelings of isolation and anxiety (cognitive factor), this can further shape an individual's access to resources, healthcare, and support system, influencing their overall well-being and resilience. All these factors are interconnected and can influence each other.

## 3.5 BIOPSYCHOSOCIAL MODEL

The biopsychosocial model forms a part of the theoretical framework and plays a significant role in the scientific understanding and management of pain, specifically MSP. This approach explains disability and pain as multi-dimensional and is an interplay of physiological, psychological, and social constituents. The biopsychosocial model applies to MSP through:

1. **Biological factors:** These involve structural changes and genetics. The physical facets of MSP, such as structural abnormalities, inflammatory and biochemical processes and tissue damage. An individual’s genetic make-up can affect sensitivity to pain, increased susceptibility to certain health problems and treatment response (Pomarensky, Macedo and Carlesso 2022).
2. **Psychological factors:** These encompass cognitive and emotional factors. The cognitive factors entail beliefs and insight into pain that play a vital role in these processes. One’s overall pain experience and duration of the pain can be affected by their own fear-avoidance beliefs and exaggeration of the significance of pain (Pomarensky, Macedo and Carlesso 2022). The perception of pain can be worsened or improved based on an individual’s mental state.
3. **Social Factors:** A support system is essential in the management of MSP of the affected individuals; this can be in the form of family, friends and community members. The interpretation and expression of pain can be moulded by cultural beliefs, particularly influencing treatment-seeking (Pomarensky, Macedo and Carlesso 2022). Occupational and environmental factors in the form of occupational stress, work ergonomics and the type of work environment can also worsen or improve MSP.

4. **Interaction and Integration:** Refers to the dynamic interaction between the biological, psychological and social factors that are emphasised in the biopsychosocial model. For instance, an individual experiencing chronic pain will most likely experience mental distress which can negatively contribute to the pain experience. The treatment protocol should focus not just on adressing the physical aspect of the pain experienced but the mental and social components as well to achieve optimal care(Gevers-Montoro *et al.* 2023).
5. **Clinical Application:** In healthcare, the use of the biopsychosocial model considers the three key components that have the most significant value, allowing the practitoner to establish the most effective management. This treatment plan would encompass protocals combining support interventions, physical therapy and cognitive-behavioral therapy (Nuernberg Back, Liebano and Avila 2021).

This model was applied to the study to help understand the most effective way musculoskeletal is managed in women by addressing the social, physiological and psychological components of an individual's pain. It further helped understand the personal effects of MSP experienced with Long COVID.

### 3.6 CHRONIC CARE MODEL

This model characterises the crucial components that promote chronic disease care of the highest quality within the health care system (Stinson *et al.* 2016). It consists of six main elements, which are described in an article by Slater and Briggs (2017):

1. Health system support: Promoting safe and high quality care through health organisational supported improvements, correcting any errors hindering good quality care, and giving incentives
2. Self-management support: To motivate and adequately preparing patients to take resoponsibility of their own health and care. This done by providing support strategies such as goal setting and action planning, highlighting the role the patient plays in improving theor own health, establishing community resources to manage self care.
3. Community: Providing access to community resources to address patients needs. This is achieved by promoting community engagement through programmes whose goals are to achieve high quality health care.
4. Delivery system design: Assuring the provision of effective and efficient health care and establishing self management support to affected individuals. This is achieved through providing care that considers a patient's needs and beliefs,

interventions that support evidence-based healthcare and ensures consistency of treatment through regular follow-ups.

5. Decision Support: Encouraging health care that is supported by evidence-based guidelines, takes patients' preferences into consideration and provides information to the patient to make them more knowledgeable, thereby encouraging their involvement.
6. Clinical Information Sytems: Systematise patient and population information to allow efficient high quality health care by facilitating patient planning and checking-in on the adequacy of health care operations.

Figure 3.2. displays the integration of the components forming the chronic care model.

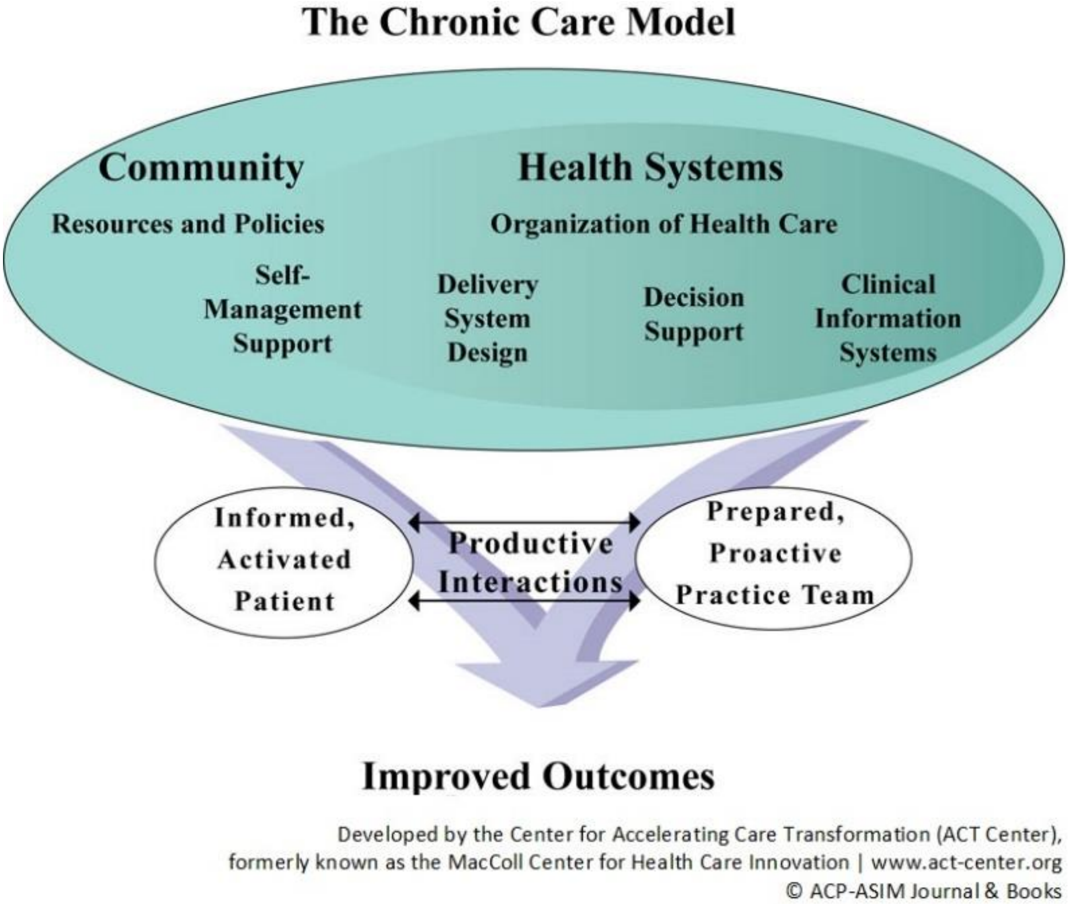


**Figure 3.2: The chronic care model, adapted from Wagner (1998)**

The chronic care model, applicable to the framework of this study, gathered information from women with Long COVID experiencing MSP regarding the type of treatment plan they followed to manage their pain as well as identifying what approaches worked best or worst for them, from. By going through the significant elements of this model, the lived experiences of MSP as a result of Long COVID and any treatment these affected women sought to relieve their pain were explored.

The chronic care model is imperative in conditions such as Long COVID, as it acknowledges that conditions as such are an on-going process with long-term clinical manifestations. In Long COVID, individuals go through constant symptoms, such as chronic pain, that continue well past the acute phase of the disease, leading to it being regarded as a type of chronic disease. The pain manifestations can be constant in the forms of muscle aches, joint/osseous pain and peripheral nerve pain, that last anywhere between a few months and years. Consistent treatment management is required to address symptoms and prevent further complications when dealing with chronic conditions as compared to acute conditions. The persistence of pain manifestation for a long period of time into Long COVID stresses the chronic nature of the condition.

The chronic pain that is experienced in Long COVID is a multi-faceted manifestation that is influenced by biological changes, psychological factors and social determinants. This model recognises the complex nature of this manifestation by taking into consideration the interactions between biological, social and psychological factors in the endurance and occurrence of the pain. An imbalance amongst these interactions can significantly impact quality of life, functional ability and mental health. Hence, acknowledging the lasting consequences of MSP in Long COVID demands a comprehensive approach that surpasses only managing symptoms but to identify aggravating factors and encourage holistic well-being.

## 3.7 COMMON SENSE MODEL

The common sense model, underpinned by the health belief theory, plays a vital role in understanding beliefs regarding MSP in managing coping responses. The beliefs regarding the relationship between the body and pain provide a crucial insight into the behavioural and emotional responses to MSP (Caneiro, Bunzli and O'Sullivan 2021).

The health belief theory states that when individuals experience a symptom, they try to understand it by forming a ‘representation’ of it. The representation is made up of a collection of beliefs on the body’s functioning in a specific circumstance (Caneiro, Bunzli and O'Sullivan 2021). These beliefs form around past experiences from the affected individual as well as from observing others enduring similar symptoms. Based on these beliefs, the affected individuals make a decision regarding the approach to their problem either by seeking help or attempting to solve the problem on their own or ignoring it all together.

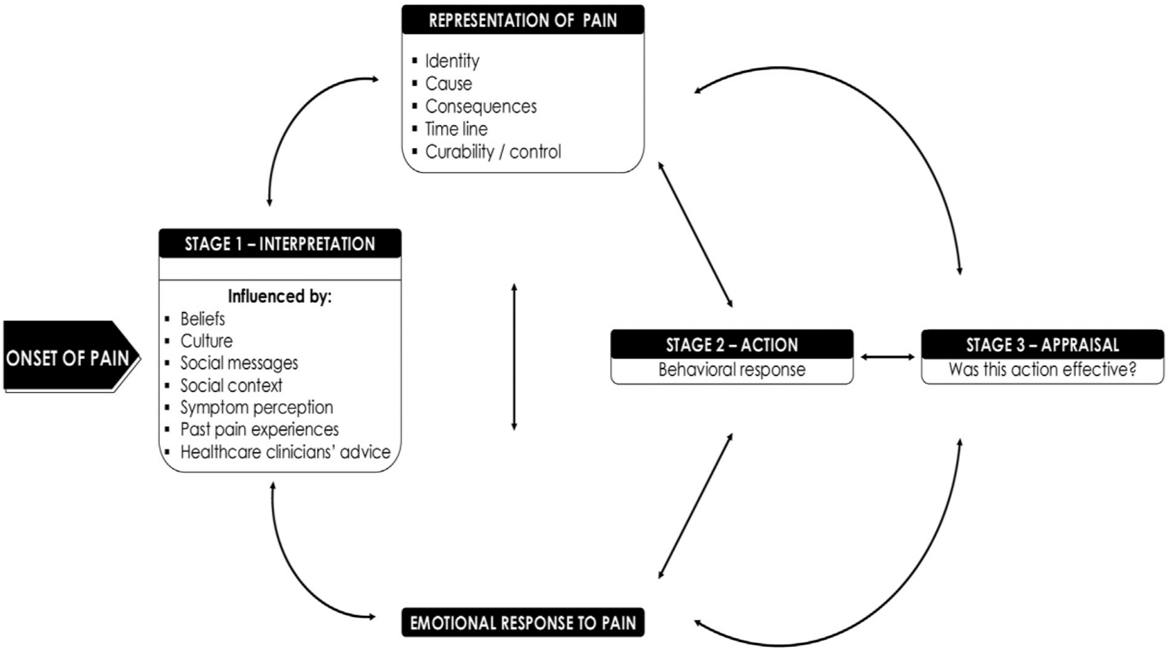


**Figure 3.3: Common sense model framework (adapted from Leventhal, Diefenbach and Leventhal 1992)**

Musculoskeletal pain is regarded as a "leading cause of disability" throughout the world (Blyth *et al.* 2019). Numerous studies established that beliefs and approaches to dealing with MSP can directly impact the duration of the pain, as well as the consequential effects of it (Caneiro, Bunzli and O'Sullivan 2021). This model aligns with framework of this study which explored women with Long COVID experiences with MSP, understanding views on MSP based on their encounters with MSP and their approach to managing their pain.

In conclusion, the common-sense model plays a decisive role in highlighting how the perceptions of MSP influence coping strategies and responses. By enduring these experiences, individuals are able to construct representations that assist them in deciding whether to seek medical assistance, self-manage or ignore their pain. The significant influence that beliefs and approaches to pain management have on the course and duration of pain highlights the relevance of this model. Furthermore, the alignment of the model with this study, emphasises the crucial importance of belief systems in healthcare outcomes through the insightful perceptions and management strategies of the affected women.

## 3.8 SUMMARY OF CHAPTER

Chapter 3 provides a comprehensive overview of the theoretical underpinnings of the study exploring the musculoskeletal pain (MSP) experiences of women with Long COVID.

The chapter begins by defining a research framework and emphasizing its importance in guiding the research process. It then delves into the concept of a theoretical framework, outlining its components and purpose.

The study employs a deductive and abstract reasoning approach to develop a theoretical framework. Key variables, both intrinsic (diet, exercise) and extrinsic (work stress, social interaction, stigma, education), are identified and their relationships are illustrated through a diagram and table.

The biopsychosocial model is introduced as a core framework to understand the interplay of biological, psychological, and social factors influencing MSP. The chronic care model is incorporated to address the long-term nature of Long COVID and the need for ongoing management. Finally, the common sense model is discussed to explain how individuals' beliefs about MSP influence their coping strategies.

Overall, the chapter establishes a strong theoretical foundation for the study by integrating multiple frameworks to provide a comprehensive understanding of the complex factors contributing to MSP in women with Long COVID.

# CHAPTER FOUR

# RESEARCH DESIGN AND METHODOLOGY

## 4.1 INTRODUCTION

This chapter focuses on the methodology used to conduct the research. It provides the design the study, location of study, target population, the process of data collection along with the procedure of the interview process and the ethical consideration and sampling strategy used. The ethics approval number allocated for this study was IREC 122/23.

## 4.2 STUDY DESIGN

A study design refers to the research technique used to conduct the overall study. A qualitative, exploratory, descriptive approach was utilised in this study (McLeod 2017). Qualitative research is described as the systematic study of social phenomena in natural environments. These phenomena may include, but are not limited to, how people experience certain aspects of their lives, the behaviour of individuals and/or groups, the functioning of organisations, and how interactions occur forming relationships (Teherani *et al.* 2015). The purpose of a qualitative approach is to obtain a greater understanding of the experiences and perspectives of individuals who can provide rich data without the use of quantitative and statistical approaches (Hamilton and Finley 2020)

In this study, MSP through the first-hand experiences of women with Long COVID were explored, to further understand how this clinical manifestation has affected their quality of life. This study involved conducting interviews with women diagnosed with Long COVID, with the purpose of providing a personal, engaging interaction to obtain rich reliable data. The benefit of conducting personal interviews is that it provides an opportunity to gather the personal perspectives of individuals and to further explore certain responses to questions, which adds reliability to a study (Hammarberg, Kirkman and de Lacey 2016).

## 4.3 STUDY LOCATION

The study was based in eThekwini Metropolitan Municipality, located in KwaZulu-Natal, South Africa. In a study by Buys *et al.* (2022), it was established that eThekwini comprises of 92 urban and peri-urban districts, with the most spoken language being isiZulu (69% of the population) and English (27% of the population).

## 4.4 POPULATION

The study population was women who suffered from musculoskeletal manifestations due to having Long COVID. These individuals were women between the ages of 18–60 years old who had tested positive for COVID-19 and were diagnosed by a clinician in a two-year time period, from January 2021–2023. These individuals had experienced MSP three months following initial diagnosis of COVID-19 infection. The rationale for the use of females within this age group is due to this age range represents a period of life characterized by relatively high physical activity and the potential for significant impact on the quality of life due to the musculoskeletal pain symptoms as the physiological changes associated with this period might influence the development and severity of MSP. By focusing on the 18-60 age group, the study can effectively investigate the specific challenges faced by women in this demographic while experiencing the musculoskeletal pain effects of Long COVID. The data obtained from this study population were sufficient to answer the research questions required, as data was collected until data saturation was reached.

## 4.5 PARTICIPANT RECRUITMENT

The recruitment process involved an advertisement in the form of a flyer (Appendix 6), available in English and isiZulu, posted on the noticeboards at The Durban University of Technology (DUT). A digital copy of the flyer was uploaded on various social media platforms.

Once participants responded to the advertisement, the selection of participants took place based off the inclusion and exclusion criteria of the study. Participation in the study was purely voluntary, with no reimbursement for the interview.

## 4.6 SAMPLING STRATEGY

The sampling strategy utilised in this study was purposive sampling with the snowball method to obtain data. Purposive sampling is a type of convenience sampling and refers to an approach where researchers apply their judgement to choose participants who are well-informed or associated with the study question being asked, provided the participants are willing to take part in the study (Stratton 2019).

Snowball sampling method refers to a form of convenience sampling that is utilised when it is arduous to attain subjects with specific characteristics (Naderifar, Goli and Ghaljaie 2017). This method allowed participants in the study to refer prospective participants amongst their acquaintances to the researcher. The sampling method was sustained throughout the accumulation of data in the study until data saturation was reached. This sampling strategy was best suited to this study because it expedited this process of recruiting participants, established trust and rapport and allowed for the collection of rich detailed information regarding the personal experiences of MSP amongst women with Long COVID.

## 4.7 SAMPLE SIZE

The sample size of the study was 12 women. The sample size was followed on the recommendation of Hamilton and Finley (2020), who concluded that a limited research scope and a comparatively homologous target population would compromise of 6–12, to sufficiently reach saturation. However, data were collected until saturation was attained. Data saturation was reached after interviewing the eighth participant, but four additional participants were interviewed thereafter to confirm saturation was reached. The selection of participants relevant to the study was based on the inclusion and exclusion criteria.

### 4.7.1 Inclusion Criteria

- Individuals who tested positive for COVID-19 and were diagnosed by a clinician from the year January 2021–2023 (two year time period).
- Participants who experienced MSP, three months following the initial diagnosis of COVID-19 infection.
- Participants who had received treatment in any form for MSP experienced.
- Participants who are female and between the ages of 18–60 years old.
- Compliance to participate in the interview over video call with consent to be recorded.
- Ability to understand and provide consent by signing an informed consent document.

### 4.7.2 Exclusion Criteria

- Participants who were unwilling to sign the informed consent form.
- Participants who are biologically males.

### 4.7.3 Research Tool

An interview guide (Appendix 5) was utilised in this study. A list of interview questions was asked adapted from various online sources and used as a guide, to gain the most information about these specific individuals’ experiences with MSP on which they were asked to elaborate.

### 4.7.4 Research Procedure

#### 4.7.4.1 Prior to Interview

Advertisements were placed around the DUT campus and Chiropractic Day Clinic to inform the public of the study that was taking place. Once participants responded to the advert in the recruitment stage and the selection of participants had been confirmed, an in-person interview was scheduled at the DUT Chiropractic Day Clinic, at a time and date convenient for the participant. This approach was the most efficient way to conduct the study as it allowed the researcher to interact with participants throughout eThekwini.

#### 4.7.4.2 During the Interview

Before commencing the interview, a letter of information (Appendix 3) and informed consent (Appendix 2) were given to the participants. Once all documentation was signed, the interview took place and was recorded utilising an audio recorder. Participant privacy and confidentiality were maintained throughout the interview. The questions were open-ended. Note taking was done during the interview to record changes in body language, tone of voice and facial expressions.

#### 4.7.4.3 Post Interview

Once the interview was concluded after 20–30 minutes, the recording was stopped, and the participant was thanked for participating and escorted out of the clinic.

## 4.8 DATA COLLECTION PROCESS

Data collection is described as a systematic method to gather information from a variety of sources to provide a comprehensive understanding, such as testing a hypothesis or evaluating results, most precisely (Rassel *et al.* 2020). The main goal of data collection is to collect quality information that can be analysed and used to support decisions or provide evidence (Tracy 2019).

Trustworthiness between the informant and researcher is a significant aspect in relation to reliability and validity in a qualitative study. Ensuring a variety of participants in the sample size increases the reliability of a qualitative study and, therefore, bias exclusion regarding age and socio-economic status is imperative.

## 4.9 DATA ANALYSIS

In order to meet the aim of this study, data were analysed using Tesch's method to identify themes and subthemes (Creswell *et al.* 2007). Hence, no data software was used to analyse the results. Tesch's method incorporates the following steps:

1. All responses will be recorded and transcribed.
2. For each transcript, the researcher asked questions relating to the participants' experience with MSP. Responses and body language were recorded.
3. After reviewing the transcripts, topics were written down and similar topics were grouped to form a framework.
4. A code was given to each topic identified. The transcripts were reviewed again, and the codes were labelled on the related responses and evaluated to check if any further topics could be identified.
5. Similar topics were categorised into subthemes.
6. The subthemes were further classified into main themes, using the most descriptive wording.
7. Data in each category were collected and a preliminary analysis was performed.
8. Data were recorded and the researcher goes through material again and recodes if necessary.

The analysis unit was the note taking during the interview and the voice recording of the interview. Data collection was guided by data saturation. Each interview was reviewed several times, keeping in mind the aim of this study, and the information obtained was analysed to find certain themes. Descriptive analysis was also used to establish a coherent summary of the impact and management MSP has had on female COVID-19 survivors.

## 4.10 DATA STORAGE

All interview responses were recorded on an audio-taping device and saved on a password-protected flash drive, which will be safely stored in the Chiropractic Department of DUT for five years and will thereafter be destroyed. Only the researcher and the supervisor have access to the recordings.

## 4.11 TRUSTWORTHINESS

Rigour, in qualitative research, refers to a means by which one instils trust and confidence in the results of a study. This further allows the researcher to be consistent with the methods over time, whilst providing a precise depiction of the findings from the sample population being investigated. The ultimate goal of rigour is to make certain that the research design, method and conclusions are truthful, unrestrictive, duplicable, reviewable and free from prejudice (Johnson, Adkins and Chauvin 2020). Qualitative rigour was maintained in this study through the use of the following principles and the respected strategies to achieve them (Thomas 2011):

- Credibility: Refers to the confidence in the authenticity of the researcher's results.

Credibility determines if the results from the research provides the most accurate information based of the participant’s original data and constitutes a true interpretation of the original views of the participants. In this principle, the researcher will review all responses from participants, assessing for similarities amongst them. In this study, it was ensured that sufficient time was spent with each participant and the participants own words were used in the results. Letters of informed consent were provided to participants and it was clearly established that participation in the study was purely voluntary.

- Transferability: Refers to the extent to which qualitative research findings can be transferred to other settings or contexts with various other respondents. The researcher assists potential in making transferability judgements by providing detailed descriptions. In this study, a standardised data collection method was used amongst all participants describing the context of behaviour and experiences displayed by participants.
- Dependability: Refers to the consistency of results over a period of time. Researchers evaluate research data to ensure dependable findings, interpretations and recommendations of the study are substantiated by the results obtained. This means providing sufficient information so a fellow researcher will be able to follow through the findings easily to draw a conclusion. Some of this information should include the purpose of the study, reasoning for the selection of the participants, duration and manner of data collection. Korstjens and Moser (2018:121) discuss that the process for ensuring dependability is referred to as an ‘audit trail’, which tracks the overall research procedure. In this study, dependability was ensured by providing sufficient information in the methodology and reviewing the transcripts several times to establish similarities or add on to current findings by both the researcher and supervisor.
- Confirmability: Refers to the extent to which the results of the study can be verified by various other researchers. Confirmability further ensures that the data and interpretations are derived from evidence provided. It is achieved once all other principles have been met and refers the researchers’ own perceptions after the interview. In this study, notes were made of any personal feelings or attitudes of the researcher after the interview. An accurate interpretation was ensured by clarifying responses when needed as well when going through the recording of the interviews.

## 4.12 ETHICAL CONSIDERATIONS

A pseudonym was provided to each participant to maintain the anonymity of the participants throughout the study.

The ethical considerations were as follows:

- The study had to be approved by the Ethics committee of DUT as well as the respective gatekeepers before the commencement of the interview procedure and data collection.
- Participants who wished to partake in the study would do so voluntarily.
- Participants in the interview would be given a document of informed consent to complete before participating.
- The selection of participants would be randomised, without bias shown to age, socio-economic status, or religion.
- Beneficence is described as the duty of the practitioner to work for the benefit of the participant/patient and endorse numerous moral rules that serve to protect and defend the rights of others, promote welfare, and limit harm to participants (Varkey 2021). It was recognised that the outcome of the study would contribute significant information on the debilitating effects MSP can have on an individual, particularly COVID-19 survivors. A greater understanding of these clinical manifestations would provide practitioners with:
    1. A better understanding on how to assist patients more efficiently in the future by educating them about MSP.
    2. The most effective treatment plan adapted to their particular symptoms through exercise, spinal manipulation and modalities (Turolla *et al.* 2020).

In terms of Chiropractic intervention, practitioners would be able to identify what form of soft tissue or manipulation therapy is most effective is helping to resolve MSP amongst females with Long COVID

Beneficence was ensured in this study as the participants’ confidential information was guaranteed prior to the commencement of the interview and further signed after the letter of informed consent (Appendix 2).

- Autonomy states that people are all responsible for their own actions and the freedom of choice of either an individual or group should always be supported and empowered (O’Donoghue 2023). Autonomy was maintained throughout the conduct of this study as the participant had the choice of whether or not to participate in the study as well as the freedom and ability to leave the study at any point. The participant's decision was always respected. Participants were given a letter of informed consent (Appendix 2) and a letter of information (Appendix 3).

- Participant confidentiality was of utmost importance and was followed and they remained anonymous (Eide and Kahn 2008). Participants' anonymity was maintained by providing participant numbers and withholding their names to hide their identity and ensure privacy. The data were stored electronically on a portable storage device (USB) at the Chiropractic Department at DUT. The files are password-encrypted on the USB and will be destroyed after five years. The supervisor and researcher were only allowed access to the data. Autonomy and justice were preserved by following confidentiality protocol.
- Justice refers to the most suitable, fair, and equal treatment/distribution of resources to an individual, as well as protecting participants' rights and providing ethical care medically (Zhou *et al.* 2024). Justice was maintained in the study by ensuring the participants will receive the outcome of the study once the research is published, patient confidentiality is maintained and ensuring the same amount of time is given to each participant.
- Non-maleficence describes that the practitioner should not bring any harm upon the participant. The practitioner should ensure interactions that encourage positive results and perform roles responsibly without any misuse of power (O'Donoghue 2023). Non-maleficence was accounted for by ensuring no harm or discomfort was brought upon the participant during the interview process. This declaration was present on the letter of information (Appendix 2), which was signed by the participant before the commencement of the interview.

## 4.13 SUMMARY OF CHAPTER

This chapter discussed the research methodology that was used in this study, and elucidated the manner in which data was obtained and analysed. The results of this study will be presented in the next chapter.

# CHAPTER FIVE

# RESULTS

## 5.1 INTRODUCTION

The findings gathered from the thematic analysis of 12 semi-structured interviews conducted with women diagnosed with Long COVID in the eThekwini municipality are presented in this chapter. Table 5.1 depicts the demographic data of the participants. These data include the age, year of infection, key areas of musculoskeletal complaint and coding allocation to each participant. The descriptions provided by the participants were transcribed verbatim. Upon the commencement of the interview process, the participant introduced themselves and provided their age as to ensure they were within the age group required for the study.

**Table 5.1: Age and type of musculoskeletal pain symptom present of each participant**

| Participant Number | Age | Year infected with COVID | Musculoskeletal Pain | Code |
|---|---|---|---|---|
| **1** | 22 | 2021 | Neck, Shoulder, and lower back pain | P122 |
| **2** | 54 | 2022 | Lower back pain, headaches, shoulder pain and joint pain | P254 |
| **3** | 51 | 2021 | Shoulder and leg pain, cramps, and headaches | P351 |
| **4** | 49 | 2021 | Neck, shoulder, knee and lower back pain and headaches | P449 |
| **5** | 29 | 2021 | Upper back and shoulder pain and headaches | P529 |
| **6** | 24 | 2022 | Neck, mid-back and lower back pain and headaches | P624 |
| **7** | 35 | 2022 | Calf and lower back pain and headaches | P735 |
| **8** | 23 | 2021 | Lower back pain, generalised body aches and headaches | P823 |
| **9** | 23 | 2021 | Neck and upper back pain and headaches | P923 |
| **10** | 56 | 2021 | Generalised body ache, neck, foot and shoulder pain, headaches and diffuse joint pain | P1056 |
| **11** | 23 | 2022 | Neck, shoulder and lower back pain and headaches | P1123 |
| **12** | 59 | 2021 | Joint pain of elbows and knees, foot pain, headaches and cramps | P1259 |

## 5.2 THEMES AND SUBTHEMES

The data from the semi-structured interviews were collated from the 12 participants and the responses were transcribed verbatim, which identified three themes and seven subthemes. Table 5.2 lists the themes and subthemes identified in the understanding of the musculoskeletal pain, choice in healthcare, effect on mental health and quality of life.

**Table 5.2. The themes and subthemes**

| **THEMES** | **SUBTHEMES** |
|---|---|
| 1. Common clinical presentation of MSP experience due to Long COVID | 1.1. Location of pain<br>1.2. Presentation of symptoms |
| 2. Negative effects of MSP symptoms on quality of life | 2.1. The negative effects on day to day living<br>2.2. Negative impact on mental health |
| 3. Varied and limited choice of healthcare treatment options | 3.1. Self-management of pain<br>3.2. Reliance on pain medication<br>3.3. Alternative methods of care |

### 5.2.1 Theme One: Common Clinical Presentation of Musculoskeletal Pain Experience Due to Long COVID

A commonality occurred among the participants in response to symptoms and location of MSP experience due to Long COVID. The majority of the participants described their MSP as diffuse through their body. In addition, the participants reported some form of back pain that was present during their COVID-19 infection and in Long COVID.

The following excerpts from the data reflect this:

> *"So actually that was the first symptom that I experienced. It came on with a lot of body pain and headaches like so throughout my body I couldn't really pinpoint it to one particular place, but it was like full body pains." (P735)*
>
> *"Everywhere on my body was just so painful. From the time I would sleep till I woke up in the morning, I was in pain, I couldn't even move from the bed. It was killing me, that's how bad it was." (P1056)*
>
> *"I didn't experience much pain when I was first diagnosed with COVID, but definitely after a few months then I started getting like lots of back pain, till now I have that back pain."* (P1123)

Due to the commonality of complaints in terms of location and presentation, subthemes were established.

#### 5.2.1.1 Subtheme One: Location of Pain

Most participants reported the presence of pain in either the upper or lower part of their back, headaches, neck and shoulder. Widespread joint pain was also reported by the majority. The following extracts are reflective of this:

> *"At that time, I didn't really realise that it was related to COVID, so I thought it was just like, you know, my posture or my sleeping habits that were affecting my neck…My lower back pain and neck pain just became worse and more constant after COVID." (P122)*
>
> *"I had a lot of headaches, and I had pain throughout my body but most especially in my neck. Everywhere on my body was just so painful. The upper back pain is still there and it is especially on the neck area and both shoulders." (P1056)*
>
> *"I experienced headaches, mainly on the sides of my head, around the temple area by my forehead. I didn't experience much pain when I was first diagnosed with COVID, but definitely after a few months then I started getting like lots of back pain, till now I have that back pain." … I get severe neck pain, like I have a neck pain right now as we speak (point to base of neck-posterior cervical muscles). I also suffer with a bit of lower back pain. I still experience the headaches once in a while so they basically come and go." (P1123)*
>
> *""I had excruciating overall body pain — worse in the neck area and described as a 'bone pain'; terrible headaches localised to the eyes and forehead region; pain in the upper part of the body – specifically bilateral shoulders" (P529)*
>
> *"My entire back was affected. I would say it was like maybe around my thoracic spine area, that was the worst. My headaches were terrible. It was mainly at the back of my head. I remember laying down and it was terrible." (P624)*
>
> *"So when I was infected with COVID, I had a lot of upper back pain mainly in the region of T5-T6 (mid back area), or rather near the bra strap area because of all the coughing and my chest was like very tight for like a week and 1/2 for two weeks. So that caused a lot of upper back pain. Those headaches are predominantly in the occiput regions, or posterior neck up into the side of my head. So, on both sides of my head. My upper back pain affected both my shoulders but mainly the right side. I have a lot of clicking on the medial border of my scapula and it causes a lot of like sometimes there's a sharp shooting pain that refers into my shoulder, or sometimes it's just within the region." (P923)*
>
> *"I experienced most of my joint pain on both of my elbows and knees." (P1259)*

> *"I do still have those joint pains I think when it gets when it's like more, I think when the weather's a bit cold when you're feeling it more. The pains do get bad." (P254)*
>
> *"Everywhere was painful, it felt like every joint in my body was sore. Even the underneath of my foot was very painful. It was a very sharp pain and lasted for about a week." (P1056)*

### 5.2.1.2 Subtheme Two: Presentation of Symptoms

The presentation of symptoms was very similar and varied among being achy, strenuous and severely more aggressive like stabbing or excruciating. The following excerpts from the data are indicative of this:

> *"But prior to like COVID, I have never experienced like as strenuous like muscular pains as like that then. I don't know ever since, like COVID. It's just like random with me. Like the pains. The pain is like on and off, it comes and goes but it's like stiff neck. Like the muscle is just like very tight. And it pulls on my entire neck and I can't like move much and it was on the right side." (P122)*
>
> *"So, I still struggle with my back muscles. Not so much lower. Mostly upper I think I actually struggle with lower when I'm actually close to my menstrual cycle more than I used to be before. So that has been a change before and after COVID. So I never really used to get much back pain previously but after COVID I think my muscles have just been a little more sensitive." (P529)*
>
> *"My headaches were kind of sort of top area of my head. I don't know what that would be (participant pointed from temple to occiput) so it wasn't sitting like sometimes it would start here, but it wasn't so much of a headache, it was just kind of like a mild pain. And then it would move to the back area of my head to the bottom of my head. It never ranged into a migraine, however, like it never affected my sight or never made me feel dizzy in any sort of way. It was just a headache as if sometimes you'd feel like when you're dehydrated, that type of headache." (P529)*
>
> *"It would feel like a sharp stabbing pain out of nowhere. It did affect my vision because I remember telling people sitting next to me at work when it happened once that I was finding it very difficult to look at my screen because it was so bright. Bright lights were sought as a trigger for the headaches for me. I would have to describe it as a tightening feeling around my muscles, it was very strange. There was not any achiness like before." (P1123)*
>
> *"So, it was a very tense tight pain. Almost like it was a very nagging pain that was very tight in character, so very tight, dull, achy pain." (P923)*

> *“Aching pain without any stiffness in my lower back.” (P823)*
>
> *“So a lot of it is like when I get up after sleeping experience, a lot of that pain and aching sensation like a stiffness in my body.” (P735)*

### 5.2.2 Theme Two: Negative Effects of Musculoskeletal Pain on Quality of Life

The overarching theme identified amongst the participants was that the musculoskeletal symptoms that occurred due to Long COVID had a negative impact on their quality of life. The effects were widespread from day to day living and mental health impact.

> *“Yes, it did. I do remember losing weight because I wasn't eating well. I couldn't get up and make myself breakfast. I couldn't get up and make myself lunch most of the time I was laying in bed and I'm the type of person that enjoys being active. I like going out. I like driving. I like getting things done. I don't like staying at home the entire time, but when I had those pains I felt like I couldn't go out. I couldn't drive and just staying at home was just it was so hard. It felt like it was my only.”*

#### 5.2.2.1 Subtheme One: The Negative Effects on Day-to-Day Living

The participants were asked to discuss how their MSP has affected their quality of life. Most responses were that the affected individuals now led a poor quality of due to the limitations in their daily activities associated with their home and work life.

The following extracts reflect this:

> *“The pain is bad, it makes me sad and upset to have to deal with it every day. It has had a negative impact on my life.”* (P1056)
>
> *“I would say it has actually decreased the quality of life made it a bit more poor that in terms of you not being able to do what you want to do as compared to previously”* (P254)
>
> *“But yeah, just quality in terms of quality of life just basically implicates me when I have to do anything that requires me to be physical. So its caused me to have a very low quality of life.”* (P923)

These affected women were probed further regarding how their quality of life has lowered since experiencing this MSP. Most of the participants responded that they suffered from generalised fatigue on a daily basis which led to a physical burnout.

The following extracts reflect this:

> *“I've been more aware that it's because of my pain that I feel like don’t have that energy that I used to do.” (P122)*

> *“The tiredness stops me more than the pain from getting things done, like even sweeping. I feel too tired after doing that but I have to just push myself.” (P1259)*
>
> *“It does get frustrating because you're not yourself you've because before you could do so much and you felt more energetic, whereas now it makes you feel more lethargic.” (P254)*
>
> *“That pain makes me feel very drained and tired and I'm not able to do as much as I used to do. Only when I take that nap, then I calm down and don’t feel as frustrated, I feel a bit, more relaxed and the pain doesn’t feel as bad and then I can continue with whatever other work I have to get done.” (P449)*
>
> *“It honestly made me feel old. I mean, I'm only 24. I should be feeling younger and more active, but the pain made me feel like I'm 50. I felt more like fatigue and lethargic with very little energy.” (P624)*
>
> *“It's caused a big lack of energy, so you can't really do as many things as you wanted to. So you tire out easily as well, when I do go out, I get tired. Yeah, quite quickly walking and things like that.” (P735)*
>
> *“I think getting tired easily is a big one. And feeling very lethargic from time to time. Because it's easier not to move, just to avoid experiencing the pain.” (P823)*

The MSP experienced by these affected women caused an impact generally on their lives in terms of carrying out household chores as well as their work life. This effect resulted in these women having their work ethic disrupted and requiring assistance at home to get through daily household activities.

The following extracts elaborate further on how these daily tasks had been impact and how it made them feel:

> *“Like it puts a strain on my day. I'm not as focused. Like studying or like just do simple tasks during the day. When I'm like, I'm being like this cause that's like where my attention is zeroed, you know. I am less likely to do a task as much as I could in a day if I was like when I'm dealing with pain. I feel it slowed down my progression with my productivity in a day.” (P122)*
>
> *“It's been very difficult now. There’s a lot of thing I could do before that I can't do it now. For instance, I cannot walk long distances anymore because of the pain of the pain I have in my feet. I can't get throughout the entire day without taking regular breaks in between because the pain gets so bad when I am standing for a long time. Yes, tasks at home is a lot more difficult now. Washing clothes and sweeping is the most strenuous task now. If I just sweep the veranda, it feels like I swept the entire*

*yard of the house, so it takes a while to get it done. I won’t lie, my life has changed a lot since having COVID.” (P1056)*

*“Yes I do I think with our daily task and with the with the life styles that we now lead everything is like so demanding. And with our jobs, we cannot say that we cannot give 100% Because at the end of the day you've got to produce the work. So have to have in COVID you can I do feel the strain because it now makes you giving more than what you can put out there. It's actually quite frustrating. Because you can't do what you normally used to do. Because it's like you wanting to do it but the body's shutting down.” (P254)*

*“I'm also not able to do much more strenuous activities because, I was involved in production at work at times, as I would be able to do a lot more things previously but now it’s not the same anymore. So I would you say that it has decreased your quality of life. Driving has been limited. Also, when I go shopping now, like you know, carrying stuff as well. Most of the time I go on my own like you know, so like to carry the stuff obviously realise that I'm not as strong as I used to be. … For me everything that I do now feels more strenuous” (P351)*

*“When I had just come out of COVID just doing exercise was a little bit tougher especially when it came to breathing. And just being active was just a little bit more intense. But during COVID and after COVID, I tried my best to stay active so that my muscles didn't completely lose function. If I did push myself I did get pain in my upper back.” (P529)*

*“Oh yes, so working from home. I do have to be at my desk quite often, so the body pain was exaggerated after that. It’s been tough, especially it's had effects on my sleeping, my struggle to get to sleep and then my quality of sleep is quite poor. So, home life as well, just trying to get through the daily chores and things like that. We've needed to get more help around the house. The feeling of tiredness also prevented/limited me from doing much. Yeah, I think my strength was a bit lessened. So, so like heavy lifting and things like that was difficult to do. I found it very frustrating to not be able to do all these activities like I normally could.” (P735)*

*“Yes, it seems to take longer to complete the daily chores and because of this I have to perform less tasks in the day. So because of the headaches my concentration gets affected because I can't sit in one position at my desk. So when I'm going to take the breaks often to get relief it also doesn’t help with my concentration.” (P823)*

*“Yes, I would say this pain has definitely has had a negative effect on my quality of living because you are not as energetic as you were previously like. So, I have a*

> *small little kid and he likes running around. So now after some time, I don't want to run around because I have a very terrible headache. It is because when he wants to play in and run around and because you have a headache that you can't handle and then you don’t want to do anything, and you know even you need to take the medication, you still wonder when it will stop. It's just because you want to get that medication out of your system but the only way to do that is to rest and you can't do that because you want to spend time with your kid as well, especially after being at work the entire day. So that’s the frustrating part of it. The home department is strenuous especially in the weekend because you have to work from Monday to Friday and then like weekend you're washing and spring cleaning and ensuring that everything's fine and that you can cook for the next week. And that is exhausting because mind you I am already tired from the week. And he had those pains and everything. And then we have to go back and do all of that at home, it’s just a lot.” (P1123)*

> *“So it's a very uncomfortable feeling. Sometimes it hinders me from doing things during the day because it becomes so overwhelming that all you want to do is just sit and not do anything, because anything you do tends to aggravate it. The pain it often hinders me, especially when I'm in clinic and when I'm treating patients. If the scapular pain is very severely flared up and often affects the way I treat because I am in so much pain that it doesn't allow me to give my 100% when treating my patient. Because of the severity of the pain. And in day-to-day life activities, If I lay a certain way It aggravates the pain. If I hold anything heavy or if I pick up heavy objects it aggravates the pain. It often becomes very intolerable or unbearable towards the end of the day after I've done a lot of strenuous activities, especially after I've treated patients, it felt especially on the medial border of my scapula. When I'm doing housework or any home chores, the pain gets aggravated, especially on the medial boarder of my scapula.” (P923)*

#### 5.2.2.2 Subtheme Two: Negative Impact on Mental Health

Living with MSP was seen to be impactful on the participants’ mental health. Majority of the participants reported issues with their mental health since the onset of their pain. The frustration and exhaustion associated with dealing with this pain daily was a lot to bear for the participants, forcing them to lead an unsatisfactory life.

Participant number 11 described how her experience dealing with MSP not only caused her stress and anxiety but more especially affected her confidence. Her response was:

> *“It's not nice having to depend on your meds. It's really not nice because especially with the headaches, it causes a lot confusion during your day and how can I put it, it actually affects your thinking? It does because now I find it difficult to concentrate and remember you're working during the day and then you have to make informed decisions. It's very overwhelming and I don’t like that feeling but I just have to push myself.”* (P1123)

> *“My mental health has definitely been affected I feel like it has damaged my self-esteem and confidence because you end up making those decisions thinking did I make the right decision? Did I make the right decision at all being in that state of mind because of the pain? It makes you question yourself and you doubt yourself a lot.”* (P1123)

> *“I definitely have more anxiety now. And its spreading in so many ways. Like it takes your mind to a place where you've been overthinking about whether this pain will get worse or better and leading to myself into depression, it affects you.”* (P1123)

Participant number 12 described how traumatising it was when she first tested positive and how fearful she has become now. Her response was:

> *“Oh God you know, that day before we got tested at work. I remember it being the Friday and it was raining so heavy and I was feeling so sick that I asked to leave work early, at around 3pm. I'm staying here in Newlands East, the taxi is only taking 30 minutes to go. It was hard even to walk from here to go to the bus stop because of how bad the pain was. It was so difficult. I was feeling so hot even though it was cold and raining that day. Then I walked by City Hall in Durban, I had to sit down because I didn’t have the energy. The police saw me sitting on the floor and they asked me why I'm sitting in the rain. Then I said no I am just tired. I was thinking that my family won’t be able to find me because I didn’t know if I was going to make it home that day. The police wanted to take me to hospital. I told them no I would be okay. It was just too hard to walk. I reached home by 6:00 that day and my husband was busy calling me. I came. I couldn’t even pick up my phone to answer the call because I was so weak. The way I was so sick that day, I was thinking that I'm going to die. Yeah, it was terrible.”* (P1259)

Other participants described how their pain caused them to be frustrated:

> *“Oh, it does make me get anxious at times. And I cannot handle that pain. You know, I just I'll be tossing and turning and then I'll get out of bed.” (P351)*

> *“I am irritable in most cases. Because sometimes the pain just doesn't just disappear even after taking so much of medication. Stress does make my pain worse, and*

> *sometimes the pain can make you anxious. Because sometimes the pain moves. And you don't know whether it's a chest pain or a back pain."* (P449)
>
> "*I was very anxious most of the time, sometimes very frustrated and flustered, because sometimes I don't know what to do to get out of the pain. I felt defeated at times because there's nothing you can do to physically take the pain away, generally." (P923)*

### 5.2.3 Theme Three: Varied and Limited Choice of Healthcare Treatment Options

The participants were asked to elaborate on their forms of management for their MSP. No participants sought out medical assistance from their general practitioner. Self-management of pain was a significant finding that was established amongst the participants, as well as seeking out alternative means of treatment, with the most commonly chosen treatment being pain medication. All participants were reliant on pain medications to help manage their pain daily. Three subthemes were identified:

#### 5.2.3.1 Subtheme One: Self-Management of Pain

Self-management of pain by participants entailed massage with some form of ointment, use of heat therapy, and rest.

The following extracts are reflective of this:

> *"I've tried to the resolve pain on my own with like thermal therapy and this and that." (P122)*
>
> *"When it does come, it is constant till I find a way to treat it and most of the time it is with medication, an injection (Voltaren) or a massage; I use lots of rubbing medicine whenever and wherever I feel the pain. I also use a lot of heat remedies like a wheat bag or hot water bottle or whatever the case may be." (P254)*
>
> *"So I used deep heat ointment, both the gel and the spray. And I found that the spray had more of an immediate effect and was quicker than having to massage it in to the muscle. So it's something that I would use at break at time when I couldn't manage. When I was just like you know not feeling great, then I would just go out spray it and come back and I can continue the day." (P1123)*
>
> *"So I used to take that. I also used, like, applied Voltaren Gel to the area I used to go for massages. Massages weren't so regular, but whenever I could, I did have massages."* (P624)

### 5.2.3.2 Subtheme Two: Reliance on Pain Medication

Participant 11 emphasised how much she resented taking pain medication but it was the only means of relief for her:

> *"I had severe headaches during that time. And I personally hate being in pain. So I generally used to take Panado and then when that didn't work I resorted to Adcodol, and I used to take 2–3 tablets daily to get relief. It's really a terrible thing. Especially, if you're a person that doesn't like taking pills and doesn't like to resort to that type of medication. Because you know how pills are, you can't take them for too long."* (P1123)
>
> *"It'd be very difficult for me to take pain medication before COVID. I would have a lot of pain medication at home because of my husband. You know, he, you basically need the anti-inflammatories because of his spinal operation and things that and since after COVID right until like, you know, this past weekend. I actually look for anti-inflammatories to assist me. I even went on to some cancer medications for the pain. I took that because there was some nights when I couldn't manage it. I don't know how to handle this pain."* (P351)
>
> *"And obviously, with medication and having it treated, it doesn't go away but the medication helps reduce the pain. I take Cataflam, Adco-Dol and Voltaren daily to help me."* (P449)
>
> *"I would often take muscle relaxants, so I would take Cataflam if it was really bad. I'd also take things like Spasmeds for when the muscle spasms are very severe. And others purely just to manage the pain, so some I don't like, like the ones in terms of having to take medication when it's very severe. That's quite annoying because I've never been somebody who likes to take tablets."* (P923)

Participants below the age of 40 years old resorted mostly to milder forms of pain relief medication:

> *"And just to manage the pain so I was just using Panado for like the headaches and some of the pain that I had in my body." (P735)*
>
> *"OK, so I took pain meds. There was a spasm medication I got from the pharmacy, it was specifically for muscular spasm. When I do get headaches now and then, the Grandpa headache tablets help with that." (P624)*
>
> *"Just if the headaches got worse then I did take Panados." (P823)*

> *"If it's a severe headache or muscle pain. The only thing that I would really take is a Mybulin. That's as much as I would take." (P529)*

### 5.2.3.3 Subtheme Three: Alternative Methods of Care

Of the 12 participants, six out chiropractic treatment to help manage their pain and found some type of relief.

> *"So unless I get like treatment for it, like I go to the* chiro*practor, like on a regular basis nearly once a week and I've like only got proper relief after the adjustments. Before that I should just like, you know, bear with the pain and take pain meds. This and that. But none of it really like helped as much as the adjustments. The chiropractic treatment for sure made a difference."* (P122)

Participant 6 elaborated the approach she found worked best for her from her chiropractic treatment. Her response was:

> *"I've had needling done, my friends adjusted me (chiropractic adjustments) and in the chiropractic clinic, etc. It did help, the adjustments did help. I prefer the needling to the adjustments because I did feel like my neck was so tender and then you know to do an adjustment on top of that. So the needling was way more effective because I did feel like it was muscle spasms, more muscles related, than a problem with the bones."* (P624)

Participant 9 specified how a particular chiropractic adjustment gave her the most relief:

> *"And often I would get chiropractic treatment to help me and just an adjustment on that one specific area on the medial border of my scapula gave me the most relief. Not even the painkiller. Just getting that adjustment provided me with the most relief. I just feel like I needed more ongoing consistent chiropractic treatment because it just flares back up when I leave it for too long."* (P923)

Other participants described how the combined effects of self-management and chiropractic treatment gave them relief:

> *"Well have been taking pain medication such as Stillpane and Panados, resting and treatments at the chiropractor for adjustments. And it did help me" (P249)*
>
> *"So I've mainly done some exercises just to strengthen the muscles as well as stretches, went for chiropractic treatments and soft tissue massages. And it had an overall positive effect." (P823)*

Participants also found themselves changing their lifestyles for the better to actively resolve their pain as well as improve their quality of life.

Participant number 6 described how her pain forced her to be immobile causing her to lose weight drastically. This motivated her to eat better and become active to improve her pain. Her response was:

> *"COVID did make my immune system weak and my body was paining all the time and I just wasn't eating much to be honest. I lost a lot of weight last year and I used to weigh like maybe 40/41kg. And then this year when I decided, OK, no, I can't live like that. I started eating healthy. I started eating more, and I picked up maybe about 4 KGS. Especially when I started being more active and like, that increased my appetite. And I started eating more to. I find yourself being less sad and unhappy about it. I used to feel like that. I felt, you know, like drained and no energy and things. But this year, maybe recently, over the past few months, I started gymming. And I feel so much better. And I feel like it helped, because even after I started gymming and eating healthy, my pains are not so bad anymore."* (P624)

Participant number 12 described that the changes she experienced was more than just improving her active lifestyle but to be able to spend more time with her family and not be miserable and in pain:

> *"So I think exercise helped me a lot. There was a guy from the neighbourhood that used to take us to the street to do the exercises. We would start of stretching then going for a short walk and then to end of we used to do like dance exercise (Zumba). But then he went back to work so the exercising stopped, now I just do walks with my husband on the roads around my house.*
>
> *I think I do feel more motivated now. Like I want to be happy and healthy. And I am 59 years old, I want spend time with my family because there is so much that's happened. Its taught me to appreciate the time we have and to spend it with our loved one because we lost so much of family."* (P1259)

Participant number 5 discussed how she became more aware of taking better care of her body:

> *"So, I've actually been more active than I used to be previously. I try and do a lot of running. Which in turn, I try to help like my muscles, especially my lungs try and stay as active as possible. I think with having COVID, it is a big change in your body. And luckily for me, it wasn't as severe. So I think my body will always experience the after effects of it. But it hasn't been to the point where my life has completely changed because of it. It still kind of lingers. It's there slightly. But because of all of the changes that I have made since then, like adding the multivitamins, doing more*

> *exercises, making sure being I think more cognisant of my muscles and my body. It's made my quality of life better than what it used to be."* (P529)

Other participants elaborated how their pain has motivated them to make healthier choices in life:

> *"All the changes I have made in my life were solely because of COVID, if that didn't happen to me I highly doubt I would have made those changes. This pain makes you think what you can do better for yourself. And I think you want to do better for yourself and become a better person and say, hey, maybe I need to change my way of thinking and lifestyle."* (P122)
>
> *"Yes, I would say I had to make changes in that I had to start taking care of myself going for walks and also eating healthy. I did make dietary changes. I tried to eat differently to lose some weight thinking that I'll be able to move easily with this pain and all of that." (P449)*
>
> *"So one of the main things that I did was trying to get more in regular exercise. So I started using the treadmill like every other day, just trying to help work out some of that stiffness in my body. I would say that this time has actually forced me to make changes for the better for myself."* (P735)

Incorporation of the theoretical framework into this chapter enhances the understanding of the findings related to the MSP experienced by women with Long COVID. The biopsychosocial model considers the interplay between biological, psychological, and social factors influencing health outcomes (Butera 2024). By applying this model, along with the common sense model and the chronic care model; the chapter can better contextualize the participants' experiences, illustrating how their physical symptoms, mental health challenges, and social circumstances collectively shape their quality of life and healthcare choices (Vinz 2023). This theoretical lens not only enriches the analysis but also provides a comprehensive perspective on the multifaceted nature of Long COVID and its impact on women's health.

# CHAPTER SIX

# DISCUSSION

## 6.1 INTRODUCTION

The results of the study are analysed and interpreted in this chapter, in context of the existing literature on the experiences of MSP in women diagnosed with Long COVID.

## 6.2 OVERVIEW OF THE RESEARCH DISCUSSION

The purpose of this study was to explore the self-reported experiences of MSP in women diagnosed with Long COVID in the eThekwini Municipality. The following three major themes were found:

| | |
|---|---|
| **THEME ONE:** | Common clinical presentation of MSP experience due to Long COVID. |
| **THEME TWO:** | Negative effects of MSP on quality of life. |
| **THEME THREE:** | Varied and limited choice of healthcare treatment options. |

### 6.2.1 Theme One: Common Clinical Presentation of Musculoskeletal Pain Experience Due to Long COVID

In the current literature, the most prevalent clinical presentation identified amongst women with Long COVID is MSP. This is supported by research conducted by Davis *et al.* (2023) that found over 200 manifestations linked to Long COVID, with the most common complaint being MSP. The results of this study, identified the most common MSP manifestation present amongst the affected women specifically back pain, neck pain, shoulder pain and headaches.

#### 6.2.1.1 Subtheme One: Location of Pain

The most common locations identified in the study as the site of MSP amongst most participants include the neck and shoulder region and upper and lower back. The outcome of this study correlated with a study by Khoja *et al.* (2022) that revealed that pain as a result of Long COVID can present as localised to a specific region in the body or diffuse and generalised, with the typical locations of pain experienced in affected women being the head, neck and back area. These areas were often reported as sites of discomfort and pain amongst Long COVID patients (Bai *et al.* 2022).

In the interviews, the participants elaborated that their back pain would range from diffuse to localising between the upper or lower back. These findings correlated with a study by

Karaarslan, Güneri and Kardeş (2022), in which they found approximately 14.4% of Long COVID patients experienced neck, back and lower back pain symptoms but these was less common than the presence of fatigue, joint pain and muscle pain symptoms. Bachtiar, Maharani and Utari (2022) discussed their findings of the most common locations for MSP to occur were diffuse and in the lower extremity. Similarly, in the results in this study, two of the 12 participants experienced widespread body pain and could not pinpoint the exact location of their pain.

#### 6.2.1.2 Subtheme Two: Presentation of Symptoms

The results in this study revealed that most of the participants experienced a muscular ache when probed to describe the character of pain experienced. It was also reported that this 'ache' was often accompanied by stiffness in the neck or back region that was affected. Common manifestations of MSP include fatigue, myalgia, arthralgia and spinal pain. Radiological findings found that these musculoskeletal manifestations may occur as result of muscle atrophy, fatty infiltration and chronic changes within the muscle (Omar *et al.* 2022).

Participants 2, 10 and 12 reported MSP manifestations in the form of joint pain in their extremities, arms and legs. Joint pain/arthralgia was reported to be a constant symptom in 21.2% of patients with Long COVID, 70.8% of those patients being female (Bai *et al.* 2022). This manifestation was regarded as one of the fundamental signs of Long COVID, along with fatigue, shortness of breath and 'brain fog'.

The results from this study align with the findings in the study by Khoja *et al.* (2022) on the '*Clinical characteristics and mechanism of MSP in Long COVID'*, which found that muscle pain and joint pain were highly prevalent amongst women with Long COVID, as identified in 18 out of the 35 studies that were reviewed.

### 6.2.2 Theme Two: Negative Effects of Musculoskeletal Pain Symptoms on the Quality of Life

After analysing the results, all participants expressed that their MSP had become a relentless companion, upset daily routines, limited mobility, decreased vitality and hampered the ability to engage in once-simple tasks. Thus, ultimately resulting in a poor quality of life being led and a poor perception of general health. This outcome correlated with the study done by Erden *et al.* (2023) which focused on the impact of musculoskeletal symptoms on the quality of life. The study revealed that musculoskeletal manifestations in the forms of muscle and joint pain had a significant negative effect on the quality of life of individuals post COVID-19 infection.

Individuals who had existing MSP, prior to the infection, experienced a greater intensity of pain during and post COVID-19. The increase in the severity of pain experienced added to the decline in the quality of life (Wang *et al.* 2022). The differences between genders was also analysed, with women scoring poorer in physical abilities and pain experienced compared to men (Erden *et al.* 2023).

#### 6.2.2.1 Subtheme One: The Negative Effects on Day to Day Living

Dealing with pain daily means meant that each task has to be prioritised and managed according to the amount of energy required to carry them out. The results of this study revealed fatigue was highly prevalent amongst women with MSP and dealing with this situation daily led to physical burnout. Of the 12 participants interviewed, seven expressed how they constantly felt drained and easily tired out during the course of their day; pacing out their day was helpful, but it was not enough to allow them to lead a functional lifestyle.

A study done in 2022 by Mills *et al.* identified a link between MSP and fatigue levels, indicating that individuals experiencing MSP were more likely to have greater levels of fatigue. This relationship raises the possibility of a potential cycle of inactivity and increased pain, as fatigue can worsen musculoskeletal symptoms and lead to less physical tasks. Similarly, the severity of MSP experienced can affect the quality of sleep, leading to fatigue and ultimately leading to the limitation of activities of daily living (Wang *et al.* 2022).

An individual’s capability to carry out daily activities can be linked with a good quality of life but when those abilities are hindered as a result of musculoskeletal manifestations, such as muscle pain, joint pain and headaches, then the result is a poor quality of life (Abdullahi *et al.* 2020: 687). The results of this study revealed that most participants expressed that they led a poor quality of life due to their experience of living with MSP. Limitations were in both their home, academic and work life due to the extent of MSP that they had experienced. Participants reported daily activities such as doing laundry, driving and exercise, felt significantly more strenuous with their pain. Whilst participants who worked and studied daily reported that they were unable to be as productive and give their maximum effort due to their pain hindering their ability to carry out their duties. Due to MSP restricting mobility and causing discomfort, daily tasks and engagement in physical activities are limited (Wang *et al.* 2022).

Similarly, in a study by Fowler Davis *et al.* (2022), on individuals living with long term MSP, the participants described their pain experience as draining and controlling of their lives. Participants felt “left out” of living a normal life due to the extent of pain they experienced, as socialisation and fulfilling tasks at work were difficult.

#### 6.2.2.2 Subtheme Two: Negative Impact on Mental Health

From unbearable joint pain to recurrent back aches, every musculoskeletal experienced was a constant reminder of the toll the virus had taken on the participants' bodies. Furthermore, they felt helpless and alone in their struggle to manage their pain due to the restricted access to healthcare. In a study in Germany, 11.6% of the sample cohort reported a worsening of pain, while 48.8% of the participants reported a worsening of their mood (Meyer-Frießem *et al.* 2021).

In this study the women were questioned how living with this pain affected their mental health. Many of them reported significant issues since the onset of their pain during their initial COVID-19 diagnosis. Being a woman, having to take on multiple roles, such as being a caregiver and a businesswoman, with the added concern of having to deal with MSP, was found to be overwhelming and severely impacted the mental health of many of the participants. Of the 12 participants, 5 reported having poor mental health due to their experience with Long COVID related MSP.

Symptoms of anxiety and depression, was found to have a greater prevalence in post-COVID-19 patients when contrasted against the general population (Erden *et al.* 2023).

Participants 3, 4 and 9 discussed how their pain caused them to be frustrated and irritable, because they expected their pain to be resolved after taking a lot pain medication Frustration was a highlighted symptom due to the lack of adequate support and effective solution to the pain experienced. The participants did not feel confident that they would find a permanent solution to their MSP (Wurz *et al.* 2022).

Participant number 11 described her experience of dealing with MSP not only caused her anxiety and depression but also affected her confidence and self-esteem, especially in the workplace, forcing her to question herself on decisions made. Simultaneously, the study by Meyer-Frießem *et al.* (2021) analysed the drastic increase in the rate of feelings of helplessness, which further resulted in a higher pain rating being experienced.

A study by Parsirad *et al.* (2023) reported that 77% of patients with MSP had poor psychological health as a result of COVID-19. Despite dealing with their severe pain daily, the pandemic restrictions that involved social isolation and fear related to being diagnosed with COVID-19 had been associated with poor coping skills with regard to managing pain and a greater prevalence of depression.

The overall emotional well-being individuals suffering with MSP as a result of COVID-19 was found to be greatly affected (Erden *et al.* 2023). Women were shown to experience greater levels of emotional exhaustion when compared to men (Aykurt Karlibel and

Kasapoğlu Aksoy 2022). Most of the participants were exhausted from dealing with their MSP on a daily basis and despite trying various approaches for relief, no permanent solution was found to resolve their pain. Participant 4 described that she was tired of being miserable and trying numerous methods to relieve her pain; no significant improvement in her pain was found since her initial diagnosis of the COVID-19 infection and she felt that she now has to come to terms with the fact that her pain would be permanent.

### 6.2.3 Theme Three: Varied and Limited Choices of Healthcare Treatment Options

When participants were interviewed and enquired about the current management of their MSP, it was evident they lacked a good choice in healthcare. Only two of the 12 participants sought health care treatment in the form of going to their pharmacist to get medication (pain tablets and injections) for their pain relief. None of the participants sought medical assistance from general practitioners or specialist to assist in the management of their pain. Participants did not provide an explanation as to why they did not seek out medical care for the management of their pain, it can be assumed that they felt the pain medication was the only worthwhile treatment for themselves.

No specific reasoning was given for participants not seeking healthcare for pain management. However, it may be associated with the current strain on the healthcare systems internationally, resulting in limited availability of specialists and delays in booking to receive treatment timeously (Parsirad *et al.* 2023); economic challenges faced by patients due to the loss of employment or reduced income, making it difficult to pay for treatment (Ziadni *et al.* 2022); and some individuals feel discouraged or dismissed by health care providers to seek appropriate treatment as they feel their MSP will not be taken seriously (Brehon *et al.* 2023).

#### 6.2.3.1 Subtheme One: Self-Management of Pain

Of the participants, four reported attempting to resolve their pain through massage, pain relief cream such as 'Deep Heat', heat therapy, and rest. Most women in this study also discussed how they have taken up some form of physical activity to help them improve their mobility and decrease their pain in the form of gym, taking long walks, and stretching. Exercise is one of the main pain management approaches used by many individuals with Long COVID, because it helps to improve muscles and joint mobility, prevent stiffness and reduce pain (Wang *et al.* 2022). Non-pharmacological interventions, such as the use of hot and cold therapy, exercise/movement and massage, are some of the methods of pain management used for MSP (Mills *et al.* 2022).

#### 6.2.3.2 Subtheme Two: Reliance on Pain Medication

A key finding amongst all women in this study was the over-reliance of pain medication to help resolve the pain. These medications ranged from mild over the counter drugs, such as Spasmed and Panado, to schedule drugs, such as Cataflam and Voltaren.

Most participants that were below the age of 40, were found to only resort to mild forms of pain relief medication. Whereas some participants older than 40 years old used stronger medication to manage their pain.

The overuse of a variety of analgesics by women suffering from MSP was evident among those affected with Long COVID (Günaydın *et al.* 2022). For many, "'medication"' is the first line of treatment in the management of pain, as no other method seemed to provide any significant improvement (Almeida *et al.* 2020: 748). The use of opioids in conjunction with non-pharmacological therapies to achieve a multi-modal approach is a safer option in managing pain rather than solely opioid usage (Wang *et al.* 2022).

#### 6.2.3.3 Subtheme Three: Alternative Methods of Care

Half of the participants received chiropractic treatment to help resolve their pain, whilst the other half self-managed their pain through other means. Only three participants described how chiropractic treatment through the form of chiropractic adjustments and dry needling was the only means of relief for their pain. This was highlighted in a study in Spain by Gevers-Montoro *et al.* (2022), where the effects of chiropractic treatment were assessed amongst patients. The chiropractic treatment that was provided in the study included chiropractic spinal manipulation in conjunction with patient education, advice on effective exercises, muscle release techniques, physical modalities, and nutritional advice. This multi-disciplinary approach was highly effective as patients reported a reduction in pain experienced and fear of movement and an improvement in well-being (Santiago *et al.* 2022). Some individuals have found great relief from distraction therapy used in conjunction with mobilisation (Mills *et al.* 2022). Additionally, two participants in this study reported that chiropractic treatment in conjunction with massages and mild pain medications, helped to manage their pain better.

Many participants believed the changes they made to their lives due to their experience of MSP was for the better. The results of this study revealed that most patients took the initiative to incorporate movement and exercise for themselves to not only get relief from their pain but to take better care of their bodies. These changes included, but were not limited to, a change of diet, engagement in social relations and self-care. Participants 1, 4 and 3 reported they experienced a self-reflective moment in which they thought about how their experience with MSP motivated them to prioritise their health and make better choices;

they believed they only made these adjustments in their lifestyle solely because of COVID-19. Positive well-structured coping mechanisms, such as consistent physical activity, self-reflection, good ability of self-managing pain and proper planning and perspective, were highlighted for their significance in making a positive improvement in lifestyles amongst Long COVID MSP sufferers (Parsirad *et al.* 2023).

## 6.3 SUMARY OF THE CHAPTER

The participants of the study expressed commonality around the clinical presentation of MSP in Long COVID. The areas highlighted were the back and neck with associated headaches. Their quality of life was greatly affected, causing physical burnout and limited capabilities to perform ordinary daily tasks, as well as negatively impacting the affected women’s mental health.

The study highlighted the prevalence of poor mental health amongst the participants, with symptoms of anxiety, depression, stress and ultimately emotional exhaustion being present; as 5 out of the 12 participants reported having poor mental health. The participants also discussed their usage of pain medication excessively and alternative methods of care to help get relief. Nonetheless, some participants made positive changes in their lifestyles by putting their health first and used physical activity to help manage their pain. The study’s outcomes highlight the importance of promoting awareness of the common areas affected with MSP as a symptom of Long COVID, as well as non-pharmacological approaches, along with discouragement of the use of pain medications and improving the mental health of those affected.

Based on the results from the study, the use of the biopsychosocial, common sense, and chronic care models collectively, provided a comprehensive view of women's experiences with Long COVID-related MSP. The biopsychosocial model highlighted the interplay of biological, psychological, and social factors, while the common sense model focused on the patient’s perceptions and coping mechanisms (Grant *et al.* 2014:4). The chronic care model emphasized the role of the healthcare system in managing long-term conditions (Butera 2024). Together, these frameworks provide a robust foundation for exploring the multifaceted nature of Long COVID, informing research, and ultimately improving care for affected women.

The following chapter will provide an overall conclusion to the study.

# CHAPTER SEVEN

## STRENGTHS, LIMITATIONS, CONCLUSION, SUMMARY AND RECOMMENDATIONS

### 7.1 INTRODUCTION

This study was aimed at addressing the experiences of MSP in women diagnosed with Long COVID. This chapter elaborates on the researcher positioning, research questions, strengths and limitations of the study as well as the conclusion of the study and further recommendations based on the results of the study.

### 7.2 RESEARCHER POSITIONING

As a women and having experienced MSP as a consequence of Long COVID, the researcher was able to resonate with the participants' responses. Due to the researcher's experience, she was knowledgeable of the effects on the quality of life, mental health and management of MSP. This facilitated efficient communication with the participants, allowing thorough analyses of the responses given.

### 7.3 STRENGTHS OF THE STUDY

This study utilised a qualitative, exploratory, descriptive approach, that enabled a deeper understanding of the experiences and insight of MSP experienced by women with Long COVID, through the collection of rich qualitative data. The study provides a detailed comprehensive description of the MSP symptoms experienced by participants, both during and after the COVID-19 infection. The focus on women specifically allowed for a better understanding of the unique challenges that women suffering from MSP experience, thereby helping to address the gap in the literature. By focusing on the participant's self-reported experiences, the study offers a first-hand account of the impact of MSP on their lives. The research also highlights the significant emotional and psychological toll of MSP on participants, including its effects on quality of life, relationships and overall well-being. The study further identifies various coping mechanisms employed by participants to manage their pain and maintain daily functioning. The findings from this study can contribute to a better understanding of the challenges faced by patients with Long COVID and MSP, informing the development of appropriate support and treatment strategies. The study aligns with the Sustainable Development Goals of South Africa, thereby promoting good health and chronic disease prevention.

## 7.4 LIMITATIONS OF THE STUDY

Pain is highly subjective and varies amongst each individual so it is difficult to generalise this as a large population is affected by MSP. Even though this may be the case, the small sample size of participants provided rich relevant data that contributed significantly to the study. The data obtained from the study are self-reported and relied on the interpretation of the question by participant. Furthermore, it is difficult to prove the questions were answered truthfully.

## 7.5 RECOMMENDATIONS

The recommendations for this study include:

- Investigating the same topic with a larger sample size, in a quantitative approach, as it will help validate the research further and improve its accuracy. A control group can be included in the study and the study should take place in different part of South Africa. The characteristics of the control group would be females between the ages of 18-60 that were not diagnosed with COVID and experience musculoskeletal pain.
- A study focusing on the effects of MSP from each of the various strains would also be beneficial.
- Long-term follow-up research should be done regularly to assess for any long-term changes in the experiences of MSP in women diagnosed with Long COVID. This will help identify if treatment plans should be modified further and provide new knowledge to the management of such patients.
- Collaborations between researchers, healthcare providers, and policymakers are imperative to translate the findings into practice and promote the improvement of support services for women with MSP in Long COVID.
- Comparative effectiveness studies in patients diagnosed with Long COVID would be informative to identify treatments that are relatively more effective than others.
- Conduct a similar study but collect input about long-COVID from additional voices or participants, such as medical practitioners, allied health practitioners and healthcare workers, who work with long-COVID.

## 7.6 CONCLUSION

In conclusion, this study aimed to explore the experiences of MSP in women diagnosed with Long COVID. Through qualitative interviews, valuable insights into the impact of MSP on the daily lives and overall well-being of these individuals were obtained. By delving into the personal experiences of these women, the research highlighted the diverse and complex nature of their symptoms, emphasizing the need for tailored interventions. The findings of this study revealed that MSP is a prevalent and debilitating manifestation of Long COVID in women. It affects the various major aspects of their lives, including physical functioning, social interactions, and mental health. The experiences of MSP were diverse, with variations in the duration, character, type, and location of symptoms reported by the participants.

The study highlighted the importance of tailored-specific interventions and support services to address the unique challenges and needs of women with MSP in the context of Long COVID. A multidisciplinary approach, involving healthcare professionals from various disciplines, was identified as crucial in providing comprehensive care and improving the quality, thereby, advocating for collaborative care models that incorporate chiropractic care, alongside other healthcare disciplines, to optimize patient outcomes. The role of a multidisciplinary approach is crucial in addressing both the physical and psychological dimensions of MSP, thereby advocating for collaborative care models that incorporate chiropractic care, alongside other healthcare disciplines, to optimize patient outcomes. This study has contributed to the growing body of knowledge on Long COVID and its musculoskeletal manifestations in women. By applying theoretical frameworks like the biopsychosocial, common sense, and chronic care models, the chapter can provide a deeper understanding of how physical symptoms, mental health, and social factors impact women with Long COVID. This comprehensive approach offers valuable insights into their overall well-being and healthcare decisions.

Overall, this study has provided valuable insights into the experiences of MSP in women diagnosed with Long COVID and the foundation for future research and interventions to enhance the management and well-being of this population.

## 7.7 SUMMARY OF THE STUDY

The study explores the self-reported experiences of women with Long COVID-related MSP.

Participants reported a wide range of MSP symptoms, including severe body aches, headaches, joint pain, and muscle soreness both during and after COVID-19. These symptoms significantly impacted their daily lives, causing fatigue, sleep disturbances, and difficulty with physical activities. The pain also had a detrimental effect on emotional well-being, leading to frustration, anxiety, and depression.

To manage their pain, participants employed various strategies, such as medication, heat therapy, and physical activity. However, many expressed dissatisfaction with the effectiveness of these treatments. While some participants adapted to their new reality and found ways to cope, others felt overwhelmed by the persistent pain and its impact on their lives.

Living with MSP after COVID-19 was described as a challenging and distressing experience. Participants faced significant limitations in their daily activities and struggled with both physical and emotional consequences. Despite their resilience, many expressed a sense of hopelessness and frustration due to the lack of effective treatments.

# REFERENCE LIST

Abdullahi, A., Candan, S. A., Abba, M. A., Bello, A. H., Alshehri, M. A., Afamefuna Victor, E., Umar, N. A. and Kundakci, B. 2020. Neurological and Musculoskeletal Features of COVID-19: A Systematic Review and Meta-Analysis. *Frontiers in Neurology*, 11:687. Available: https://doi.org/10.3389/fneur.2020.00687. (Accessed 16/04/2021)

Almeida, M., Shrestha, A. D., Stojanac, D. and Miller, L. J. 2020. The impact of the COVID-19 pandemic on women's mental health. *Archives of Women's Mental Health*, 23(6): 741–748. Available: 10.1007/s00737-020-01092-2 (Accessed 11/09/2023)

Astin, R., Banerjee, A., Baker, M. R., Dani, M., Ford, E., Hull, J. H., Lim, P. B., McNarry, M., Morten, K., O'Sullivan, O., Pretorius, E., Raman, B., Soteropoulos, D. S., Taquet, M. and Hall, C. N. 2023. Long COVID: mechanisms, risk factors and recovery. *Experimental Physiology*, 108(1): 12–27. Available: 10.1113/EP090802 (Accessed 22/08/2023)

Aykurt Karlibel, İ. and Kasapoğlu Aksoy, M. 2022. The relationship between burnout syndrome and low back pain, neck pain and mood status in hospital workers in the COVID-19 pandemic. *The European Research Journal*, 8(2): 191–201. Available: https://doi.org/10.18621/eurj.989751 (Accessed 22/08/2023)

Bachtiar, F., Maharani, F. T. and Utari, D. 2020. Musculoskeletal disorder of workers during work from home on COVID-19 pandemic: a descriptive study. In: Proceedings of *International conference of health development. COVID-19 and the role of healthcare workers in the industrial era (ICHD 2020)*. Atlantis Press, 153–160. Available: 10.2991/ahsr.k.201125.025 (Accessed 11/02/2024)

Bai, F., Tomasoni, D., Falcinella, C., Barbanotti, D., Castoldi, R., Mulè, G., Augello, M., Mondatore, D., Allegrini, M., Cona, A., Tesoro, D., Tagliaferri, G., Viganò, O., Suardi, E., Tincati, C., Beringheli, T., Varisco, B., Battistini, C. L., Piscopo, K., Vegni, E., Tavelli, A., Terzoni, S., Marchetti, G. and Monforte, A. D. A. 2022. Female gender is associated with long COVID syndrome: a prospective cohort study. *Clinical Microbiology and Infection*, 28 (4): 611.e619–611. Available: 10.1016/j.cmi.2021.11.002 (Accessed 27/05/2023)

Bhoi, D., Jain, D., Garg, R., Iyengar, K. P., Hoda, W., Vaishya, R., & Jain, V. K. (2021). Complementary and Alternative Modalities (CAM) for pain management in musculoskeletal diseases (MSDs). Journal of clinical orthopaedics and trauma, 18, 171–180. https://doi.org/10.1016/j.jcot.2021.04.021 (Accessed 27/07/2024)

Blyth, F. M., Briggs, A. M., Schneider, C. H., Hoy, D. G. and March, L. M. 2019. The Global Burden of Musculoskeletal Pain—Where to From Here? *American Journal of Public Health*, 109(1): 35–40. Available: 10.2105/AJPH.2018.304747 (Accessed 13/02/2024)

Bonanni, R.; Cariati, I.; Tancredi, V.; Iundusi, R.; Gasbarra, E.; Tarantino, U. 2022. Chronic Pain in Musculoskeletal Diseases: Do You Know Your Enemy? Journal of Clinical Medicine, 11(9):2609. https://doi.org/10.3390/jcm11092609 (Accessed 27/07/2024)

Borges Do Nascimento, I. J., Cacic, N., Abdulazeem, H. M., Von Groote, T. C., Jayarajah, U., Weerasekara, I., Esfahani, M. A., Civile, V. T., Marusic, A., Jeroncic, A., Carvas Junior, N., Pericic, T. P., Zakarija-Grkovic, I., Meirelles Guimarães, S. M., Luigi Bragazzi, N., Bjorklund, M., Sofi-Mahmudi, A., Altujjar, M., Tian, M., Arcani, D. M. C., O’Mathúna, D. P. and Marcolino, M. S. 2020. Novel Coronavirus Infection (COVID-19) in Humans: A Scoping Review and Meta-Analysis. *Journal of Clinical Medicine*, 9(4): 941. Available: 10.3390/jcm9040941 (Accessed 06/05/2021)

Brehon, K., Miciak, M., Hung, P., Chen, S.-P., Perreault, K., Hudon, A., Wieler, M., Hunter, S., Hoddinott, L., Hall, M., Churchill, K., Brown, D. A., Brown, C. A., Bostick, G., Skolnik, K., Lam, G., Weatherald, J. and Gross, D. P. 2023. “None of us are lying”: an interpretive description of the search for legitimacy and the journey to access quality health services by individuals living with Long COVID. *BMC Health Services Research*, 23(1). Available: 10.1186/s12913-023-10288-y (Accessed 03/05/2024)

Buys, E., Nadasan, T., Pefile, N., Ogunlana, M. O. and Naidoo, D. 2022. Clinical and socio-demographic determinants of community reintegration in people with spinal cord injury in eThekwini Municipality, KwaZulu-Natal province. *South African Journal of Physiotherapy*, 78(1): 1631. Available: 10.4102/sajp.v78i1.1631 (Accessed 14/08/2023)

Cabral, B. M. I., Edding, S. N., Portocarrero, J. P. and Lerma, E. V. 2020. Rhabdomyolysis. *Disease-a-Month*, 66(8): 101015.

Available: https://doi.org/10.1016/j.disamonth.2020.101015 (Accessed 31/10/2023)

Caneiro, J. P., Bunzli, S. and O'Sullivan, P. 2021. Beliefs about the body and pain: the critical role in musculoskeletal pain management. *Brazilian Journal of Physical Therapy*, 25(1): 17–29. Available: 10.1016/j.bjpt.2020.06.003 (Accessed 08/03/2024)

Cascella, M., Rajnik, M., Aleem, A., Dulebohn, S. C. and Di Napoli, R. 2020. Features, evaluation, and treatment of coronavirus (COVID-19). *NIH:StatPearls*

Available : https://www.ncbi.nlm.nih.gov/books/NBK554776/. (Accessed 28/07/2024)

Crawford, L. M., Burkholder, G. J., Cox, K. A. and Hitchcock, J. H. 2019. *Research Design and Methods* SAGE Publications. Available: https://uk.sagepub.com/sites/default/files/upm-assets/105274_book_item_105274.pdf (Accessed 28/09/2023)

Creswell, J. W., Hanson, W. E., Clark Plano, V. L. and Morales, A. 2007. Qualitative research designs: Selection and implementation. *The counseling psychologist*, 35(2): 236–264. Available: https://doi.org/10.1177/0011000006287390 (Accessed 21/05/2021)

Davis, H. E., McCorkell, L., Vogel, J. M. and Topol, E. J. 2023. Long COVID: major findings, mechanisms and recommendations. *Nature Reviews Microbiology*, 21(3): 133–146. Available: https://doi.org/10.1038/s41579-022-00846-2 (Accessed 19/05/2024)

De Oliveira Soares Junior, A., Dos Santos Afonso, M., Vieira, Y. P., Rocha, J. Q. S., Dumith, S., Neves, R. G., Da Silva, C. N., Duro, S. M. S. and De Oliveira Saes, M. 2023. Musculoskeletal pain during and after SARS-CoV-2 infection and healthcare utilization: a cross-sectional study. *BMC Musculoskeletal Disorders*, 24(1). Available: 10.1186/s12891-023-06794-z (Accessed 21/04/2024)

Disser, N. P., De Micheli, A. J., Schonk, M. M., Konnaris, M. A., Piacentini, A. N., Edon, D. L., Toresdahl, B. G., Rodeo, S. A., Casey, E. K. and Mendias, C. L. 2020. Musculoskeletal Consequences of COVID-19. *JBJS*, 102(14): 1197–1204.

Available: 10.2106/JBJS.20.00847 (Accessed 23/04/2024)

Dryden, M., Mudara, C., Vika, C., Blumberg, L., Mayet, N., Cohen, C., Tempia, S., Parker, A., Nel, J., Perumal, R., Groome, M. J., Conradie, F., Ndjeka, N., Sigfrid, L., Merson, L. and Jassat, W. 2022. Post-COVID-19 condition 3 months after hospitalization with SARS-CoV-2 in South Africa: a prospective cohort study. *The Lancet Global Health*, 10(9): e1247–e1256. Available: 10.1016/S2214-109X(22)00286-8 (Accessed 30/08/2022)

Dydyk, A. M., & Conermann, T. 2024. Chronic Pain. In StatPearls. StatPearls Publishing, 1-25. Available: https://pubmed.ncbi.nlm.nih.gov/31971706/ (Accessed 27/07/2024)

Eide, P. and Kahn, D. 2008. Ethical issues in the qualitative researcher—participant relationship. *Nursing ethics*, 15(2): 199–207. Available: 10.1177/0969733007086018 (Accessed 26/05/2021)

El-Tallawy, S.N., Nalamasu, R., Pergolizzi, J.V. and Gharibo, C., 2020. Pain management during the COVID-19 pandemic. Pain and Therapy, 9(2), pp.453-466. (Accessed 27/07/2024)

El-Tallawy, S.N., Perglozzi, J.V., Ahmed, R.S., Kaki, A.M., Nagiub, M.S., LeQuang, J.K. and Hadarah, M.M., 2023. Pain management in the post-COVID era—an update: a narrative review. Pain and Therapy, 12(2), pp.423-448. (Accessed 27/07/2024)

El-Tallawy, S. N., Nalamasu, R., Salem, G. I., Lequang, J. A. K., Pergolizzi, J. V. and Christo, P. J. 2021. Management of Musculoskeletal Pain: An Update with Emphasis on Chronic Musculoskeletal Pain. *Pain and Therapy*, 10(1): 181–209. Available: 10.1007/s40122-021-00235-2 (Accessed 31/07/2023)

Erden, E., Turk, A. C., Erden, E. and Dag, Z. 2023. Musculoskeletal system symptoms in patients with COVID-19 and the impact of these symptoms on quality of life. *Journal of Back and Musculoskeletal Rehabilitation*, Article ID(Preprint): 1–14.

Available: 10.3233/BMR-220297 (Accessed 03/05/2024)

Fernández-de-Las-Peñas, C., de-la-Llave-Rincón, A. I., Ortega-Santiago, R., Ambite-Quesada, S., Gómez-Mayordomo, V., Cuadrado, M. L., Arias-Navalón, J. A., Hernández-Barrera, V., Martín-Guerrero, J. D. and Pellicer-Valero, O. J. 2022a. Prevalence and risk factors of musculoskeletal pain symptoms as long-term post-COVID sequelae in hospitalized COVID-19 survivors: a multicenter study. *Pain*, 163(9): e989–e996.

Available: 10.1097/j.pain.0000000000002564 (Accessed 19/05/2024)

Fernández-De-Las-Peñas, C., Martín-Guerrero, J. D., Pellicer-Valero, Ó. J., Navarro-Pardo, E., Gómez-Mayordomo, V., Cuadrado, M. L., Arias-Navalón, J. A., Cigarán-Méndez, M., Hernández-Barrera, V. and Arendt-Nielsen, L. 2022b. Female Sex Is a Risk Factor Associated with Long-Term Post-COVID Related-Symptoms but Not with COVID-19 Symptoms: The LONG-COVID-EXP-CM Multicenter Study. *Journal of Clinical Medicine*, 11(2): 413. Available: 10.3390/jcm11020413 (Accessed 29/06/2022)

Finsterer, J., Scorza, F. A., Scorza, C. A. and Fiorini, A. C. 2021. Peripheral neuropathy in COVID-19 is due to immune-mechanisms, pre-existing risk factors, anti-viral drugs, or bedding in the Intensive Care Unit. *Arquivos de Neuro-Psiquiatria*, 79(10): 924–928. (Accessed 31/10/2023)

Firouzabadi, N., Ghasemiyeh, P., Moradishooli, F. and Mohammadi-Samani, S. 2023. Update on the effectiveness of COVID-19 vaccines on different variants of SARS-CoV-2. *International Immunopharmacology*, 117: 109968. Available: 10.1590/0004-282X-ANP-2021-0030 (Accessed 22/04/2024)

Fowler Davis, S., Humphreys, H., Maden-Wilkinson, T., Withers, S., Lowe, A. and Copeland, R. J. 2022. Understanding the Needs and Priorities of People Living with Persistent Pain and Long-Term Musculoskeletal Conditions during the COVID-19 Pandemic—A Public Involvement Project. *Healthcare*, 10(6): 1130. Available: 10.7196/samj.2015.v105i12.10260 (Accessed 02/05/2024)

Gcelu, A. and Kalla, A. A. 2015. Musculoskeletal disorders – disease burden and challenges in the developing world. *South African Medical Journal*, 105(12): 1070. Available: 10.1038/s41598-023-31054-4 (Accessed 06/05/2021 )

Gevers-Montoro, C., Liew, B. X. W., Deldar, Z., Conesa-Buendia, F. M., Ortega-De Mues, A., Falla, D. and Khatibi, A. 2023. A network analysis on biopsychosocial factors and pain-related outcomes assessed during a COVID-19 lockdown. *Scientific Reports*, 13(1). (Accessed 21/02/2024)

Gevers-Montoro, C., Deldar, Z., Conesa-Buendía, F. M., Lazar, E. A., Mahillo-Fernandez, I., Khatibi, A. and Ortega De Mues, A. 2022. Pain catastrophizing mediates rapid benefits of accessing in-person chiropractic care during the COVID-19 lockdown. *European Journal of Pain*, 26(2): 463–479. Available: 10.1002/ejp.1872 (Accessed 03/05/2024)

Govender, T. and Dlungwane, T. P. 2018. Prevalence of, and factors associated with, musculoskeletal pain among oral health workers in public health facilities in Kwazulu-Natal, 2016. *South African Dental Journal*, 73(3): 137–140. Available: 10.1002/ejp.1872 (Accessed 21/04/2024 )

Günaydın, E. B., Öcalan, M. Ç., Uzunkulaoğlu, A. and Ay, S. 2022. Evaluation of the effects of the COVID-19 pandemic on pain, stress, sleep and quality of life in patients with chronic musculoskeletal pain. *Gülhane Tip Dergisi*, 64(2): 169.

Available: https://gulhanemedj.org/articles/doi/gulhane.galenos.2021.07379

(Accessed 03/05/2024)

Hartvigsen, J. and French, S. D. 2020. So, what is chiropractic? Summary and reflections on a series of papers in Chiropractic and Manual Therapies. Chiropractic &amp; Manual Therapies, 28 (1). Available: 10.1186/s12998-019-0295-2 (Accessed 03/05/2024)

Hajee, N. 2022. *A Survey on the Prevalence of Musculoskeletal Symptoms Experienced in COVID-19 Positive Patients During and After Their Infectious Stage*. University of Johannesburg (South Africa). Available: 10.1016/j.psychres.2019.112516 (Accessed 21/04/2024)

Hamilton, A. B. and Finley, E. P. 2020. Reprint of: Qualitative methods in implementation research: An introduction. *Psychiatry Research*, 283: 112629. (Accessed 30/05/2021)

Hammarberg, K., Kirkman, M. and de Lacey, S. 2016. Qualitative research methods: when to use them and how to judge them. *Human Reproduction*, 31(3): 498–501.

Available: https://doi.org/10.1093/humrep/dev334 (Accessed 30/05/2021)

Hartvigsen, J., Hancock, M. J., Kongsted, A., Louw, Q., Ferreira, M. L., Genevay, S., Hoy, D., Karppinen, J., Pransky, G., Sieper, J., Smeets, R. J., Underwood, M., Buchbinder, R., Hartvigsen, J., Cherkin, D., Foster, N. E., Maher, C. G., Underwood, M., Van Tulder, M., Anema, J. R., Chou, R., Cohen, S. P., Menezes Costa, L., Croft, P., Ferreira, M., Ferreira, P. H., Fritz, J. M., Genevay, S., Gross, D. P., Hancock, M. J., Hoy, D., Karppinen, J., Koes, B. W., Kongsted, A., Louw, Q., Öberg, B., Peul, W. C., Pransky, G., Schoene, M., Sieper, J., Smeets, R. J., Turner, J. A. and Woolf, A. 2018. What low back pain is and why we need to pay attention. *The Lancet*, 391(10137): 2356–2367. Available: 10.1016/S0140-6736(18)30480-X (Accessed 20/04/2024)

Hasan, L. K., Deadwiler, B., Haratian, A., Bolia, I. K., Weber, A. E. and Petrigliano, F. A. 2021. Effects of COVID-19 on the Musculoskeletal System: Clinician's Guide. *Orthopedic Research and Reviews*, 13: 141–150. Available: 10.2147/ORR.S321884

(Accessed 10/09/2023)

Ikejezie, J., Miglietta, A., Hammermeister Nezu, I., Adele, S., Higdon, M. M., Feikin, D., Lata, H., Mesfin, S., Idoko, F., Shimizu, K., Acma, A., Moro, S., Attar Cohen, H., Sinnathamby, M. A., Otieno, J. R., Temre, Y., Ajong, B. N., Mirembe, B. B., Guinko, T. N., Sodagar, V., Schultz, C., Muianga, J., De Barros, S., Escobar Corado Waeber, A. R., Jin, Y., Rico Chinchilla, A., Izawa, Y., Khare, S., Poole, M., Alexander, N., Ciobanu, S., Dorji, T., Hassan, M., Kato, M., Matsui, T., Ogundiran, O., Pebody, R. G., Phengxay, M., Riviere-Cinnamond, A., Greene-Cramer, B. J., Peron, E., Archer, B. N., Subissi, L., Kassamali, Z. A., Awofisayo-Okuyelu, A., Le Polain De Waroux, O., Hamblion, E., Pavlin, B. I., Morgan, O., Fall, I. S., Van Kerkhove, M. D. and Mahamud, A. 2024. Informing the pandemic response: the role of the WHO's COVID-19 Weekly Epidemiological Update. *BMJ Global Health*, 9(4): e014466. Available: https://doi.org/10.1136/bmjgh-2023-014466 (Accessed 23/04/2024)

Johnson, C. D., Little, C. S., Sterling, T. A., Gojkovich, S., Boghosian, K. and Ciolfi, M. A. 2020. Response of Chiropractic Organizations to the COVID-19 Pandemic: A Descriptive Report. *Journal of Manipulative and Physiological Therapeutics*, 43(5): 405.e401–405.e407. Available: 10.1016/j.jmpt.2020.04.001 (Accessed 17/11/2022)

Johnson, J. L., Adkins, D. and Chauvin, S. 2020. A Review of the Quality Indicators of Rigor in Qualitative Research. *American Journal of Pharmaceutical Education*, 84(1): 7120. Available: 10.5688/ajpe7120 (Accessed 19/02/2023)

Jones, L. C., Mont, M. A. and Collins, K. A. 2022. Clinical manifestations and diagnosis of osteonecrosis (avascular necrosis of bone). *UpToDate. Seo P (ed): Wolters Kluwer, Philadelphia, PA*, Article ID. (Accessed 23/04/2024)

Kamerman, P. R., Bradshaw, D., Laubscher, R., Pillay-van Wyk, V., Gray, G. E., Mitchell, D. and Chetty, S. 2020. Almost 1 in 5 South African adults have chronic pain: a prevalence study conducted in a large nationally representative sample. *Pain*, 161(7): 1629–1635. Available: 10.1097/j.pain.0000000000001844 (Accessed 18/04/2024)

Karaarslan, F., Güneri, F. D. and Kardeş, S. 2022. Long COVID: rheumatologic/musculoskeletal symptoms in hospitalized COVID-19 survivors at 3 and 6 months. *Clinical Rheumatology*, 41(1): 289–296. Available: 10.1007/s10067-021-05942-x (Accessed 19/05/2024)

Kardeş, S., Erdem, A. and Gürdal, H. 2021. Public interest in musculoskeletal symptoms and disorders during the COVID-19 pandemic. *Zeitschrift für Rheumatologie*, Article ID: 1–5. Available: 10.1007/s00393-021-00989-2 (Accessed 06/05/2021)

Kerzhner, O., Berla, E., Har-Even, M., Ratmansky, M. and Goor-Aryeh, I. 2023. Consistency of inconsistency in long-COVID-19 pain symptoms persistency: A systematic review and meta-analysis. *Pain Practice*,24(1): 120-159.

Available: https://doi.org/10.1111/papr.13277. (Accessed 30/10/2023)

Khalil, S., Hashaad, N. and Tantawy, R. 2022. Post-COVID-19 Arthritis. *Benha Journal of Applied Sciences*, 7(11): 83–92. (Available: 10.21608/bjas.2022.293393
Accessed 23/04/2024)

Khan, M., Adil, S. F., Alkhathlan, H. Z., Tahir, M. N., Saif, S., Khan, M. and Khan, S. T. 2020. COVID-19: a global challenge with old history, epidemiology and progress so far. *Molecules*, 26(1): 39. Available: 10.3390/molecules26010039 (Accessed 11/02/2024)

Khoja, O., Silva Passadouro, B., Mulvey, M., Delis, I., Astill, S., Tan, A. L. and Sivan, M. 2022. Clinical Characteristics and Mechanisms of Musculoskeletal Pain in Long COVID. *Journal of Pain Research*, 15: 1729–1748. Available: 10.2147/JPR.S365026
(Accessed 07/04/2023)

Larsson, M. E., Nordholm, L. A. and Öhrn, I. 2009. Patients' views on responsibility for the management of musculoskeletal disorders – A qualitative study. *BMC Musculoskeletal Disorders*, 10(1): 103. (Accessed 30/05/2021)

Leventhal, H., Diefenbach, M. and Leventhal, E. A. 1992. Illness cognition: Using common sense to understand treatment adherence and affect cognition interactions. *Cognitive therapy and research*, 16: 143–163. Available: https://doi.org/10.1007/BF01173486
(Accessed 08/03/2024)

Lin-Man, W., Su, X. and Xue-Qiang, W. 2021. Pain Symptoms in Patients with Coronavirus Disease (COVID-19): A Literature Review. *Journal of Pain Research*, 14: 147–159. Available: 10.1186/1471-2474-10-103 (Accessed 16/04/2021)

Lin, I., Wiles, L., Waller, R., Goucke, R., Nagree, Y., Gibberd, M., Straker, L., Maher, C. G. and O'Sullivan, P. P. B. 2020. What does best practice care for musculoskeletal pain look like? Eleven consistent recommendations from high-quality clinical practice guidelines: systematic review. *British Journal of Sports Medicine*, 54(2): 79–86. Available: 10.2147/JPR.S269206 (Accessed 08/102023)

Lippi, G., Sanchis-Gomar, F. and Henry, B. M. 2023. COVID-19 and its long-term sequelae: what do we know in 2023. *Pol Arch Intern M.ed*, 16402. Available: 10.20452/pamw.16402 (Accessed 22/08/2023)

Mabuka, T., Naidoo, N., Ncube, N., Yiga, T., Ross, M., Kurehwa, K., Nare Nyathi, M., Silaji, A., Ndemera, T., Lemeke, T., Taiwo, R., Macharia, W. and Sithole, M. 2023. The Impact of SARS-CoV-2 Lineages (Variants) and COVID-19 Vaccination on the COVID-19 Epidemic in South Africa: Regression Study. *JMIRx Med*, 4: e34598. Available: 10.2196/34598 (Accessed 25/08/2023)

Madhi, S. A. and Nel, J. 2021. Epidemiology of severe COVID-19 from South Africa. *The Lancet HIV*, 8(9): e524–e526. Available: 10.1016/S2352-3018(21)00183-1 (Accessed 30/10/2023)

Main, C. J. and de C Williams, A. C. 2002. Musculoskeletal pain. *BMJ*, 325(7363): 534–537. Available: 10.1136/bmj.325.7363.534 (Accessed 12/10/2023)

Majumdar, P., Mandi, S., Biswas, A., Nayak, P. and Sahu, S. 2022. COVID-19 pandemic-imposed lockdown: impacts on the rural agrarian and the urban corporate workforce of India. *Biological Rhythm Research*, 53(11): 1753–1769. (Accessed 17/04/2024)

Marshall, C. and Rossman, G. B. 2014. *Designing qualitative research*. Sage publications. (Accessed 28/09/2023)

McLean, G., Kamil, J., Lee, B., Moore, P., Schulz, T. F., Muik, A., Sahin, U., Türeci, Ö. and Pather, S. 2022. The impact of evolving SARS-CoV-2 mutations and variants on COVID-19 vaccines. *Mbio*, 13(2): e02979–02921. (A Available: https://doi.org/10.1080/09291016.2022.2031422 (Accessed 29/09/2022)

McLeod, J. 2017. Qualitative methods for routine outcome measurement. In: *The cycle of excellence: Using deliberate practice to improve supervision and training.* Wiley-Blackwell, 99–122. (Available: https://doi.org/10.1002/9781119165590.ch5 (Accessed 21/05/2021)

Mehta, O. P., Bhandari, P., Raut, A., Kacimi, S. E. O. and Huy, N. T. 2021. Coronavirus Disease (COVID-19): Comprehensive Review of Clinical Presentation. *Frontiers in Public Health*, 8. Available: 10.3389/fpubh.2020.582932 (Accessed 16/04/2021 )

Meyer-Frießem, C. H., Gierthmühlen, J., Baron, R., Sommer, C., Üçeyler, N. and Enax-Krumova, E. K. 2021. Pain during and after COVID-19 in Germany and worldwide: a narrative review of current knowledge. *Pain reports*, 6(1): e893. Available: 10.1097/PR9.0000000000000893 (Accessed 01/05/2024 )

Mills, G., Briggs-Price, S., Houchen-Wolloff, L., Daynes, E. and Singh, S. 2022. The prevalence and location of musculoskeletal pain following COVID-19. *Musculoskeletal Care*, Article ID. (Accessed 03/05/2024)

Moore, C., Wong, A. Y. L., De Luca, K., De Carvalho, D., Johansson, M. S., Pohlman, K. A., Miller, A., Funabashi, M., Dougherty, P., French, S., Adams, J. and Kawchuk, G. 2022. The impact and public health response of chiropractors to the COVID-19 pandemic: a survey across four continents. *Chiropractic &amp; Manual Therapies*, 30(1). Available: 10.1186/s12998-022-00432-6 (Accessed 31/10/2023)

Morrison, W. B. and Sanders, T. G. 2008. *Problem solving in musculoskeletal imaging e-book*. Elsevier Health Sciences. (Accessed 31/10/2023)

Naderifar, M., Goli, H. and Ghaljaie, F. 2017. Snowball Sampling: A Purposeful Method of Sampling in Qualitative Research. *Strides in development of medical education*, 14(3). Available: 10.5812/sdme.67670 (Accessed 31/05/2021)

National Institute Of Communicable Diseases. 2023. *Weekly Epidemiological Debrief* 25/03/2023 ed. Online: National Health Labratory Service. Available:

https://www.nicd.ac.za/diseases-a-z-index/disease-index-COVID-19/surveillance-reports/weekly-epidemiological-brief/ (Accessed 23/04/2024)

Ng, Y.M., Voo, P. & Maakip, I. Psychosocial factors, depression, and musculoskeletal disorders among teachers. BMC Public Health 19, 234 (2019). https://doi.org/10.1186/s12889-019-6553-3 (Accessed 27/07/2024)

Ngqakamba, S. 2020. 'Crystal clear that eThekwini district has become epicentre of COVID-19 in KZN' - Premier Zikalala. *news24*, 19/04/2020 Available: https://www.news24.com/news24/southafrica/news/crystal-clear-that-ethekwini-district-has-become-epicentre-of-COVID-19-in-kzn-premier-zikalala-20200419 (Accessed 19/02/2023).

Nuernberg Back, C. G., Liebano, R. E. and Avila, M. A. 2021. Perspectives of implementing the biopsychosocial model to treat chronic musculoskeletal pain in primary health care. *Pain Management*, 11(2): 217–225. Available: 10.2217/pmt-2020-0024 (Accessed 09/03/2024)

O’Donoghue, K. 2023. Learning Analytics within Higher Education: Autonomy, Beneficence and Non-maleficence. *Journal of Academic Ethics*, 21(1): 125–137. Available: 10.1007/s10805-021-09444-y (Accessed 24/04/2024)

Omar, I. and Garg, A., 2021. Magnetic resonance neurography findings in three critically ill COVID-19 patients with new onset of extremity peripheral neuropathy. Polish Journal of Radiology, 86(1), pp.394-400. (Accessed 27/07/2024)

Omar, I. M., Weaver, J. S., Samet, J. D., Serhal, A. M., Mar, W. A. and Taljanovic, M. S. 2022. Musculoskeletal Manifestations of COVID-19: Currently Described Clinical Symptoms and Multimodality Imaging Findings. *Radiographics*, 42(5): 1415–1432. Available: 10.1148/rg.220036 (Accessed 28/09/2022)

Parsirad, M., Oomen-Lochtefeld, S., Suerig, B. and Wang, C. 2023. Has the COVID 19 Pandemic Impacted the Management of Chronic Musculoskeletal Pain? *Current*

*Rheumatology Reports*, 25(7): 128–143. . Available: 10.1007/s11926-023-01103-y (Accessed 23/08/2023)

Perumal, R., Shunmugam, L. and Naidoo, K. 2023. Long COVID: An approach to clinical assessment and management in primary care. South African Family Practice, 65(1), 1-10. https://dx.doi.org/10.4102/safp.v65i1.5751 (Accessed 27/07/2024)

Polykretis, P., Donzelli, A., Lindsay, J.C., Wiseman, D., Kyriakopoulos, A.M., Mörz, M., Bellavite, P., Fukushima, M., Seneff, S. and McCullough, P.A., 2023. Autoimmune inflammatory reactions triggered by the COVID-19 genetic vaccines in terminally differentiated tissues. Autoimmunity, 56(1), p.2259123. (Accessed 27/07/2024)

Pomarensky, M., Macedo, L. and Carlesso, L. C. 2022. Management of Chronic Musculoskeletal Pain Through a Biopsychosocial Lens. *Journal of Athletic Training*, 57(4): 312–318. Available: 10.4085/1062-6050-0521.20 (Accessed 09/03/2024)

Proal, A.D. and VanElzakker, M.B., 2021. Long COVID or post-acute sequelae of COVID-19 (PASC): an overview of biological factors that may contribute to persistent symptoms. Frontiers in microbiology, 12, p.698169. (Accessed 27/07/2024)

Quah, L. J. J., Tan, B. K. K., Fua, T.-P., Wee, C. P. J., Lim, C. S., Nadarajan, G., Zakaria, N. D., Chan, S.-E. J., Wan, P. W. and Teo, L. T. 2020. Reorganising the emergency department to manage the COVID-19 outbreak. *International journal of emergency medicine*, 13: 1–11. Available: 10.1186/s12245-020-00294-w (Accessed 28/09/2022)

Rassel, G., Leland, S., Mohr, Z. and O'Sullivan, E. 2020. *Research methods for public administrators*. ondon: Routledge. (Accessed 18/05/2024)

Ravitch, S. M. and Riggan, M. 2016. *Reason & rigor: How conceptual frameworks guide research*. Sage Publications. Available: https://doi.org/10.1080/07380577.2017.1360538 (Accessed28/09/2023)

Santiago, J., Papuga, M., Santiago, J., Post, A. and DiMond, M. 2022. THE UTILIZATION AND EFFECTS OF CHIROPRACTIC CARE DURING THE COVID-19 PANDEMIC: A SURVEY OF NORTHEAST CHIROPRACTORS. *Journal of Contemporary Chiropractic*, 5(1): 251–258. Available: https://journal.parker.edu/article/78052-the-utilization-and-effects-of-chiropractic-care-during-the-covid-19-pandemic-a-survey-of-northeast-chiropractors (Accessed 03/05/2024)

Schett, G., Manger, B., Simon, D. and Caporali, R. 2020. COVID-19 revisiting inflammatory pathways of arthritis. *Nature Reviews Rheumatology*, 16(8): 465–470. Available: 10.1038/s41584-020-0451-z (Accessed 06/05/2021)

Shen, Q., Li, J., Zhang, Z., Guo, S., Wang, Q., An, X. and Chang, H., 2022. COVID-19: systemic pathology and its implications for therapy. International Journal of Biological Sciences, 18(1), p.386. (Accessed 27/07/2024)

Slater, H. and Briggs, A. M. 2017. Models of Care for musculoskeletal pain conditions: driving change to improve outcomes. *Pain Management*, 7(5): 351–357. Available: 10.2217/pmt-2017-0025 (Accessed 26/02/2024)

Stinson, J., Connelly, M., Kamper, S. J., Herlin, T. and April, K. T. 2016. Models of care for addressing chronic musculoskeletal pain and health in children and adolescents. *Best practice & research Clinical rheumatology*, 30(3): 468–482. Available: 10.1016/j.berh.2016.08.005 (Accessed 09/03/2024)

Stratton, S. J. 2019. Data Sampling Strategies for Disaster and Emergency Health Research. *Prehospital and Disaster Medicine*, 34(03): 227–229. Available: 10.1017/S1049023X19004412 (Accessed 29/08/2022)

Svebak, S., Hagen, K. and Zwart, J.-A. 2006. One-Year prevalence of chronic musculoskeletal pain in a large adult Norwegian County population: relations with age and Gender–The HUNT study. *Journal of Musculoskeletal Pain*, 14(1): 21–28. Available: 10.1300/J094v14n01_04 (Accessed 20/04/2024)

Tartof, S. Y., Xie, F., Yadav, R., Wernli, K. J., Martin, E. T., Belongia, E. A., Gaglani, M., Zimmerman, R. K., Talbot, H. K. and Thornburg, N. 2023. Prior SARS-CoV-2 infection and COVID-19 vaccine effectiveness against outpatient illness during widespread circulation of SARS-CoV-2 Omicron variant, US Flu VE network. *Influenza and Other Respiratory Viruses*, 17(5): e13143. Available: https://doi.org/10.1111/irv.13143 (Accessed 22/04/2024)

Teherani, A., Martimianakis, T., Stenfors-Hayes, T., Wadhwa, A. and Varpio, L. 2015. Choosing a qualitative research approach. *Journal of graduate medical education*, 7(4): 669–670. Available: https://doi.org/10.4300/JGME-D-15-00414.1 (Accessed 11/09/2023)

Teoli, D. and Bhardwaj, A. 2019. Hospice appropriate diagnoses. *NIH: StatPearls*. Available: https://www.ncbi.nlm.nih.gov/books/NBK536962/ (Accessed 28/07/2024)

Thomas, M. J. K. 2011. Qualitative Rigor or Research Validity in Qualitative Research. *Journal*, 16: 151–155. Available: https://doi.org/10.1111/j.1744-6155.2011.00283.x (Accessed 21/11/2021)

Tracy, S. J. 2019. *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact*. Hoboken, NJ: John Wiley & Sons. (Accessed 18/05/2018)

Turolla, A., Rossettini, G., Viceconti, A., Palese, A. and Geri, T. 2020. Musculoskeletal Physical Therapy During the COVID-19 Pandemic: Is Telerehabilitation the Answer? *Physical Therapy*, 100(8): 1260–1264. Available: 10.1093/ptj/pzaa093

(Accessed 06/05/2021)

Tüzün E. H. 2007. Quality of life in chronic musculoskeletal pain. Best practice & research. Clinical rheumatology, 21(3), 567–579. https://doi.org/10.1016/j.berh.2007.03.001. (Accessed: 27/07/2024)

United Nations. 2023. *WHO chief declares end to COVID-19 as a global health emergency* 03/05/2023 ed. Online: United Nations News. Available: https://news.un.org/en/story/2023/05/1136367 (Accessed 11/09/2023)

United Nations South Africa. 2022. *The Sustainable Development Goals in South Africa*. Available: https://southafrica.un.org/en/sdgs/3 (Accessed 19/02/2023)

Varkey, B. 2021. Principles of Clinical Ethics and Their Application to Practice. *Medical Principles and Practice*, 30(1): 17–28. Available: https://doi.org/10.1159/000509119 (Accessed 24/04/2024)

Venkatesan, P. 2021. NICE guideline on long COVID. *The Lancet Respiratory Medicine*, 9(2): 129. Available: 10.1016/S2213-2600(21)00031-X (Accessed 23/04/2024)

Violante, F. S., Mattioli, S. and Bonfiglioli, R. 2015. Chapter 21 - Low-back pain. In: Lotti, M. and Bleecker, M. L. eds. *Handbook of Clinical Neurology*. Elsevier, 397–410. Available: https://www.sciencedirect.com/science/article/pii/B9780444626271000202 (Accessed 17/04/2024)

Wagner, E. H. 1998. Chronic disease management: what will it take to improve care for chronic illness? *Effective clinical practice*, 1(1). Available: https://pubmed.ncbi.nlm.nih.gov/10345255/ (Accessed 08/03/2024)

Wang, C.-C., Chao, J.-K., Chang, Y.-H., Chou, C.-L. and Kao, C.-L. 2020. Care for patients with musculoskeletal pain during the COVID-19 pandemic: Physical therapy and rehabilitation suggestions for pain management. *Journal of the Chinese Medical Association*, 83(9): 822–824. Available: 10.1097/JCMA.0000000000000376 (Accessed 12/10/2023)

Wang, C., Pu, R., Ghose, B. and Tang, S. 2018. Chronic Musculoskeletal Pain, Self-Reported Health and Quality of Life among Older Populations in South Africa and Uganda. *International Journal of Environmental Research and Public Health*, 15(12): 2806. Available: https://doi.org/10.3390/ijerph15122806 (Accessed 12/10/2023)

Wang, L., Yang, N., Yang, J., Zhao, S. and Su, C. 2022. A review: the manifestations, mechanisms, and treatments of musculoskeletal pain in patients with COVID-19. *Frontiers in Pain Research*, 3: 18. Available: 10.3389/fpain.2022.826160 (Accessed 12/10/2023)

Wenham, C., Smith, J. and Morgan, R. 2020. COVID-19: the gendered impacts of the outbreak. *The Lancet*, 395(10227): 846–848. Available: 10.1016/S0140-6736(20)30526-2 (Accessed 29/09/2022)

Widanarko, B., Legg, S., Stevenson, M., Devereux, J., Eng, A., Cheng, S., Douwes, J., Ellison-Loschmann, L., McLean, D. and Pearce, N. 2011. Prevalence of musculoskeletal symptoms in relation to gender, age, and occupational/industrial group. *International Journal of Industrial Ergonomics*, 41(5): 561–572. Available: https://doi.org/10.1016/j.ergon.2011.06.002 (Accessed 20/04/2024)

Widyadharma, I. P. E., Sari Ni Nyoman Shinta, P., Pradnyaswari Kadek, E., Yuwana Kadek, T., Adikarya, I. P. G. D., Tertia, C., Wijayanti, I. A. S., Indrayani, I. A. S. and Utami Desak Ketut, I. 2020. Pain as clinical manifestations of COVID-19 infection and its management in the pandemic era: a literature review. *The Egyptian Journal of Neurology, Psychiatry, and Neurosurgery*, 56(1). Available: 10.1186/s41983-020-00258-0 (Accessed 16/04/2021)

World Health Organization. 2021. *Weekly epidemiological update on COVID-19 - 4 May 2021*: World Health Organization. Available: https://www.who.int/publications/m/item/weekly-epidemiological-update-on-COVID-19---4-may-2021 (Accessed 06/05/2021).

World Health Organization. 2024. *COVID-19 epidemiological update – 19 January 2024* 19/01/2024 ed. Online: World Health Organization. Available: https://www.who.int/publications/m/item/COVID-19-epidemiological-update---19-january-2024 (Accessed 23/04/2024)

Wurz, A., Culos-Reed, S. N., Franklin, K., Demars, J., Wrightson, J. G. and Twomey, R. 2022. "I feel like my body is broken": exploring the experiences of people living with long COVID. *Quality of Life Research*, 31(12): 3339–3354. Available: 10.1007/s11136-022-03176-1 (Accessed 03/05/2024)

Zhou, J., Qin, Q., Chen, S. and Zhang, H. 2024. Moral Dilemmas Regarding Physical Restraints in Intensive Care Units: Understanding Autonomy, Beneficence, Non-Maleficence and Justice in the Use of Physical Restraints. *Journal of Multidisciplinary Healthcare*, Volume 17: 1619–1627. Available: 10.2147/JMDH.S455910 (Accessed 24/04/2024)

Ziadni, M. S., You, D. S., Cramer, E. M., Anderson, S. R., Hettie, G., Darnall, B. D. and Mackey, S. C. 2022. The impact of COVID-19 on patients with chronic pain seeking care at a tertiary pain clinic. *Scientific Reports*, 12(1). Available: 10.1038/s41598-022-10431-5 (Accessed 03/05/2024)

Ziauddeen, N., Gurdasani, D., O’Hara, M. E., Hastie, C., Roderick, P., Yao, G. and Alwan, N. A. 2022. Characteristics and impact of Long COVID: Findings from an online survey. *PLOS ONE*, 17(3): e0264331. Available: 10.1371/journal.pone.0264331 (Accessed 29/09/2022)

# APPENDICES

## Appendix 1: Letter of Permission for Gatekeeper Permission

[19/05/2023]

**Request for Permission to Conduct Research**

Dear Ms Lebo Ramakatsa

My name is Karisa Pillay, a chiropractic student at the Durban University of Technology. The research I wish to conduct for my Masters dissertation involves the experiences of musculoskeletal pain as a manifestation of Long COVID in women

I am hereby seeking your consent to conduct my research, where I will be conducting in-person interviews at the Durban University of Technology Chiropractic Boardroom.

I have provided you with a copy of my proposal which includes copies of the data collection tools and consent and/ or assent forms to be used in the research process, as well as a copy of the approval letter which I received from the Institutional Research Ethics Committee (IREC).

If you require any further information, please do not hesitate to contact my supervisor, Dr A. Abdul-Rasheed, Email: ashuraar@gmail.com. Thank you for your time and consideration in this matter.

Yours sincerely,

Karisa Pillay

Durban University of Technology

Cell number: 0614049865

Email address: pillaykarisa98@gmail.com

## Appendix 2: Letter of Informed Consent

**Full Title of the Study:** An exploration into the self-reported experiences of musculoskeletal pain in women diagnosed with long COVID within the eThekwini Municipality

**Names of Researcher/s:** Karisa Pillay

**Statement of Agreement to Participate in the Research Study:**

- I hereby confirm that I have been informed by the researcher, Miss Karisa Pillay, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: IREC 122/23_______,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

**Full Name of Participant** **Date** **Time** **Signature/RightThumbprint**

I, Karisa Pillay herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Karisa Pillay

**Full Name of Researcher** **Date** **Signature**

**Full Name of Witness** **Date** **Signature**
**(If applicable)**

**Full Name of Legal Guardian** **Date** **Signature**
**(If applicable)**

## Appendix 3: Letter of Information

**Title of the Research Study:** Experiences of musculoskeletal pain as a manifestation of long COVID in women

**Principal Investigator/s/researcher:** Miss Karisa Pillay (BHSc: Chiropractic)

**Co-Investigator/s/supervisor/s:** Supervisor: Dr Ashura Abdul-Rasheed (M.Tech: Chiropractic, PhD: Health Sciences)

**Brief Introduction and Purpose of the Study:**

Good day, thank you for agreeing to participate in this study. This document serves to inform you with a brief insight into description of my study. I am a 5th year chiropractic Masters student at the Durban University of Technology. This document serves as an invitation to participate in my study. The experiences of Musculoskeletal pain in women with long COVID, has often been overlooked in many of the current literature published. The common musculoskeletal pain manifestations of long COVID include: headache, muscle and joint pain. These symptoms are often debilitating and can lead to a poor quality of life.

**Outline of the Procedures**: The aim of this study is to explore the lived experience of musculoskeletal pain as a clinical manifestation of long COVID-19 in women. You will kindly be invited to participate in an interview that will take approximately 30-45 minute. The interview will take place in-person at the DUT Chiropractic Boardroom at a time that is convenient for you that is within the applicable working hours. Consent will be required before the voice recording of the interview. Approximately 12 interviewees will be required.

**Risks or Discomforts to the Participant:** There are no foreseeable risks or discomfort to participant in this study.

**Explain to the participant the reasons he/she may be withdraw from the Study:** participation in the study in purely voluntary and withdrawal from the study is applicable if you wish to.

**Benefits:** This information can provide key insight into the detrimental effects it can have one's life, as well as provide practitioners, especially chiropractors with key information in terms of the severity and extent of musculoskeletal pain and the best management approach.

**Remuneration:** There will be no remuneration for participation in this study.

**Costs of the Study**: No costs will be incurred in this study.

**Confidentiality:** All responses will remain confidential and will not be associated to the participants.

**Results:** The outcome of this study will be released in the form of a dissertation and published at the DUT library.

**Research-related Injury:** There is no anticipated risk of injury.

**Storage of all electronic and hard copies including tape recordings:** All responses will be recorded on a taping device. The researcher will only have access to these recordings. It will then be stored on a password protected flash drive, which will be safely stored in the Chiropractic Department of DUT for 5 years and will thereafter be destroyed.

**Persons to contact in the Event of Any Problems or Queries:** Please contact Ms Karisa Pillay on (0614049865), my supervisor- Dr A Abdul-Rasheed (email: ashuraar@gmail.com) or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr L Linganiso on 031 373 2577 or researchdirector@dut.ac.za.

## Appendix 4: Letter of Permission to the Head of Department of Chiropractic

[19/05/2023]

**Request for Permission to Conduct Research**

Dear Dr D. Varatharajullu

My name is Karisa Pillay, a chiropractic student at the Durban University of Technology. The research I wish to conduct for my Masters dissertation involves: An exploration into the self-reported experiences of musculoskeletal pain in women diagnosed with long COVID within the eThekwini Municipality

I am hereby seeking your consent to conduct my research, where I will be conducting in-person interviews at the Durban University of Technology Chiropractic Boardroom.

I have provided you with a copy of my proposal which includes copies of the data collection tools and consent and/ or assent forms to be used in the research process, as well as a copy of the approval letter which I received from the Institutional Research Ethics Committee (IREC).

If you require any further information, please do not hesitate to contact my supervisor, Dr A. Abdul-Rasheed, Email: ashuraar@gmail.com. Thank you for your time and consideration in this matter.

Yours sincerely,

Karisa Pillay

Durban University of Technology

Cell number: 0614049865

Email address: pillaykarisa98@gmail.com

## Appendix 5: Interview Guide

| **DEMOGRAPHIC DATA** | **PARTICIPANT NUMBER:** |
|---|---|
| ***Age of participant*** | |
| ***Race of participant*** | |

**Research Question 1:**
**Describe the musculoskeletal symptoms you have experienced whilst infected with COVID**
Probes:
Can you describe the character of pain experienced, elaborate on the location of the pain?
Can you discuss further how long the pain lasted?
Did you have any additional complaints with the pain? If yes, please discuss the site/character/ nature of the complaint?

**Research Question 2:**
**Describe the musculoskeletal symptoms you have experienced after the COVID-19 infection?**
Probes:
Can you describe the character of pain experienced, elaborate on the location of the pain?
Can you discuss further how long the pain lasted?
Did you have any additional complaints with the pain? If yes, please discuss the site/character/ nature of the complaint?

**Research Question 3:**
**Discuss your experience living with musculoskeletal pain since COVID-19 infection?**
Probes: How did having the pain make you feel? Can you elaborate the effects that this pain had on your quality of life?

**Research Question 4:**
**Can you elaborate on how these musculoskeletal symptoms have impacted your day-to-day life?**
Probes: has it made your daily tasks more strenuous? Do you have to take regular breaks? Are you unable to continue doing the daily tasks you used to, before having COVID? Is there any impact to the activities done in your home and work life? Has it affected your level of intimacy?

**Research Question 5:**
**Can you provide some information on how you have dealt with the musculoskeletal pain?**
Probes: Describe the treatments you have used? Discuss any changes you have had to make in your life whether dietary/medically/non-medically/lifestyle?

**Research Question 6:**
**How do you feel about the changes you had to make in your life with these pain symptoms?**
Probes: Has your quality of life changed since having these pain symptoms? Do you feel like there is no solution to your pain? Would you say it has any effects on your mental health?

## Appendix 6: Advertisement

**DUT**

**DURBAN UNIVERSITY OF TECHNOLOGY**
**INYUVESI YASETHEKWINI YEZOBUCHWEPHESHE**

**Have you had COVID-19 and suffer from musculoskeletal pain?**

*Are you female?*

*Have you suffered with headaches, muscle pain, joint pain or generalized body pain for more than 4 weeks since having COVID?*

<u>You may be eligible to participate in an interview regarding your experiences in long COVID with musculoskeletal pain</u>

Research is being conducted at the Durban University of Technology.

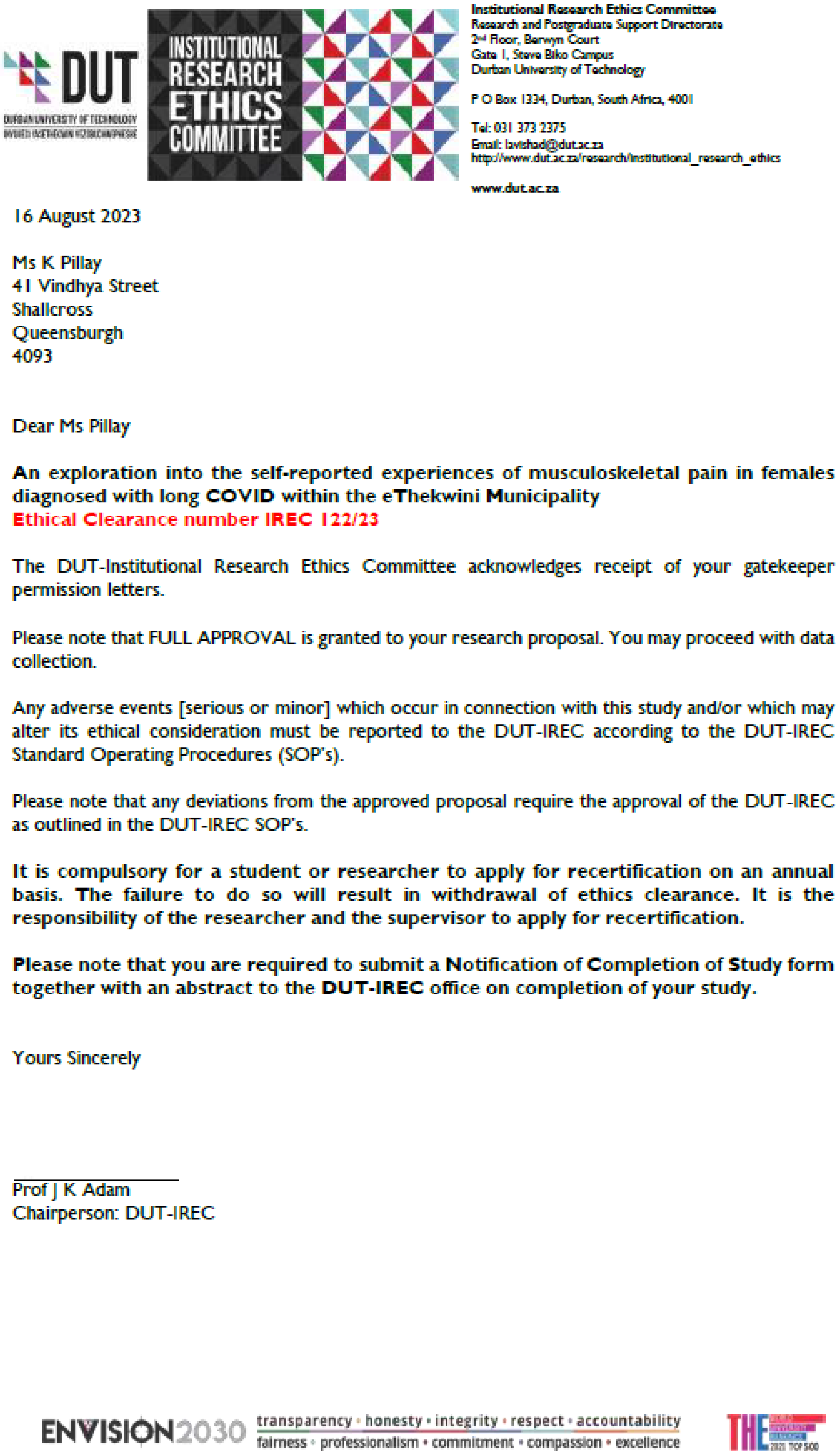
For more information contact:

Ms Karisa Pillay (BHSc: Chiropractic)

Telephone/WhatsApp: 0614049865

Email: pillaykarisa98@gmail.com

## Appendix 7: Full Ethical Approval



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INSTITUTIONAL RESEARCH ETHICS COMMITTEE

**Institutional Research Ethics Committee**
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

16 August 2023

Ms K Pillay
41 Vindhya Street
Shallcross
Queensburgh
4093

Dear Ms Pillay

**An exploration into the self-reported experiences of musculoskeletal pain in females diagnosed with long COVID within the eThekwini Municipality**
**Ethical Clearance number IREC 122/23**

The DUT-Institutional Research Ethics Committee acknowledges receipt of your gatekeeper permission letters.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the DUT-IREC according to the DUT-IREC Standard Operating Procedures (SOP's).

Please note that any deviations from the approved proposal require the approval of the DUT-IREC as outlined in the DUT-IREC SOP's.

**It is compulsory for a student or researcher to apply for recertification on an annual basis. The failure to do so will result in withdrawal of ethics clearance. It is the responsibility of the researcher and the supervisor to apply for recertification.**

**Please note that you are required to submit a Notification of Completion of Study form together with an abstract to the DUT-IREC office on completion of your study.**

Yours Sincerely

Prof J K Adam
Chairperson: DUT-IREC

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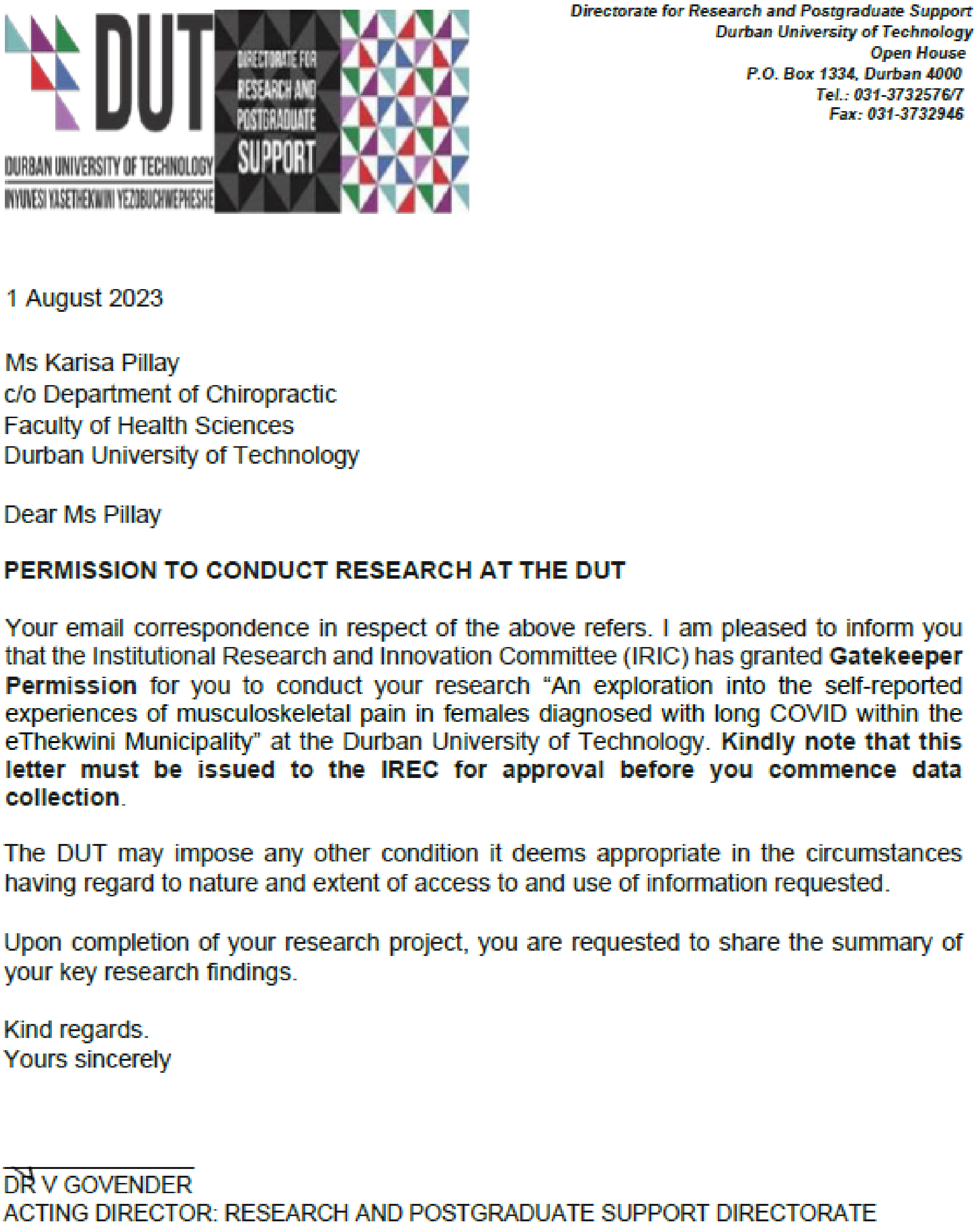
## Appendix 8: Gatekeeper Permission to Conduct Research at DUT



*Directorate for Research and Postgraduate Support*
*Durban University of Technology*
*Open House*
*P.O. Box 1334, Durban 4000*
*Tel.: 031-3732576/7*
*Fax: 031-3732946*

1 August 2023

Ms Karisa Pillay
c/o Department of Chiropractic
Faculty of Health Sciences
Durban University of Technology

Dear Ms Pillay

**PERMISSION TO CONDUCT RESEARCH AT THE DUT**

Your email correspondence in respect of the above refers. I am pleased to inform you that the Institutional Research and Innovation Committee (IRIC) has granted **Gatekeeper Permission** for you to conduct your research “An exploration into the self-reported experiences of musculoskeletal pain in females diagnosed with long COVID within the eThekwini Municipality” at the Durban University of Technology. **Kindly note that this letter must be issued to the IREC for approval before you commence data collection**.

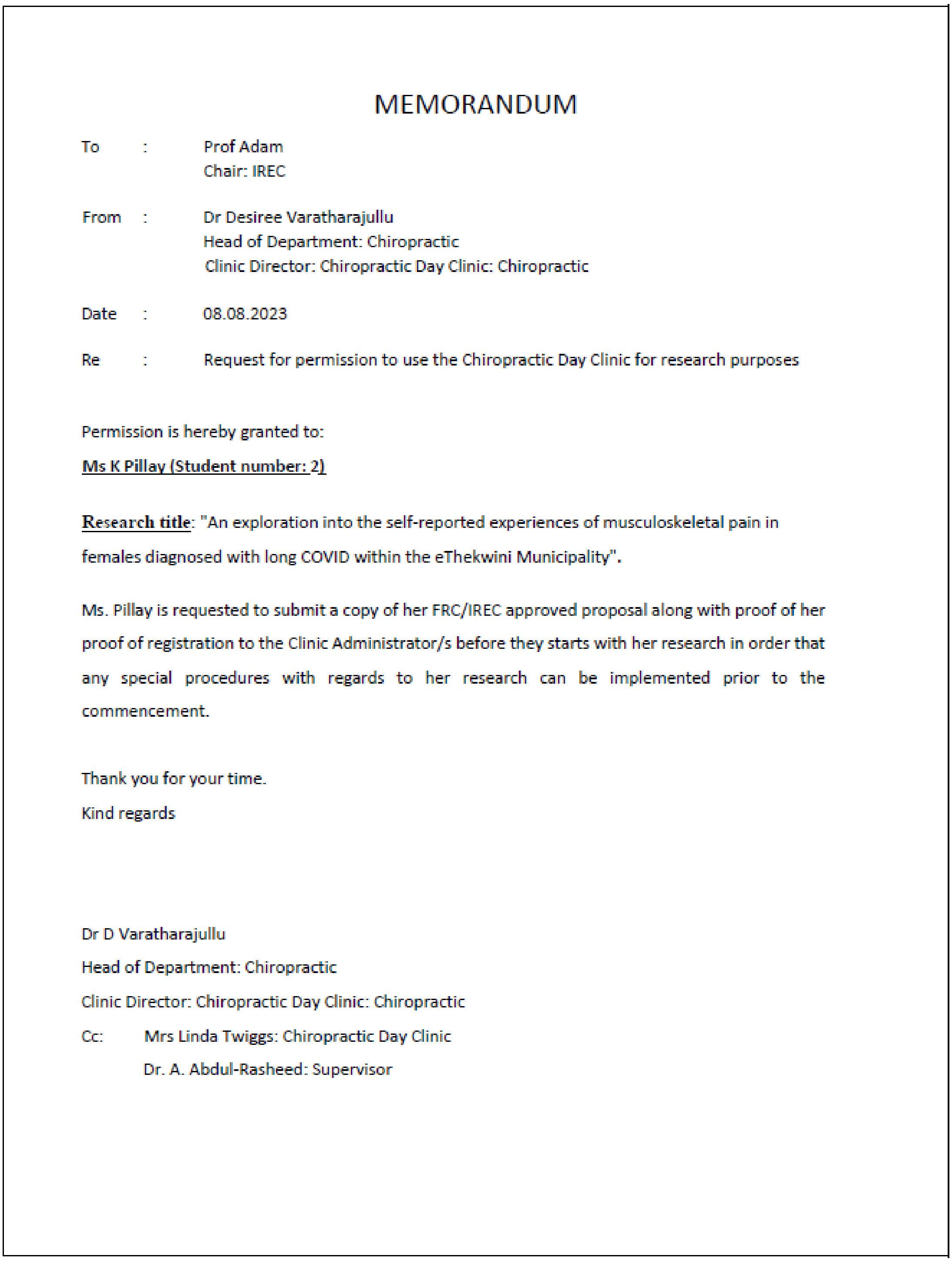
The DUT may impose any other condition it deems appropriate in the circumstances having regard to nature and extent of access to and use of information requested.

Upon completion of your research project, you are requested to share the summary of your key research findings.

Kind regards.
Yours sincerely

DR V GOVENDER
ACTING DIRECTOR: RESEARCH AND POSTGRADUATE SUPPORT DIRECTORATE

# Appendix 9: Gatekeeper Permission to Conduct Research at DUT Chiropractic Day Clinic



MEMORANDUM

To : Prof Adam
Chair: IREC

From : Dr Desiree Varatharajullu
Head of Department: Chiropractic
Clinic Director: Chiropractic Day Clinic: Chiropractic

Date : 08.08.2023

Re : Request for permission to use the Chiropractic Day Clinic for research purposes

Permission is hereby granted to:

**Ms K Pillay (Student number: 2)**

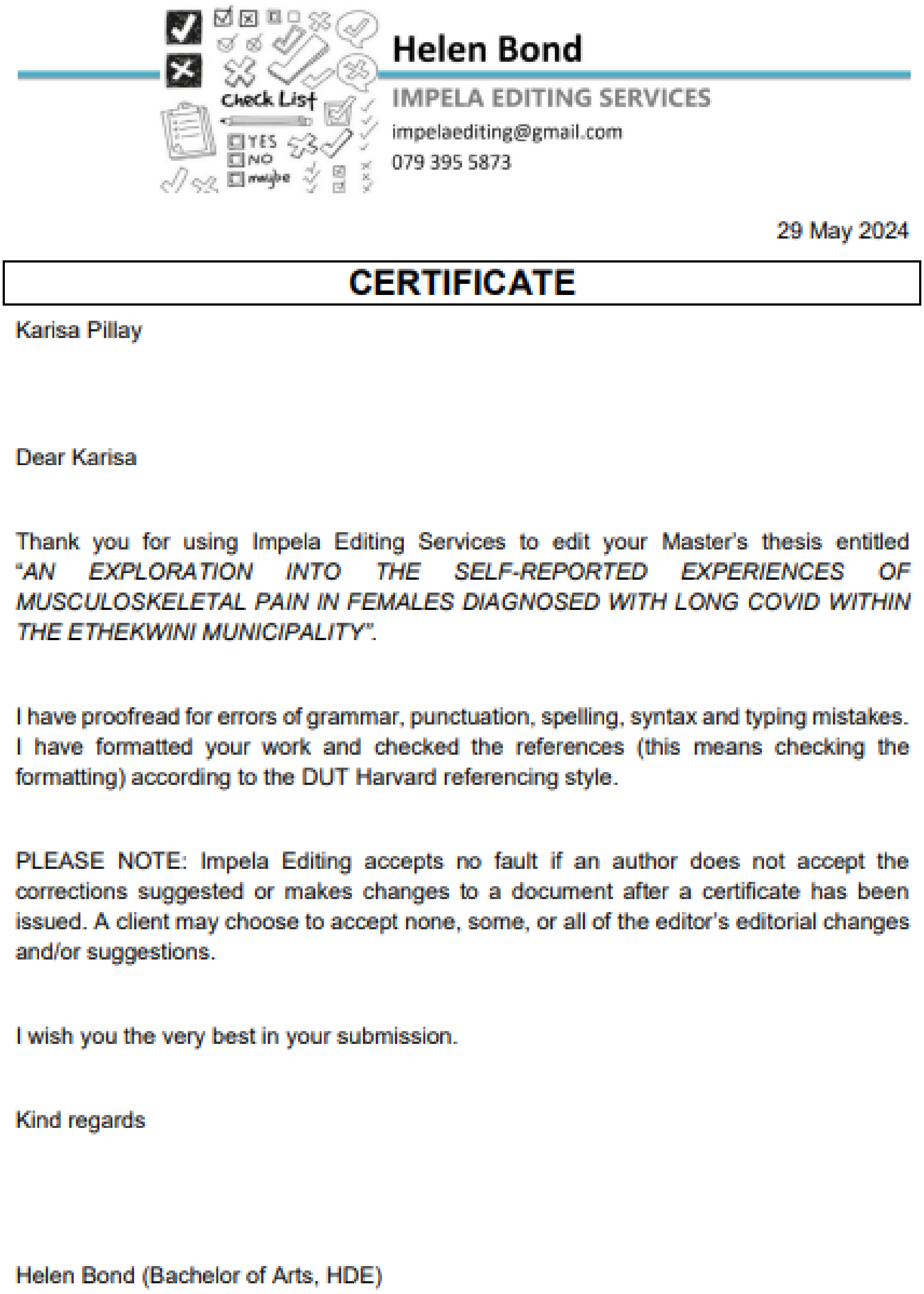
**Research title**: "An exploration into the self-reported experiences of musculoskeletal pain in females diagnosed with long COVID within the eThekwini Municipality".

Ms. Pillay is requested to submit a copy of her FRC/IREC approved proposal along with proof of her proof of registration to the Clinic Administrator/s before they starts with her research in order that any special procedures with regards to her research can be implemented prior to the commencement.

Thank you for your time.
Kind regards

Dr D Varatharajullu
Head of Department: Chiropractic
Clinic Director: Chiropractic Day Clinic: Chiropractic
Cc: Mrs Linda Twiggs: Chiropractic Day Clinic
Dr. A. Abdul-Rasheed: Supervisor

# Appendix 10: Editor’s Certificate



**Helen Bond**
IMPELA EDITING SERVICES
impelaediting@gmail.com
079 395 5873

29 May 2024

## CERTIFICATE

Karisa Pillay

Dear Karisa

Thank you for using Impela Editing Services to edit your Master's thesis entitled “*AN EXPLORATION INTO THE SELF-REPORTED EXPERIENCES OF MUSCULOSKELETAL PAIN IN FEMALES DIAGNOSED WITH LONG COVID WITHIN THE ETHEKWINI MUNICIPALITY*”.

I have proofread for errors of grammar, punctuation, spelling, syntax and typing mistakes. I have formatted your work and checked the references (this means checking the formatting) according to the DUT Harvard referencing style.

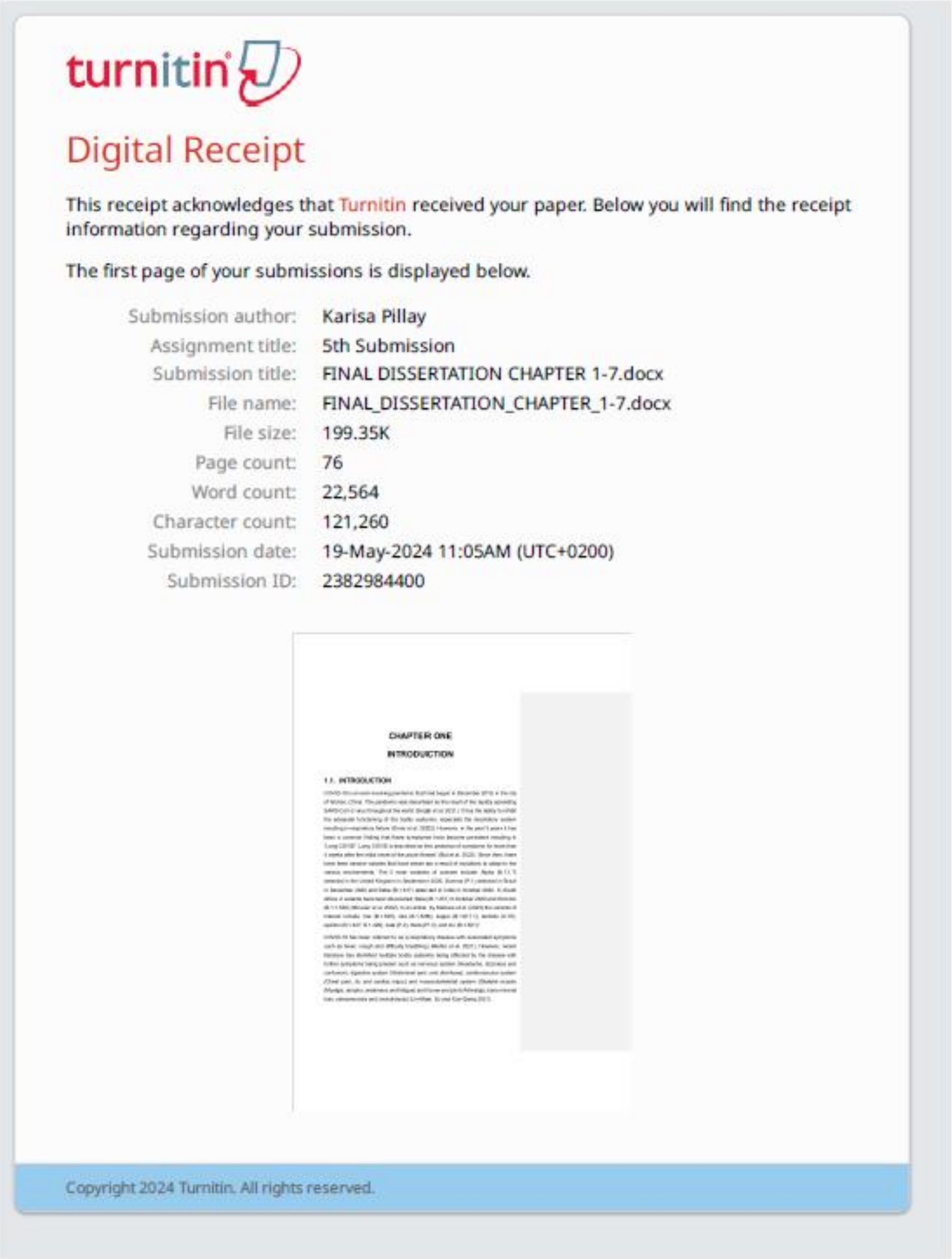
PLEASE NOTE: Impela Editing accepts no fault if an author does not accept the corrections suggested or makes changes to a document after a certificate has been issued. A client may choose to accept none, some, or all of the editor’s editorial changes and/or suggestions.

I wish you the very best in your submission.

Kind regards

Helen Bond (Bachelor of Arts, HDE)

## Appendix 11: Plagiarism Report



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| Page count: | 76 |
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| Character count: | 121,260 |
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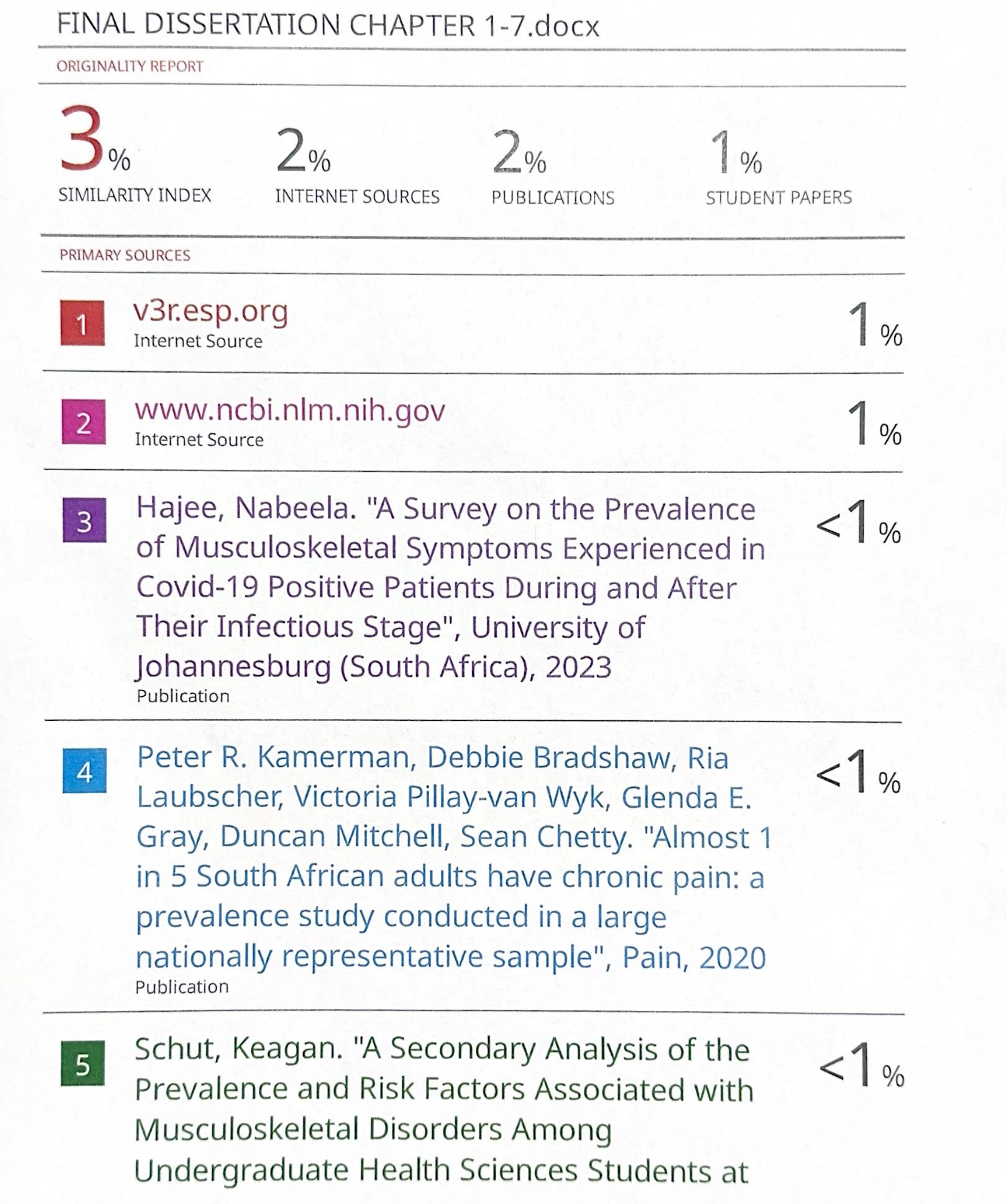
CHAPTER ONE

INTRODUCTION

1.1. INTRODUCTION



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