



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

**South African classical pianists' lived experiences of preventing and recovering from playing- and performance-related injuries**

**Landi Schaap**

A dissertation submitted in partial fulfilment of the requirements for the degree

MMus (Performing Art)

School of the Arts: Music

Faculty of Humanities

University of Pretoria

Supervisor: Dr Dorette Vermeulen

2023

# Plagiarism Form



The School of the Arts places specific emphasis on integrity and ethical behaviour with regard to the preparation of all written work to be submitted for academic evaluation<sup>1</sup>.

You are guilty of plagiarism when you extract information from a book, article or web page without acknowledging the source and pretend that it is your own work. In truth, you are stealing someone else's property. This does not only apply to cases where you quote verbatim, but also when you present someone else's work in a somewhat amended format (paraphrasing), or even when you use someone else's deliberation without the necessary acknowledgement. You are not allowed to use another student's previous work. You are furthermore not allowed to let anyone copy or use your work with the intention of presenting it as his/her own.

Students who are guilty of plagiarism will forfeit all credit for the work concerned. In addition, the matter can also be referred to the Committee for Discipline (Students) for a ruling to be made. Plagiarism is considered a serious violation of the University's regulations and may lead to suspension from the University.

## Declaration

I, Jolandi Schaap \_\_\_\_\_, 17208590 \_\_\_\_\_,

1. affirm that I am aware of and have read the Rules and Policies of the University, more specifically the Disciplinary Procedure and the Tests and Examinations Rules, which prohibit any unethical, dishonest or improper conduct during tests, assignments, examinations and/or any other forms of assessment. understand what plagiarism entails and am aware of the University's policy in this regard;
2. declare that this document is my own, original work. Where someone else's work was used (whether from a printed source, the Internet or any other source) due acknowledgement was given and reference was made according to departmental requirements;
3. did not make use of another student's previous work and submit it as my own;
4. did not allow and will not allow anyone to copy my work with the intention of presenting it as his or her own work.

Signature

A handwritten signature in black ink that reads 'Schaap'.

Date: \_March 2023

---

<sup>1</sup> [https://www.up.ac.za/media/shared/1/ZP\\_Files/s5106-19-plagiarism-prevention-policy.zp181077.pdf](https://www.up.ac.za/media/shared/1/ZP_Files/s5106-19-plagiarism-prevention-policy.zp181077.pdf)

# Acknowledgements

I wish to express my gratitude to the following people for assisting me through the process of completing this research:

A special thanks and appreciation to Dr Dorette Vermeulen for her guidance, expertise, editorial suggestions, and thorough support during the process of completing my research. It was an immense privilege to work under her guidance.

Isobel Rycroft at the University of Pretoria's music library for the assembling of library materials, friendly support, and assistance throughout the process of completing this study.

The six pianists who volunteered to participate in this study and for their time and willingness to proceed with audio-visual recordings to produce their insights for this research study.

I am grateful to the University of Pretoria for granting me a bursary to complete this study.

## Abstract

This research aimed to explore the lived experiences of South African classical pianists who have suffered from a playing- and performance-related injury, and how they have navigated this challenge. I facilitated an in-depth exploration of six adult South African classical pianists, each diagnosed with a musculoskeletal disorder (MSD), through semi-structured online interviews to access their individual lived experiences.

I implemented a qualitative interpretivist paradigm, analysing the data using an interpretative phenomenological (IPA) approach and identifying four main themes. These themes are firstly, pianists' playing-related musculoskeletal injuries; secondly, the influence of musculoskeletal injuries on pianists; thirdly, how the pianists recovered from a musculoskeletal injury; and fourthly, how pianists can prevent a musculoskeletal injury.

Although the visual symptoms of an underlying MSD were minimal, the pianists experienced their musculoskeletal injuries with pronounced physical symptoms while playing and practising the piano. The injuries that the pianists suffered from influenced them in profound ways, including their daily lives, mental and emotional well-being, and piano careers. Although the participants were satisfied with the medical care they received, it became evident that body awareness, relaxation techniques, and alternative practising methods were key aspects to assist in the recovery process. They also suggested that these strategies may prevent further injuries and should form part of the daily practising regimes of a pianist. Overall, the pianists did not experience the recovery and prevention process as a singular event, but rather a combination of a range of somatic lifestyle practices and piano practising methods that promote a healthy and sustainable career as professional pianist.

With this study, I drew on the participants' experiences to increase awareness and extend knowledge of performance-related MSDs affecting pianists in a South African context. The study concludes that, for professional pianists to prevent MSDs from occurring, music pedagogies in South Africa need to promote awareness with regards to healthy piano technique, and provide knowledge about prevention and recovery strategies during piano training from an early age. This study contributes to extending knowledge and education about playing-related MSDs that may potentially lead to pianists experiencing long-term problem-free playing for continuous artistic development.

# Keywords

Performance-related injuries

Playing-related injuries

Musculoskeletal disorder (MSD)

Overuse injury

Injury prevention

Injury recovery

Pianists

Piano technique

Musicians

## Notes to the reader

In this dissertation:

- The language selected for proofing is English United Kingdom.
- APA 7<sup>th</sup> referencing style is used as this is required by the School of the Arts: Music division. Therefore, page numbers are provided directly after quoted text according to APA 7<sup>th</sup> guidelines.
- Although the full term “performance-related musculoskeletal disorder” (Rennie-Salonen & de Villiers, 2016, p. 3) closely resembles the phenomenon explored in the current study, the terms ‘performance-related injuries’, ‘playing-related injuries’, ‘musculoskeletal injuries’, and ‘musculoskeletal disorders (MSDs)’, are used interchangeably.
- When I used the abbreviation MSD (pronounced ‘emesdee’) in a sentence instead of the complete term (musculoskeletal disorder), I used the article ‘an’ to fit the initial vowel sound.

# Table of Contents

<b>Plagiarism Form</b>	<b>i</b>
<b>Acknowledgements</b>	<b>ii</b>
<b>Abstract</b>	<b>iii</b>
<b>Keywords</b>	<b>iv</b>
<b>Notes to the reader</b>	<b>v</b>
<b>Table of Contents</b>	<b>vi</b>
<b>Chapter 1: Introduction</b>	<b>1</b>
1.1 Background to the study	1
1.2 Aims of the study	2
1.3 Research questions	2
1.4 Key concepts	3
1.5 Research methodology	4
1.6 Delimitations of the study	4
1.7 Value of the study	4
1.8 Chapter outline	5
<b>Chapter 2: Literature Review</b>	<b>6</b>
2.1 Playing- and performance-related MSDs experienced by musicians	6
2.1.1 Prevalence of playing- and performance-related MSDs experienced by musicians	6
2.1.2 Symptoms of MSDs in musicians	6
2.1.3 Causes of MSDs in musicians	7
2.1.4 Recovery strategies for MSDs in musicians	7
2.1.5 Prevention strategies for MSDs in musicians	8

2.2 Playing- and performance-related MSDs experienced by pianists	8
2.2.1 Symptoms of MSDs in pianists	9
2.2.2 Causes of MSDs in pianists	10
2.2.3 How to recover from an MSD as a pianist	12
2.2.4 Prevention strategies for MSDs in pianists	13
<b>Chapter 3: Research Methodology</b>	<b>17</b>
3.1 Research paradigm	17
3.2 Research approach and design	18
3.3 Sampling strategy	18
3.4 Data collection	19
3.5 Data preparation	20
3.6 Data analysis	21
3.7 Research quality	22
3.8 Ethical considerations	23
<b>Chapter 4: Data analysis and findings</b>	<b>25</b>
4.1 Theme 1: Pianists' playing- and performance-related injuries	29
4.1.1 Causes of injury	29
4.1.2 Location of injury	38
4.1.3 Awareness of symptoms	39
4.2 Theme 2: Influence of MSD injuries on pianists	42
4.2.1 Routine activities	42
4.2.2 Mental and emotional well-being	43
4.2.3 Piano career	43
4.3 Theme 3: Recovering from MSD injuries	45



4.3.1 Medical care	45
4.3.2 Non-medical recovery methods	51
4.4 Theme 4: Preventing a musculoskeletal injury	55
4.4.1 Parameters for an injury-free piano career	56
4.4.2 Healthy body and mind	60
<b>Chapter 5: Discussion, Conclusion and Recommendations</b>	<b>64</b>
5.1 Discussion of the results	64
5.1.1 Theme 1: Pianists' playing-related MSD injuries	64
5.1.2 Theme 2: Influence of MSD injuries on pianists	68
5.1.3 Theme 3: Recovering from MSD injuries	69
5.1.4 Theme 4: Preventing a musculoskeletal injury	72
5.2 Answering the research questions	76
5.2.1 Secondary research questions	76
5.2.2 Answering the main research question	78
5.3 Limitations	78
5.4 Recommendations for future research	78
<b>References</b>	<b>80</b>
<b>Appendix A: Selection criteria for participants</b>	<b>90</b>
<b>Appendix B: Semi-structured interview schedule</b>	<b>91</b>
<b>Appendix C: Letter of Information to Pianists</b>	<b>97</b>

## **List of tables**

Table 1: Key concepts in the study	3
Table 2: Profile breakdown of participants	25
Table 3: Main themes, superordinate and subordinate themes	27

# Chapter 1: Introduction

"All the music is complete and alive within me, so that I wish to effortlessly breathe it out, but now I can hardly bring it forth; I trip over one finger with the other. This is truly frightening and has already caused me much pain." Robert Schumann (Storck, 1907)

## 1.1 Background to the study

Professional classical pianists need to play with exceptional artistry and skill. However, a performance-related injury may shatter a pianist's dream of becoming a piano virtuoso, as illustrated in the above excerpt from a letter by composer and pianist, Robert Schumann. A high number of classical pianists suffer from playing- and performance-related musculoskeletal disorders (MSDs) at some point in their career (Brown, 2004; Maslen, 2013; Redmond & Tierman, 2001; Steinmetz et al., 2012; Sun, 2017). From a classical pianists' perspective, I have become aware of an increase in playing- and performance-related injuries in classical pianists around me. More than three decades ago, Revak (1989) noticed playing- and performance-related MSDs when he conducted a study to determine the occurrence of upper extremity discomfort among piano students at seven different music schools in Philadelphia. Revak found that pain, aching, weakness, muscle cramps, tingling, numbness, burning and loss of control could indicate an underlying MSD in pianists. Since then, various institutions around the world have developed and taught MSD prevention methods (Milanovic, 2014).

The central problem of this study is that piano syllabi and curricula at school and tertiary level in South Africa include limited – if any – information related to MSDs (Ajidahun & Phillips, 2013; Devroop, 2014; Rennie-Salonen & de Villiers, 2016). Ajidahun and Phillips (2013) identify three issues directly impacting classical pianists in South Africa. Firstly, they argue that South African classical pianists are not aware of MSDs and this prohibits them from seeking further education about MSDs. Secondly, the lack of education and knowledge about symptoms and causes of MSDs negatively influence classical pianists' level of playing. Thirdly, classical pianists' careers can be cut short due to the former two issues. Bosi (2017) and Ling et al. (2018) acknowledge the problems that arise due to the lack of awareness of MSDs. Devroop's (2014) literature review indicates that there are limited studies on performing arts medicine in developing countries, and at that stage, none focused on South African musicians. Because South African pianists are less likely to be educated on symptoms and causes of MSDs, and due to the high frequency of MSDs

in classical pianists (Ajidahun & Philips, 2013), it was important for me to gain an in-depth understanding of this phenomenon in a South African context, especially concerning professional classical pianists.

Knowledge and education of MSDs may potentially lead to pianists experiencing long-term careers (Tchernik, 2017). I therefore identified the need to highlight and increase awareness about the impact of MSDs, and to explore the experiences of classical pianists who have been navigating this challenge.

## **1.2 Aims of the study**

In this research study I aimed to gain an in-depth understanding of the playing- and performance-related personal experiences of South African classical pianists who have an MSD, or who have suffered from an MSD in the past. With this study, I drew on these participants' experiences to increase awareness and extend knowledge of piano-related MSDs in a South African context.

## **1.3 Research questions**

The main research question that guided this study is:

What are the lived experiences of South African classical pianists diagnosed with MSDs regarding the identifying, recovering from, and preventing of playing- and performance-related injuries?

The secondary research questions that supported the main question are:

- What symptoms did the participants experience with their playing and performance-related MSDs?
- How did the participants conclude that they have MSDs?
- What factors did the participants' experience as contributing to their MSDs?
- What are the participants' experiences of the strategies they used that, in their view, contributed to their recovery process?
- What are the participants' experiences of how they can prevent further MSDs in their piano careers?

## 1.4 Key concepts

In this study, I used certain key concepts to find sources in the initial search for literature and they closely relate to the research problem. Table 1 provides a description of these key concepts.

*Table 1: Key concepts in the study*

Musculoskeletal disorders	Musculoskeletal Disorders (MSDs) are disorders and injuries “that affect the human body’s movement or musculoskeletal system” (Middlesworth, 2022, para. 6). Affected areas include the bones, muscles, ligaments, tendons, nerves, discs, blood vessels, and soft tissues, all making up the musculoskeletal system (Merriam-Webster, n.d.).
Repetitive motion injury/ Repetitive stress injury/ Overuse injury	The terms repetitive motion injury, repetitive stress injury, and overuse injury are commonly used to refer to MSDs. However, these terms imply that the only cause for these injuries is “repetition and stress” (Middlesworth, 2022, para. 9). Recent research, however, indicates that there are several factors contributing to these medical problems musicians suffer from and that the correct terminology is “performance-related musculoskeletal disorder” (Rennie-Salonen & de Villiers, 2016, p. 3)
Technique	The way a person uses basic physical movements (Merriam-Webster, n.d.).
Practice versus Practise	The term ‘practice’ applies to human action as a customary or habitual way of doing something (Hawker, 2006). Such routinised behaviour includes physical and mental activities (Warde, 2005). However, when this term is spelt with an ‘s’ as in ‘practise’, it refers to how musicians spend hours playing their instruments on a daily basis to acquire expertise and refine their skill (Lash, 2011).

## **1.5 Research methodology**

The study followed an interpretative phenomenological methodology; a qualitative research approach that yielded in-depth examinations of individualised experiences of the research participants (Osborn & Smith, 2015). Guest et al. (2006) recommend six participants for phenomenological studies, stressing that theoretical saturation is more important than involving more participants. I therefore purposefully selected six South African classical pianists who have experienced MSDs to take part in individual in-depth, semi-structured interviews (Merriam & Tisdell, 2015). This corresponds with interviewing as main data collection strategy in qualitative studies; especially as it remains the most important data source in phenomenological studies (Merriam & Tisdell, 2015). More detailed information of the research methodology is presented in Chapter 3.

## **1.6 Delimitations of the study**

The study included only six adult South African classical pianists of different ages and gender, currently situated in South Africa and who have experienced or are currently experiencing playing- and performance-related musculoskeletal disorders (MSDs). The reason for the limited range of participants was to explore the identification, recovery, and prevention of MSDs with specific reference to South African classical pianists, as musicians' health and MSDs are not usually included in piano pedagogy at school or tertiary level in South Africa.

## **1.7 Value of the study**

This research study investigated professional classical pianists' personal experiences of suffering from playing- and performance-related MSDs, their recovery process, as well as their attempts to prevent MSDs in future. The findings of this study may lead to an increased awareness of the impact of MSDs on musicians in general. Furthermore, it may lead to an understanding of possible prevention and recovery strategies for South African classical pianists, piano teachers, and music students.

## **1.8 Chapter outline**

Chapter 1 contains an introduction and background, the research aims, as well as the main and secondary research questions. I provide a brief outline of the selected research methodology to indicate how the research problem was approached.

Chapter 2 discusses relevant published research on the research topic. The main areas include the prevalence, symptoms, causes, recovery-, and prevention strategies of MSDs in musicians as well as symptoms, causes, recovery-, and prevention strategies of MSDs in classical pianists.

Chapter 3 includes the details regarding the research approach, paradigm, design, sampling, data collection and analysis techniques, as well as the research quality and ethical considerations.

Chapter 4 presents the data analysis, derived from the one-on-one semi-structured interviews with the six participants. The four themes that emerged during data analysis are described and motivated with evidence from empirical data.

Chapter 5 discusses the findings of the data analysis as it relates to relevant research literature. A summary of the research project is given, indicating how the findings lead to reliable answers of the research questions. The dissertation ends with recommendations for further research.

## **Chapter 2: Literature Review**

This chapter provides information on different elements of playing- and performance-related musculoskeletal disorders (MSDs). The same aspects related to MSDs apply for all musicians, but are described in separate sections; firstly, to provide a broad understanding of MSDs experienced by musicians in general, and secondly, to give an in-depth perspective of MSDs specifically affecting classical pianists.

### **2.1 Playing- and performance-related MSDs experienced by musicians**

In the following sections, information on different elements of MSDs that musicians may suffer from is provided. These elements include prevalence, symptoms, causes, as well as recovery- and prevention strategies of MSDs in musicians.

#### **2.1.1 Prevalence of playing- and performance-related MSDs experienced by musicians**

There is a wide variety of findings in research literature regarding the prevalence and rates of MSDs in musicians. Guptill and Zaza's (2010) study, for example, finds that 25% of musicians experience MSDs while Bosi (2017) indicates that the average rate of MSDs ranges between 39–87% in professional musicians, 34–62% in secondary school music students, and 20% in conservatory students. Panebianco's (2017) longitudinal mixed-methods study, conducted over three years with 145 undergraduate music students at the University of Pretoria, concludes that 83% of musculoskeletal and health problems occur among music students.

#### **2.1.2 Symptoms of MSDs in musicians**

Symptoms of MSDs in musicians most likely occur in the upper body, such as the back, neck, and shoulders (Ajidahun et al., 2019). The results of Ajidahun's (2011) three-stage study on music students and educators at the University of the Western Cape showed that tightening, soreness, numbness, cramping, burning, pins and needles, aching, fatigue, weakness, tingling, dull pain, and pain in a specific area, are all symptoms of playing-related injuries, the majority being tightening (68.4%) and soreness (57.9%). Panebianco's (2017) mixed-methods study indicates that students experienced pain in the lower spine, upper spine, left and right forearm, as well as orofacial problems such as sinus. Moreover, findings reveal four problems that are connected to



these MSDs, which are unexplained exhaustion, difficulty in concentrating, sleep disruption, and headaches.

### **2.1.3 Causes of MSDs in musicians**

There are usually multiple factors contributing to the development of MSDs (Allsop & Ackland, 2010; Stassijns et al., 2015). Lengthy practise sessions of more than one hour without adequate breaks are a significant cause of MSDs (Bosi, 2017; Ioannou & Altenmüller, 2015; Kaufman-Cohen et al., 2018; Ling et al., 2018; Tchernik, 2017; Turon, 2000). Hagglund and Jacobs (1996) compared the statistics from their study to a similar research project in Boston, indicating that music students who took ten to fifteen-minute breaks during two-hour long practising sessions had a decrease in the incidence of injury. However, Ajidahun's (2011) physiotherapy study in South Africa on injury prevention in musicians showed that only 41.7% of the participants, who were members of the Performing Arts Medicine Association, were aware that a sudden increase in the playing load of a musician could lead to MSDs.

The stress of both cognitive and emotional subdivisions are prominent risk factors in the development of musculoskeletal pain, with the shoulders, neck and head as the dominant body locations (Westgaard, 1999). He noticed that the trapezius<sup>2</sup> muscle shows a noticeable response to cognitive stress. Psychological stressors such as performance anxiety and a competitive environment contribute to MSDs (Stassijns et al., 2015). Moreover, practising in preparation for an upcoming performance, pressures from the self, and academic requirements at university, also form part of these psychological stressors (Bosi, 2017). Psychological performance stress can increase through fear patterns connected to new or previously formed emotional associations with musical performances (Swart, 2016). The need for the current research is especially important in South Africa as professional musicians often supplement their incomes with non-music related jobs, which could place additional stress on their bodies (Devroop, 2014; Hohls, 2010).

### **2.1.4 Recovery strategies for MSDs in musicians**

Medical researchers who specialise in challenges faced by performing artists recommend that severe MSD cases may require surgery, but that it should be avoided if possible (Brandfonbrener,

---

<sup>2</sup> There are two trapezius muscles in the body. They are large, flat, and triangular-shaped, stretching from the neck down over the upper back on each side of the spine. They are used to move the head and neck as well as to twist the arms (Physiopedia, n.d.).

2003; Lederman, 2003; Warrington, 2003). The surgeon should be aware of the impact of surgery on the performance abilities of the musician, especially as aspects such as mobility, strength, stability and length of digit may be affected (Sheibani-Rad et al., 2013). Brandfonbrener (2003) recommends that ice is applied to injured muscles after playing and that extreme wrist flexion as a cause of MSDs can be reduced by wearing night splints, stretching the muscles around the wrist as well as reducing the wrist flexion when playing. It is often necessary for the musician to make a technique adjustment to recover (Bosi, 2017). Musicians can consult physiotherapists to incorporate practical activities such as stretches and warm-up exercises before practising or performing (O’Neil, 2019).

Bosi (2017), Brandfonbrener (2003), Warrington (2003), and Lederman (2003) argue that if musicians ignore MSD symptoms and do not recover properly, this results in poor long-term health. Toledo’s (2004) study on a self-directed education programme on sports and performing arts medicine revealed that steroid injections are not recommended for musicians as they may have detrimental consequences on collagen repair in ligaments and tendons.

### **2.1.5 Prevention strategies for MSDs in musicians**

Several researchers discovered that there are prevention strategies that reduce the risk of MSDs in musicians. These include warming up effectively (Bosi, 2017), and stretching muscles before a practising session or performance (Mayon, 2017; Stassijns et al., 2015). Musicians should also decrease playing time per session by taking regular breaks (Bosi, 2017; Stassijns et al., 2015), for example, a break once every hour of practising (Brandfonbrener, 2003; Lederman, 2003; Warrington, 2003). However, Ajidahun (2011) warns that isolated warm-up exercises will not fully prevent MSDs without the inclusion of other strategies and methods to prevent injuries. The role of health professionals should not be limited to mere diagnoses and treatments of injuries, but a holistic approach should be employed in the management of playing-related MSDs among instrumental musicians. Ajidahun’s (2011) injury prevention study revealed that 83.3% of the participants were aware of the importance of good posture.

## **2.2 Playing- and performance-related MSDs experienced by pianists**

Stanhope et al. (2019) conducted a systematic review of all published research between 2007–2016 related to musculoskeletal disorders in musicians. Their review only includes a single study conducted in Africa, namely that of Ajidahun and Phillips (2013), stating that “the majority of

primary studies (85%) were from high-income countries” (p. 295). Moreover, only fifteen of the 158 studies they included in their review focus on pianists specifically. Although many of the MSD symptoms in pianists are comparable to those in musicians playing other instruments, there are unique differences due to the position of the head, neck, torso, arms, legs, and sitting position in front of a piano. Therefore, in the following sections, I describe the symptoms, causes, recovery- and prevention strategies of MSDs in pianists separately to provide a closer focus as required for the research problem.

### **2.2.1 Symptoms of MSDs in pianists**

MSDs in pianists most likely occur in the upper body (Corrêa et al., 2018; Willis et al., 2017) and physical symptoms include pain, fatigue, stiffness, tenderness, decrease in strength, and pain while stretching the muscles of the upper limbs (Ling et al., 2018). Visibly noticeable symptoms such as swelling and redness of the hand and arm are rare, as only 6% of piano students in Revak’s (1989) study showed these symptoms. Redmond and Tierman (2001) note that most undergraduate piano students (93%) experience a range of 27 playing-related injuries, while 60–80% of musicians have some type of upper extremity disorder during their careers, of which pianists make up 40–60%. Bruno et al. (2008) created a questionnaire for classical piano students at two Italian conservatories to calculate the prevalence of MSDs. Their study shows that 37.4% of their participants experienced MSDs, specifically in the following areas: neck (29.3%), thoracic spine (21.3%), and upper limbs (20–30.4%). Kaufman-Cohen et al.’s (2018) cross-sectional study, involving 15 pianists and using 3D motion capture, anthropometric<sup>3</sup> measurements, and questionnaires about MSD with both psychological and personal contributing factors, revealed that 80% of the pianists experienced neck pain. These authors suggest that the significantly higher percentage of neck pain may indicate that psychological factors – such as stress or anxiety – raised the pain level experienced by the participants.

Sakai’s (2002) research involved 200 professional pianists (35 men and 165 women) in Japan with a mean age of 26.3 years who all experienced hand pain from overuse injuries. Sakai divided the results of the study into six groups; each group related to a specific type of injury, namely tendinitis<sup>4</sup>, enthesopathy<sup>5</sup>, muscle pain, neurological disturbance, joint pain and neck/scapular

---

<sup>3</sup> Anthropometric refers to the comparative study of human body measurements (Merriam-Webster, n.d.).

<sup>4</sup> Tendinitis refers to an inflamed tendon usually associated with repetitive action (Healthline, 2021).

<sup>5</sup> Enthesopathy is a pain around the joints where the muscle attaches to the bone (WordSense, n.d.).

pain (Sakai, 2002). In contrast to the findings by Kaufman-Cohen et al. (2018), showing a high percentage (80%) of neck pain in research participants, Sakai's study reveals that only 2.5% of participants had neck or scapular pain specifically. The reason for these contradicting findings could be that Sakai's (2002) study specifically focused on hand pain from overuse injuries.

### **2.2.2 Causes of MSDs in pianists**

The following sub-sections discuss the causes of MSDs in pianists. These causes include an extended length of playing sessions, problems with a "one size fits all" mindset, technique and challenging repertoire, and poor posture.

#### **2.2.2.1 Problems with a 'one size fits all' mindset for pianists**

Booker and Boyle (2011) point out that there may be significant variations in pianists' hand sizes depending on whether they are, for example, children, adults, males, females, or from different ethnic groups. The current piano keyboard – designed for Caucasian male pianists during the 19th century – is not ideal for this diversity. Several researchers argue that pianists with smaller hands are more likely to suffer from MSDs (Brown, 2004; Furuya et al., 2006; MacRitchie & Baylis, 2016; Sakai & Shimawaki, 2010). Sakai and Shimawaki (2010) note that pianists with small hands are inclined to hyper-abduct and hyper-extend their fingers to achieve a larger hand span, this causing the little finger to be stiffer, and the hypothenar<sup>6</sup> muscle and wrist flexors need considerable strength to combat the reaction force on each key. This could relate to findings suggesting that females are twice as prone to MSDs than men (Brown, 2004; Furuya et al., 2006; MacRitchie & Baylis, 2016), as they are usually smaller in stature and more inclined to hypermobility<sup>7</sup> (Gong et al., 2014). Stassijns et al. (2015) found that females are more prone to develop MSDs than men in all types of injuries, except for focal dystonia<sup>8</sup>. However, Allsop and Ackland's (2010) study on the prevalence of MSDs in professional and non-professional pianists, revealed that hand span had no effect on MSDs, and that these problems were rather caused by overuse of muscles when playing. Lister-Sink (2016) adds that both overuse or misuse of muscles, as well as a mismatch between the size of the pianist and the piano keyboard, lead to MSDs.

---

<sup>6</sup> Hypothenar is the muscle on the hand palm above the base of the little finger (Merriam-Webster, n.d.).

<sup>7</sup> Hypermobility is the capability to increase the movement range of a body part or joint (Merriam-Webster, n.d.).

<sup>8</sup> Dystonia refers to conditions such as Parkinson's disease, characterised by movement defects and loss of muscle tone (Merriam-Webster, n.d.).

### **2.2.2.2 Poor posture in pianists**

Good posture is vital to prevent or overcome MSDs (Kaur & Singh, 2016; Turon, 2000). By strengthening muscles in the cervical spine, a healthier posture can be obtained, especially for pianists who often bend forward to look at their hands (Stassijns et al., 2015). According to Lister-Sink (2016), the core principles of biomechanics include the ideal dynamic skeletal alignment of the whole body – not only the upper body – when playing, as well as the use of muscle in an efficient manner. For her, the goal is to use physical energy most economically so that there is limited stress on the neuromuscular system, allowing pianists to use their bodies to create the musical result they desire. To engage this physical energy, pianists need to have an awareness of a natural breathing state, a lengthened spine balanced on the sitting bones, the release of tension in the shoulder and neck, the support from the torso, the hanging of the arms from the shoulders, and relaxed legs with the support of the floor under the feet. These are all ways in which Lister-Sink (2016) strengthens her argument for pianists to achieve skeletal alignment when sitting at the piano.

### **2.2.2.3 Technically challenging repertoire for pianists**

Technically challenging repertoire demands many repetitions of extreme movements with increased force and stretching of the hand span (Kaufman-Cohen et al., 2018; Kaur & Singh, 2016; Mariotti, 2014; Rosety-Rodriguez et al., 2020). Extreme wrist and/or elbow flexion – seen on an ultrasound as a thickening of the median nerve in pianists (Brandfonbrener, 2003) – are the main causes of carpal tunnel syndrome (Kaufman-Cohen et al., 2018). Techniques that require large stretches of the hand span, such as chords and octaves often found in challenging repertoire, contribute to hand pain in pianists as they involve the hyperabduction<sup>9</sup> of both the thumb and the fifth finger (Sakai, 2002). Hyperabduction of both the fifth and fourth fingers increases stress on the radial collateral ligaments of the proximal interphalangeal<sup>10</sup> joints, which causes an imbalance of flexor and extensor muscles. This may result in pain in the elbow or forearm (Stassijns et al., 2015). A non-neutral position with louder playing increases the burden on the forearm muscles in various wrist positions (Oikawa et al., 2011). Additionally, extensors prepare the hand for the next note while flexors provide power to play and maintain a grip on the keys (Stassijns et al., 2015). These challenging piano techniques generally cause stronger flexor muscles, leading to an imbalance between the two muscles (Stassijns et al., 2015). The focus on human anatomy has

---

<sup>9</sup> Abducting refers to the spreading of a body part, such as the fingers, from a position near the median axis of the body or limb (Merriam-Webster, n.d.).

<sup>10</sup> Interphalangeal refers to the joints between phalanges of the hand or foot (Merriam-Webster, n.d.).

only become an important factor in piano technique since the 21st-century (Wristen, 2000). Since pedagogues only started to view the movements in piano playing objectively and scientifically from the late-nineteenth and early-twentieth centuries, 21st-century developments in ergonomics and biomechanics make it possible to study piano technique to determine how to most efficiently use the human body (Wristen, 2000). Medical, biomechanical and ergonomic research have indicated that some physical movements – such as extreme wrist movement – can cause an injury (Foxman & Burgel, 2006; Wristen, 2000). Therefore, piano teachers should educate their students on correct piano technique to minimize such extreme movements.

### **2.2.3 How to recover from an MSD as a pianist**

The following sections include information on recovery strategies from MSDs for pianists. These strategies relate to general recovery as well as the impact of ignoring symptoms and poor recovery.

#### **2.2.3.1 General recovery strategies**

Focal peripheral nerve entrapment is a nerve injury that is common in the upper body, the most frequent being carpal tunnel syndrome (Neal & Fields, 2010). Pianists with focal peripheral nerve entrapment – diagnosed by electro-diagnostic (EMG) studies – who did not recover through conventional treatment with night splinting and alteration of activity, may respond well to three alternative methods (Sheibani-Rad et al., 2013). The first of these methods involves surgical decompression. Secondly, muscle activities for both the wrist extensor and flexor are the lowest in the neutral wrist position, which is why researchers recommend this neutral wrist position to decrease playing-related musculoskeletal load during playing (Oikawa et al., 2011). Thirdly, research indicates that pianists should keep their bodies as relaxed as possible when playing (Arthur et al., 2013).

#### **2.2.3.2 Ignoring symptoms and poor recovery**

Bosi (2017), Brandfonbrener (2003), Warrington (2003), and Lederman (2003) argue that ignoring symptoms and not recovering properly result in poor long-term mental and physical health. However, pianists often avoid time-off due to academic and performing demands, income needs, technique and psychological state (Bosi, 2017). Corticoid infiltration also has side effects such as damaging tendons (Brandfonbrener, 2003). Tchernik (2017) points out that it is not always visible from the outside that a pianist is experiencing pain while playing, therefore students must alert their teacher if they experience pain or discomfort. Moreover, pain is hard to quantify as it

is highly subjective to individual pain thresholds, making it difficult to treat a possible injury in time (Mohamed, 2011).

## **2.2.4 Prevention strategies for MSDs in pianists**

Rather than treating MSDs in pianists after injuries have occurred, researchers recommend that prevention strategies should be applied to avoid MSDs from occurring (Guptill & Zaza, 2010; Kaufman-Cohen et al., 2018; Lister-Sink, 2015; Reid, 2010; Stassijns et al., 2015; Turon, 2000). The suggested methods include overall physical health, piano pedagogy with input from medical professionals, somatic approaches, utilising technology in piano practice, and developing a sound piano technique.

### **2.2.4.1 Developing a sound piano technique**

In 1984, Dorothy Taubman – an American music teacher, lecturer, and founder of the Taubman Institute of Piano (Milanovic, 2014) – was concerned that insufficient research had been conducted regarding professional pianists’ piano technique, also noting that the limited amount of research was frequently overlooked. She, therefore, designed an individual approach to healthy piano technique, known as the “Taubman Approach” (Milanovic, 2014, p. 2). In this approach, the finger, hand, and forearm work in unified movement with special attention to forearm rotation, allowing effortless playing (Milanovic, 2011).

Proper technique is a necessity if pianists want to avoid MSDs (Woo, 2017). This author’s study compares Cortot’s *Rational principles of pianoforte technique* and Tausig’s *Daily studies for the pianoforte* with current medical performance research. Additionally, James (2012) links piano playing to neuroscience, arguing that arm weight reinforcement makes piano technique more sustainable as the pianist saves energy while playing. The increased awareness of the use of arm weight works with the assistance of gravity, a force that is always present in human body movements.

### **2.2.4.2 Overall physical health**

Stassijns et al. (2015) suggest that pianists should take care of their overall physical condition to prevent muscle weakness, especially by strengthening the muscles that support good posture. Joints cannot be considered singularly when solving injury problems, and therefore it is vital that joint synchronization occurs (Kaufman-Cohen et al., 2018). Physical therapy with an exercise programme could be created, especially to support spine and shoulder muscles. The pianist can

achieve this through light resistance and high-repetition strength training (Kaufman-Cohen et al. 2018). Scapular instability may be an important contributor to MSDs in pianists (Reid, 2010), which is caused by imbalanced or weak muscles around the shoulder blade (Paine & Voight, 2013).

#### **2.2.4.3 Piano pedagogy with input from medical professionals**

Piano pedagogues should collaborate with medical professionals to educate themselves on healthy piano technique so that they can apply that in their teaching practice (Turon, 2000). Music teachers should help their students to avoid MSDs by teaching evidence-based prevention methods (Guptill & Zaza, 2010). Redmond and Tiernan's (2001) study involved 42 piano teachers from a teacher's association in the USA regarding strategies they use for educating their high-school students on playing-related injury prevention. Their research reveals that no consistent principles were guiding the selection of such strategies, and that teachers gained their knowledge on injury prevention mostly from the teachers who taught them when they were students, or from colleagues. The teachers drew on the following practices: proper body mechanics and posture, healthier playing technique, the importance of warm-up, and appropriate repertoire choices for the student's physical abilities. All these principles varied widely depending on the teacher's age and years of teaching experience, with most participants desiring more information on how to prevent playing-related injuries. Redmond and Tiernan (2001) recommend that piano teachers collaborate with health care professionals to increase their knowledge on correct injury prevention, as piano students would rather ask their teacher for advice than a health care professional. Piano teachers are in the foremost position to increase their piano students' knowledge about playing-related injuries and how to prevent them (Turon, 2000). Therefore, piano teachers should be well prepared so that they can prevent medical problems by a continued partnership with performing arts specialists in both the medical and musical fields (Turon, 2000).

Anna Schmidt-Shkloyskaya, a professional Soviet pianist, asked physiologist, Ivan Kryzhanovsky, to help her recover and prevent MSDs during her piano playing and piano pedagogy career (Tchernik, 2017). Kryzhanovsky's experience with MSDs in pianists helped to rebuild Schmidt-Shkloyskaya's piano technique, after which she developed a complete system of teaching to promote a healthy piano technique.



#### **2.2.4.4 Somatic approaches**

Somatic approaches<sup>11</sup> to treat MSDs in pianists focus on connecting the mind and body, thereby enriching the pianist's awareness of internal mental, physical, and psychological processes to gain a "first-person perspective" (Noulis, 2014, p. 59). Somatic approaches studied by Noulis include the Pilates method, Yoga, and the Alexander Technique. These approaches allow pianists to be more aware of their actions, which is a way to ensure problem-free and healthy piano playing. Noulis strongly advocates that somatic education forms an integral part of piano curricula.

Lister-Sink's (2015) conducted an interdisciplinary, non-traditional approach for recovery and prevention of playing-related neuromusculoskeletal disorders and their effects on technique, musicality, and extra-musical factors. Her research involved 74 participants including undergraduate and graduate students, piano teachers, college teachers, and professional pianists and organists who studied her piano method for a minimum of two semesters between 1990 and 2015. Several of the research participants revealed how a holistic approach allowed them to view piano technique as a function of the whole body directed by the brain. This holistic method improved their awareness, mindfulness, and observation while playing the piano, allowing them to feel what may have been contributing to their pain.

Bindel (2013) created an injury prevention programme called "body mapping" (p. 67), specifically created for musicians to learn how to move their bodies in a healthy and mindful way. A body map is a self-representation of the individual's body by having a better understanding of how joints move and how the body functions. This process creates better coordination in movement, resulting in injury prevention. By training and careful attention to body movements, musicians can achieve greater musical artistry (Bindel, 2013).

#### **2.2.4.5 Utilising technology in piano playing**

Innovations and technology offer evidence-based feedback to pianists to reduce the potential of developing a playing-related MSD (Savvidou et al., 2017). For example, if piano students view video recordings of their playing via the specially developed "Kinect depth camera" (Hadjakos, 2012) that captures a pianist's motions, they could gain objective feedback when they detect poor

---

<sup>11</sup> Somatic approaches refer to methods that relate directly to the body as distinct from the mind (Merriam-Webster, n.d.).

posture (Savvidou et al., 2017). Such innovations make the student more aware of habitual patterns or extreme positions to work toward better postural alignment (Savvidou et al., 2017).

Surface electromyography<sup>12</sup> biofeedback and video are tools that help with the identification of an increase in muscle tension and improper body alignment. By utilizing feedback-assisted retraining the pianist can increase awareness of oneself and the tools to reduce tension and achieve ideal performance (Riley, 2011). In the proposed study, I aim to explore participants' experiences regarding piano technique and what methods they use to avoid recurring MSDs.

### **Concluding remarks**

Injuries can be devastating in a musician's career as revealed by research literature. The authors reviewed in this chapter argue that it is important to make piano students and pianists aware of MSDs by educating classical pianists about the symptoms, causes, recovery and prevention thereof. In their view, this will reduce the risks of playing- and performance-related injuries for pianists. However, there is insufficient education and awareness about this matter in South Africa. This has been evident in the lack of sufficient research literature about MSDs in piano syllabi and curricula at school and tertiary level in South Africa, necessitating the current study. The next chapter outlines the research methodology used in this study.

---

<sup>12</sup> An electromyograph is an instrument that creates visual or sound recordings of electrical activity connected to the functioning skeletal muscle to diagnose neuromuscular disorders and biofeedback training (Merriam-Webster, n.d.).

## **Chapter 3: Research Methodology**

In this chapter, I explain and motivate the research methodology that guided this study. Details are provided on the research paradigm, research approach and design, sampling strategy, data collection and preparation techniques, Interpretive Phenomenological Analysis (IPA), and the research quality and ethical considerations I applied.

### **3.1 Research paradigm**

To align the research phenomenon studied in this project, the most appropriate methodology for this study was a qualitative paradigm. As qualitative research enables a detailed understanding of a topic and approaches the data in an interpretive manner (Austin & Sutton, 2015), this was ideally situated to the selected research topic. A strength of qualitative research is that it is a flexible approach allowing the researcher to capture changing attitudes within a target group. Furthermore, qualitative researchers can explore phenomena that are nuanced and complex in comparison to quantitative studies that can be reduced to numerical representations (Merriam & Tisdell, 2015).

A weakness of qualitative research is that researchers may unknowingly influence the participants – both consciously and unconsciously – to provide the anticipated outcome as they may ask questions leading in a certain direction (Madrigal & McClain, 2012). Qualitative research is naturalistic, meaning that the researcher studies the participants in a natural setting, and the researcher attempts to interpret the phenomenon in terms of the meanings that people bring to them (Creswell & Poth, 2017). My research focus was on the lived experiences of the participants regarding a specific phenomenon, namely experiencing piano playing- and performance-related MSDs. This allowed me to generate textual findings with contextual descriptions (Austin & Sutton, 2015).

For this study, an interpretivist paradigm was the best fit for the research topic. According to Morgan (2007), the interpretivist paradigm includes that the researcher is aware that the social world is formed through subjective and social interpretations. A researcher working within an interpretivist paradigm accepts that there is unavoidable interaction between him/herself and the participants, and that it is important to create context to avoid subjective interpretation. Moreover, the researcher should be cognisant that the individual participant needs to be understood in context rather than through the application of universal laws (Morgan, 2007).

### **3.2 Research approach and design**

An interpretative phenomenological study is a qualitative research approach to yield in-depth examinations of individualised experiences (Osborn & Smith, 2015). When the researcher approaches the research in a phenomenological manner, s/he should bracket personal judgement as far as possible. The researcher should seek to listen to the participant's individual lived experience and to interpret the data in a more objective manner (Fouché & Schurink, 2011). Through interpreting the data objectively, prevents the researcher from applying pre-existing theoretical preconceptions in the study and recognises that humans tend to have interpretative endeavour as sense-making creatures (Osborn & Smith, 2015). An interpretative phenomenological study was therefore a suitable research design for this study as the semi-structured interview process allowed open conversation and connection between me as researcher and the participants, with modification of interview questions according to the participants' responses. This helped the process of finding interesting and important areas that arose through the interviews for the best possible data collection in the light of the research questions guiding the study (Smith & Osborn, 2008). IPA was also particularly applicable to the study of playing- and performance-related MSDs as it allowed me to examine an intricate and emotionally loaded topic since pain is a key part of the phenomenon (Osborn & Smith, 2015). Being a classical pianist and aware of the complex psycho-somatic interactions that participants may feel, I was sensitive to these personal experiences which may not have been easy for the participants to express. This enabled me to probe further and, in a sensitive way, ask appropriate follow-up questions.

### **3.3 Sampling strategy**

Guest et al. (2006) recommend that the researcher selects six participants for phenomenological studies, stressing that theoretical saturation is more important than involving more participants. In their view, "a sample of six interviews [is] sufficient to enable the development of meaningful themes and useful interpretations" (Guest et al., 2006, p. 78). Therefore, I selected six South African classical pianists who have experienced MSDs to take part in in-depth interviews (Merriam & Tisdell, 2015). To fit the research aims of this study, I conducted a pilot study with a single participant, who did not form part of the six participants involved the main study, to test whether the proposed methodology would be suitable for generating useful responses. I then contacted pianists whom I knew via email or phone for an initial brief conversation to establish if they were willing to participate, and whether they met the selection criteria as described below and stipulated in Appendix A.

The selection requirements for suitable participants were as follows:

- They should be adult professional South African classical pianists, currently situated in South Africa, and they could be of any age or gender.
- They should have participated in a music competition during their lifetime.
- They should regularly present public performances as a classical pianist.
- They have currently, or in the past, been medically diagnosed with a piano playing- and performance-related MSD.
- They should have a brief understanding of what playing- and performance-related MSD entails from personal experience.
- They should have implemented recovery strategies to recover from playing- and performance-related MSD.
- They are implementing prevention methods for future playing-and performance-related MSDs if already recovered from such MSDs.
- The participants had to agree that I made an audio-visual recorded during the online interview.

To collect rich data connected to the precise research questions, I used a purposive sampling strategy (Bernard, 2002) in a stratified manner to select two specific individuals whom I knew were medically diagnosed with MSDs, and who also complied with the other characteristics to take part in the study. After identifying the first two participants, I employed a “snowball [strategy], perhaps the most common form of purposeful sampling” (Merriam & Tisdell, 2015, p. 98), to find additional participants for this study. This meant that I solicited recommendations from the first two participants for further individuals they knew, who had the potential characteristics for inclusion in the study (Johnson, 2003). I continued with the snowball sampling process until I found an additional four suitable participants who met all the selection criteria, as well as agreeing to be audio-visually recorded. During the initial reviewing of the scripts, I also realised that I had reached data saturation by the time I had six participants (Merriam & Tisdell, 2015).

### **3.4 Data collection**

In qualitative research, the researcher mostly collects data through interviewing, which is also an important data source in phenomenological studies (Merriam & Tisdell, 2015). Therefore, I collected data for this study through individual, in-depth semi-structured interviews. Semi-structured interviews allow flexibility regarding the areas that the researcher needs to cover, permitting the interview to go into different areas that the researcher may not have originally thought of (Smith & Osborn, 2004). These types of interviews are most appropriate for an interpretive phenomenological study because they are flexible (Moser & Korstjens, 2018). The

process of asking questions provides the option for the interviewer to have the freedom to think about and analyse questions as they come to mind throughout the interview (Kumar, 2014).

Once I obtained informed consent from the participants, I conducted individual interviews with all of them, each interview lasting approximately 90 minutes. COVID-19 restrictions and travel constraints compelled me to use an online interview platform with audio-visual capturing options. Therefore, I chose Zoom as it offered all the necessary attributes, such as high-quality sound and visual capturing options, built-in collaboration features, and end-to-end encryption features which safeguarded the confidentiality of the interview. During the interviews, I invited the participants to reflect on their experiences and situations in their own words (Moser & Korstjens, 2018). I also asked the participants to illustrate aspects on the piano if that would enrich their answers or explanations. The audio-visual recordings I made of the interviews, therefore, allowed me to capture the conversations so that I could make verbatim transcriptions thereof, as well as visually studying the demonstrations they made at the piano. These demonstrations included, amongst others, areas in the body where they experienced pain as they played on the piano, and remedial exercises that the participants applied.

I used the semi-structured interview schedule (see Appendix B) during interviews, with the questions serving as a guide rather than a fixed set. The interview schedule allowed me to explore individual participants' symptoms of MSD(s); how they concluded that they had MSD(s); factors that contributed to their MSD(s); strategies they used to recover from their MSD(s); as well as methods to prevent further MSD(s). The way that individual participants responded steered the direction of each interview and led to additional areas of investigation that I may not have anticipated (Moser & Korstjens, 2018).

### **3.5 Data preparation**

The raw data collected from the one-on-one semi-structured interviews were prepared through verbatim transcription of the audio-visual recordings. Audio-recorded data allowed for the information to be easily accessible as I could replay it to capture details and nuanced descriptions or demonstrations. Furthermore, it ensured that I could focus on detail while retaining the data as originally recorded (Tessier, 2012). Moreover, the audio-visual recordings enhanced the data analysis (Nieuwenhuis, 2016) since the participants were able to add in-depth detail by demonstrating aspects on the piano as they explained their lived experiences of MSDs. Audio-visual recordings were therefore an ideal strategy to collect data in this study. After completing

the verbatim transcripts of the interviews, I shared it individually with all the participants so that they could verify that I accurately captured their views (Nieuwenhuis, 2016).

### **3.6 Data analysis**

The strategy suited to analyse data in this study is interpretative phenomenological analysis (IPA). Through IPA, a researcher seeks to explore participants' personal lived experiences rather than attempting to reach an objective view (Osborn & Smith, 2015). This form of analysis makes it possible to examine detailed information regarding the participants' life and experience. Osborn and Smith (2015) refer to the crucial role of the researcher in the process of obtaining an insider's view of the participant's experiences, even though it is not completely possible to do. They recommend that the researcher tries to make sense of the participant's perspective through interpretive activity. Because participants may struggle to express feelings or thoughts, it becomes challenging for a researcher to fully connect to the participant's mental and emotional state (Eatough & Smith, 2017). Therefore, as a researcher, I had to adopt "an empathic stance and imagine what-it-is-like to be the participant [whilst remaining] critical" (Eatough & Smith, 2017, p. 14) to probe for deeper meaning and understanding of the phenomenon.

I used clear guidelines suggested by Biggerstaff and Thompson (2008), and Pietkiewicz and Smith (2014), to do the data analysis. The first step of data analysis included multiple readings of the interview transcripts and making notes. These authors suggest that the researcher studies both video recordings and transcripts more than once to help them discover new insights every time they read or listen to them. Therefore, during data analysis, I gave special focus to content, language use, context, emotional responses, and initial interpretative comments, as well as to comments that referred to personal reflexivity (Pietkiewicz & Smith, 2014). The second step was to transform the notes into emergent themes. Personal notes – rather than the transcript – provided sufficient information so that I could reflect on the source material. During the third step, I searched for relationships, clustering themes by grouping them according to the similarity in concepts and adding a descriptive title to each collection. The final list of themes contained various superordinate themes and subthemes (Pietkiewicz & Smith, 2014), as provided in table 3 in Chapter 4. I then compiled a narrative account of the study using the analysis discussed above by describing and exemplifying each theme with extracts from the interviews, and adding personal comments (Pietkiewicz & Smith, 2014).

### 3.7 Research quality

In qualitative research, Guba and Lincoln (1982) suggest four criteria to ensure research quality. These are credibility, transferability, dependability and confirmability. The following bullet points describe how I applied each of these criteria in this study.

- **Credibility**

I applied Credibility by drawing credible information from the participants' explanations and descriptions of their lived experiences, allowing me to interpret their views correctly from the original raw data (Graneheim & Lundman, 2004). Additionally, I used the pilot study with an individual participant to ensure that the research methodology was appropriate and credible by testing the prepared interview schedule. Furthermore, I made sure that there were no leading questions that may have influenced participants to answer in a certain way (Appendix B).

- **Transferability**

Transferability refers to the degree to which the findings of qualitative research can be applied to other circumstances or with other respondents (Tobin & Begley, 2004). Bitsch (2005) adds that, if the researcher presents a thorough, in-depth, and interpretive description of the research findings, as well as using purposeful sampling, a "basis for transferability" (p. 86) can be provided. In this study, I therefore applied a purposeful sampling strategy and provided a thick description of the research results.

- **Dependability**

Dependability refers to "the stability of findings over time" (Bitsch, 2005, p. 86). This involves participants assessing the results to make sure that they are all supported by the data received from the informants of the study (Tobin & Begley, 2004). I applied dependability in my study by sharing the completed verbatim transcripts of the interviews with each participant so that they could verify that their views had been accurately captured. Additionally, after I analysed the data, I shared the results with the participants to check if they agreed.



- **Confirmability**

Confirmability refers to the notion that the “interpretations of the findings are not figments of the inquirer’s imagination but are clearly derived from the data” (Tobin & Begley, 2004, p. 392). Researchers, therefore, play a primary role in their approach to understand qualitative data, as they are in control of how the data are constructed and interpreted (Finlay, 2002). Through this knowledge, it is evident that the researcher needs to exercise reflexivity to apply confirmability. Reflexivity refers to how researchers intentionally explore the way they may impact data collection and interpretation processes (Carolan, 2003). Phenomenological research uses a bracketing process (Fischer, 2009) so that the researcher becomes aware of personal viewpoints, for example, identifying with personal experiences, cultural aspects, beliefs, and instincts (Fischer, 2009). This awareness can prevent unintentional subjective opinions that may dominate the analysis of the data (Osborn & Smith, 2015). I therefore applied reflexivity throughout the data analysis process to acknowledge the presence of my subjectivity so that I could work with the data in a transparent manner.

### **3.8 Ethical considerations**

Data collection for this study only commenced after I obtained ethical clearance from the Humanities Research Ethics committee of the University of Pretoria. I then contacted the participants who fitted the criteria as outlined in Appendix C. The participants who agreed to take part in the study were informed about all the ethical issues involved in their participation, for example, that their participation was voluntary, that their identity would be kept confidential, and that they could decide to withdraw from the study at any time. This was clearly explained in the letter of information (see appendix A). Additionally, I encouraged the participants to ask questions about the study. Before the interviews commenced, I asked all the participants to sign the consent form and email it to me.

After I transcribed the audio-visual recordings of the interviews, I sent all participants the transcript of their interview so that they could verify that I have accurately captured their responses (Nieuwenhuis, 2016). All the transcribed data from this study will be stored in a password-protected electronic format at the School of the Arts of the University of Pretoria for 15 years. Since the participants reside in different parts of the country, and due to Covid-19 restrictions, all interviews were held virtually.

## **Chapter summary**

The current chapter provided an account of the research methodology applied in the study, and the methods used for data collection, data preparation and analysis. Furthermore, I motivated and described the research quality measures and ethical considerations I applied. In the following chapter, I present the findings of the data analysis process.

## Chapter 4:

### Data analysis and findings

In this chapter, I present an analysis of the primary interview data collected from six pianists diagnosed with musculoskeletal injuries. The participants provided rich explanations about their experiences, allowing me to gain an in-depth understanding of the topic. Six participants were involved in this study, including three male and three female pianists. Table 2 provides a profile breakdown of all the participants.

*Table 2: Profile breakdown of participants*

Participant	Profile and MSD experiences
Pianist 1	Pianist 1 started playing piano at the age of thirteen. He obtained his BMus degree in Classical Piano Performance at a university in Gauteng but is currently pursuing a career mainly in jazz and popular music. He suffered an MSD from overuse in the back and inner forearms.
Pianist 2	Pianist 2 started playing piano at the age of five, exploring more technically demanding repertoire from the age of thirteen. He is currently studying BMus at a university in the Western Cape. He had problems with an MSD that started off in the wrists and moved to the forearms.
Pianist 3	Pianist 3 started playing piano at the age of six. She relocated to Johannesburg towards the end of Grade 7 and, with a change of piano teachers, she took up piano technique more seriously. She started taking part in piano competitions more seriously towards Grade 10. Pianist 3 obtained her BMus degree in Classical Piano Performance at a University in Gauteng and is currently pursuing her MMus degree in Classical Piano Performance. She suffers from two different MSDs, one being the formation of ganglion cysts in her wrists and the second an MSD from <i>glissandi</i> techniques.

Pianist 4	Pianist 4 started playing piano at the age of seven. He obtained both his BMus and MMus degrees in classical music at a university in the Western Cape. After specialising in classical music for 22 years, he gradually started shifting focus towards jazz and is currently pursuing a Master's degree in Contemporary Performance at a College of Music in Spain. He suffered from an MSD in the left arm and hand at the muscles responsible for the movement of the pinkie.
Pianist 5	Pianist 5 is currently a 5 <sup>th</sup> -year music student at a university in the Western Cape. She regularly accompanies several choirs, does entertainment gigs, and teaches piano lessons. She had an MSD impacting her back, shoulders, lower back as well as swelling in her wrists.
Pianist 6	Pianist 6 obtained her BMus and MMus degrees in Performing Arts at a university in Gauteng, specialising in piano performance. Enhancing her performance skills, she completed three licentiates including a Teacher's Licentiate in Piano, a Performance Licentiate in Chamber Music (Piano), and a Performance Licentiate in Piano. She is also an organist and gained a Diploma in Church Music at a university in Gauteng. She pursued her piano career in accompaniment and regularly accompanies soloists and choirs. This participant had two different MSDs, the first being a herniated cervical disc in the neck which caused neck and shoulder pain moving down to her right arm, and the second MSD occurring in her left hand between fingers 2 and 3.

During data analysis, I identified the following four main themes.

- Theme 1: Pianists' playing- and performance-related injuries
- Theme 2: Influence of MSD injuries on pianists
- Theme 3: Recovering from MSD injuries
- Theme 4: Preventing a musculoskeletal disorder

As I delved deeper into the data during the analysis process, several superordinate themes emerged. In most instances, subordinate and underlying codes followed. Table 3 on the following pages presents the four main themes and their related levels of super- and subordinate themes, and in some instances, underlying codes.

Table 3: Main themes, superordinate and subordinate themes

Theme 1: Pianists' playing- and performance-related injuries		
Superordinate themes	Subordinate themes	Underlying codes
4.1.1 Causes of injury	4.1.1.1 In the practise room	• Lengthy & inconsistent practise sessions
		• No warmup before practising
		• Ignoring symptoms
		• Improper posture
• Piano sizes & bench height		
4.1.1.2 Lack of piano pedagogy	• Inadequate piano technique education	
	• No education in injury prevention	
	4.1.1.3 Challenging repertoire	
4.1.2 Location of injury	4.1.2.1 Back, neck & shoulders	
	4.1.2.2 Forearm, wrist & fingers	
4.1.3 Awareness of symptoms	4.1.3.1 Visible symptoms	
	4.1.3.2 Physical symptoms	

## Theme 2: Influence of MSD injuries on pianists

Superordinate themes	Subordinate themes
4.2.1 Routine activities	
4.2.2 Mental & emotional well-being	
4.2.3 Piano career	4.2.3.1 Decreased self-confidence
	4.2.3.2 Increased stress
	4.2.3.3 Increased ability after recovery

## Theme 3: Recovering from MSD injuries

Superordinate themes	Subordinate themes	Underlying codes
4.3.1 Medical care	4.3.1.1 Support from medical professionals	<ul style="list-style-type: none"> <li>• Rest</li> <li>• Frequent breaks</li> <li>• Ice packs, compression &amp; pillows</li> <li>• Medication</li> <li>• Acupuncture</li> <li>• Surgery</li> </ul>
	4.3.1.2 Experience of medical care	
4.3.2 Non-medical recovery methods	4.3.2.1 Body awareness & relaxation	
	4.3.2.2 Alternative piano practising methods	
	4.3.2.3 Mental practise	
	4.3.2.4 Dietary considerations	
	4.3.2.5 Support from other people	

## Theme 4: Preventing a musculoskeletal injury

Superordinate themes	Subordinate themes
4.4.1 Parameters for an injury-free piano career	4.4.1.1 Sound piano technique
	4.4.1.2 Proper playing posture
	4.4.1.3 Balanced practising routine
	4.4.1.4 Choice of repertoire
4.4.1 Healthy body and mind	4.4.2.1 Body awareness & relaxation
	4.4.2.2 Physical activity
	4.4.2.3 Dietary adjustments
	4.4.2.4 Somatic practices

In the following sections, I explain and describe the themes outlined in table 3 verified by verbatim quotes from the participants' lived experiences.

### 4.1 Theme 1: Pianists' playing- and performance-related injuries

When analysing the data, I soon realised that it was quite common for professional pianists to acquire musculoskeletal injuries while playing and practising piano. The participants described what they perceived as being the cause for their injuries, the location of MSD injuries on their bodies, and their awareness of the symptoms of the injuries, which I describe in the following sections.

#### 4.1.1 Causes of injury

Several factors seem to trigger injuries in pianists. These include what happens in the practice room, knowledge of MSDs, and challenging repertoire.

#### **4.1.1.1 In the practice room**

Several factors are at play when the pianist spends time practising for a concert or other event. These factors include long practice sessions; the way the pianist warms up before a practising session; ignoring the symptoms of an injury; having an improper posture and bench height when playing the piano; and the influence of stress on their playing.

- **Lengthy and inconsistent practise sessions**

A major cause of injury from playing is long sessions of practising. The pianists referred to being tired and overworked, but still needing to practise many hours every day. These factors all influenced their chances of obtaining an injury. All the participants described strenuous practicing sessions, at least “four to six hours a day” (Pianist 1). Moreover, if the pianist does not take regular breaks, it worsens the symptoms.

“Five hours a day depending more if needed but I did have the problem where I practise everything in one go and not take a break.” (Pianist 5)

“Practising, for hours and hours” (Pianist 4)

“Yes, I probably practiced four to five hours a day.” (Pianist 6)

“Crunch time, I think, is the worst part when you have to practise a lot of hours every single day.” (Pianist 5)

“I would overwork myself sometimes, especially like late in the evenings, because I didn’t have time for everything.” (Pianist 1)

“It is easily five hours where you have to be on the job.” (Pianist 6)

“I had, like, very busy days at school. [...] I’d often feel like, I’d get home and be very tired, but I need to practise.” (Pianist 3)



“When you were under stress and when you have to perform and rehearse a lot.” (Pianist 6)

Although they may have felt tired, the participants indicated that they continued practising as they had upcoming performances. However, sporadic and inconsistent practise hours also negatively influenced the development of injuries. A sudden long practice session of many hours on one day and less on others may lead to the development of injuries.

“It [my practising regime] was not always that consistent. Of course, in school term it was very busy, so it would often be shorter practise sessions throughout the day. [Then] there were days where I would practise six, eight, ten hours a day, which probably contributed to that.” (Pianist 2)

- **No warmup before practising**

Omitting proper warmup before practising seems to negatively influence the development of injuries, as described by one of the participants.

“A lot of times I would skip the warmup, which I definitely know is not a good thing.” (Pianist 1)

- **Ignoring symptoms**

Ignoring initial symptoms of an injury is another aspect that influenced the development of injuries. Hoping the pain would go away or ignoring it for too long only seemed to worsen the injury eventually.

“I just kind of went over the pain, it did worsen.” (Pianist 5)

“I ignored it for hopelessly too long, so it was a mistake from my side. I think I should have addressed it much quicker.” (Pianist 6)

“I thought it would just kind of go away [...] until it was much further in and it became quite painful.” (Pianist 1)

- **Improper posture**

Not having the correct posture when practising or performing is a key aspect causing injury. The participants described how they were not necessarily conscious of their posture, only becoming aware of it when they experienced pain. Realising that they may have injured themselves, they became more mindful of their posture.

“Before my injury I was much less aware of my posture.” (Pianist 1)

“I wasn’t completely aware of my posture [...] I didn’t necessarily take my posture into consideration.” (Pianist 3)

“I actually had a problem just slouching and not using my lower half” [demonstrates by slouching entire back while sitting in front of the piano]. (Pianist 5)

Although pianist 6 described how she used an awkward posture at times when she had to “turn [her] neck when accompanying and [had] to have eye contact with [the] conductor or soloist”, she explained that she generally sits “up straight in front of the piano”, and that posture did not have an impact on her “hand injuries”.

- **Piano sizes and bench height**

As performing artists, pianists are at times required to play on different sizes or types of pianos, for example, an upright piano, a grand piano, or an electronic piano. In the participants’ view, they could have acquired an injury due to being required to switch to a different instrument.

“I don’t have a grand piano, I have an upright piano, and it is quite easy to make a big sound [...]. Sometimes if I, like, play on a grand that has a slightly stiffer or firmer touch, then I need to make sure that my whole body doesn’t tense up along.” (Pianist 3)

“It also has a big difference to practise on an electric piano and then going back to practising on an actual piano at campus.” (Pianist 5)

Additionally, data analysis revealed that improper bench height might have an influence on the development of injuries in pianists. As all people have different lengths, body builds, and technical abilities, it is necessary that the pianist adjusts the bench height accordingly. The research findings seem to indicate that sitting too low may lead to developing an injury.

“I’ve always sat very low; I sit much higher now.” (Pianist 2)

“If you sit lower or higher on a chair, that will influence the octave technique. (Pianist 4)

“When I arrive at a place where the chair is too low, [...] it doesn’t work. I think one must play from above.” (Pianist 6)

- **Stress**

Stress contributes to injuries that pianists suffer, especially during times of frequent performances and high-pressure situations.

“I guess, actually, live performances. I tend to get a bit stressed, especially on stage or having to do an exam, even actually playing for my lecturer.” (Pianist 5)

“It was much worse when you were under stress and when you have to perform and rehearse a lot.” (Pianist 6)

“I do feel, like, a lot of these things sort of fled up more just before or during high-pressure moments.” (Pianist 3)

#### **4.1.1.2 Lack of piano pedagogy**

The second subordinate theme linked to causes of injuries is the lack of piano pedagogy. All six pianists commented that their education as a piano student did not provide sufficient support in this regard.

- **Inadequate piano technique education**

The following pianists commented on how they had inadequate education in proper piano technique.

“I was never taught how to properly, you know, use the entire body, or thinking of the entire body at the piano.” (Pianist 1)

“I don’t really remember learning specifically about things like piano technique.” (Pianist 3)

“I guess it is injury due to [...] overuse and incorrect use of, you know, all of the mechanisms that go into playing the piano.” (Pianist 1)

“Things that I learned that I wasn’t really technically ready for.” (Pianist 2)

“I would sort of play but not really engage the rest of my arm when playing.” (Pianist 3)

“I don’t think this was a posture related injury, it was more of an injury that was kind of inherited from [improper] technique.” (Pianist 4)

“I definitely have weaknesses in technique, but it is not things that would lead to injuries. Injuries could be related to these weaker fingers and muscles [points to fingers 3, 4 and 5 of the left-hand].” (Pianist 4)

“Practising, [...] the same technique over and over again, you know, those muscles are going to get fatigued at some point.” (Pianist 4)

Two of the pianists described how tension caused their injuries:

“Tension in my wrist and forearm while I was playing.” (Pianist 3)

“Too much tension.” (Pianist 2)

After explaining that he struggled with the correct technique to perform runs effortlessly, one of the pianists described how that changed once he gained a more relaxed technique using the whole body:

“It’s so much easier to actually do a run properly, use my whole body to travel somewhere.” (Pianist 5)

- **No education in injury prevention**

Pianists described how they lacked awareness and education about musculoskeletal injuries or the steps needed to prevent them.

“I did not even know that it was a possibility.” (Pianist 6)

“I tried to research ganglions, but the research about them is very vague.” (Pianist 3)

“I didn’t really pay much attention to it until it actually happened to me.” (Pianist 5)

“I knew that too much practising can cause injuries, but that was about it.” (Pianist 2)

Pianists also explained how they did not realise that excessive or unnecessary movements, such as the head or upper limbs of the body, may cause injuries during piano playing.

“I could not move my neck for a few days from doing unnecessary movement.”  
(Pianist 4)

Gaining a solid piano technique during the developmental years as a pianist goes hand in hand with being able to perform challenging repertoire, which I deal with in the following subordinate theme.

#### 4.1.1.3 Challenging repertoire

The findings of this study revealed that challenging repertoire significantly impacted the development of injuries as it requires the pianist to utilize strenuous techniques. These may include large hand stretches, octave stretches, large voicing<sup>13</sup> stretches, rapid finger passages, *glissandi*, as well as arpeggiated passages, as indicated in the participants' descriptions of their experiences.

“Playing these big kind of chords for a long period of time.” (Pianist 1)

“I think the size of my hands played a big role, as I have very small hands and can only stretch an octave.” (Pianist 6)

The participants mentioned repertoire from specific composers that they found challenging to execute, for example, if it included consecutive octave stretches and large chords covering a wide range on the piano, which seemed to have an impact on the development of their injuries.

“Prokofiev, I know specifically, it must have been Prokofiev or Chopin that caused it [the injury].” (Pianist 6)

“It was one specific piece I was practising that caused it [the injury]. I think, Liszt's “*Grand Gallop Chromatique*. [...] A lot of octave-playing. [...] It is also the speed, the power you play those things. [...] If you want a really harsh or brutal sound, you are going to apply a lot more muscular force, because you know just playing without tension is only going to get you so far. [The participant demonstrates a fast-jumping action with the right hand positioned in an octave position]. Your pinkie must still supply resistance to handle the octave jump. Force in one direction requires opposite force in the other direction.” (Pianist 4)

---

<sup>13</sup> Voicing refers to bringing out specific notes more than others when played simultaneously by one hand. Usually, this requires the pianist to stretch the hand over a wide range of keys to reach all the notes at once.

“It was Rachmaninoff’s Opus 39 Number 9 that caused that problem again [the pianist plays a series of large chords – each stretching over a wide range of keys – on the piano].” (Pianist 2)

Large stretches with specific reference to voicing played a role in pianist 2’s development of an injury. As this technique requires the pianist to hold some notes longer than the others in a chordal position, the hand has to be stretched out to reach all the notes.

“Where you are stretching while holding some notes, that created a lot of tension that made things much worse.” (Pianist 2)

Pianist 3 experienced an increase in the development of her injury during rapid finger passages and scales.

“Scales is where I felt quite a bit of tension. [...] I was playing a Chopin etude that involved a lot of fast finger work. So, I definitely would feel very tired.” (Pianist 3)

Pianist 3 commented on her technique in passages containing *glissandi*. Her previous technique of only using her finger weight instead of her whole arm weight during these passages contributed to her development of a finger injury.

“You need to be able to carry your whole weight into the *glissandi*. So, for me, I was sort of just using my fingers like this [the participant demonstrates *glissandi* using no arm weight, just finger work].” (Pianist 3)

Arpeggiated passages influenced pianist 3’s second injury of the formation of ganglion cysts in her wrists.

“My forearms would definitely be tired, but they wouldn’t be strained. My muscles were definitely very tired.” (Pianist 3)

## **4.1.2 Location of injury**

Data analysis revealed that the upper body is the most prominent area to be susceptible to MSDs in pianists. I divided these areas into two subordinate themes. Firstly, the back, neck and shoulders, and secondly, the forearms, wrists and fingers, as illustrated by verbatim quotes from the participants.

### **4.1.2.1 Back, neck and shoulders**

Three of the participants experienced injuries that fall in this category. Pianist 1 experienced one of his two injuries in his back, pianist 5 experienced her injury in her back and shoulders, and pianist 6 experienced her herniated cervical disc injury in her back, neck and shoulders, which influenced her right arm movements.

“For me it was in my back.” (Pianist 1)

“My back, shoulders, back, lower back.” (Pianist 5)

“Mainly neck, neck pain and shoulder pain, and it moved down to your right arm.” (Pianist 6)

### **4.1.2.2 Forearms, wrists and fingers**

All the pianists experienced injuries in this region of the body that includes the forearms, wrists and fingers. Pianist 1 experienced his second injury in his inner forearm area, pianists 2, 3 and 4 experienced their injuries in their wrist and forearm areas while pianist 5 experienced her second injury only in the wrist area. Pianists 3 and 6 both experienced injuries in their fingers.

“These tendons here [shows inner part of elbow connecting to forearm], um, like, by my elbow.” (Pianist 1)

“It started off with my right wrist and then it ended up moving up to my forearms as well.” (Pianist 2)



“I felt a bit of tension around my wrist, around this area [refers to forearm area]. I would sometimes get these lumps that sometimes appear on your wrists, like the ganglion sort of lumps.” (Pianist 3)

“In my left arm, left hand left arm, with the muscles responsible for the movement of the pinkie.” (Pianist 4)

“Swelling in my wrists.” (Pianist 5)

“I definitely felt, like, I got like quite a bit of scraping here [points to index finger of right hand on the left-inner part of the finger]” (Pianist 3)

“Especially my left hand. I got hurt between the 2<sup>nd</sup> and 3<sup>rd</sup> finger [refers to the front section of the left hand where the 2<sup>nd</sup> and 3<sup>rd</sup> fingers start]. (Pianist 6)”

### **4.1.3 Awareness of symptoms**

The third superordinate theme that emerged when I analysed the data was the pianists' awareness of symptoms from their injuries. Only two of the participants experienced visible symptoms, while the physical symptoms were evident in the experiences of all six participants.

#### **4.1.3.1 Visible symptoms**

Pianist 3 experienced visible symptoms of redness and blistering, caused by *glissandi* techniques required in her repertoire.

“I could see there was redness, a bit of tenderness and I could see there was a little bit of blistering of the skin.” (Pianist 3)

She also noticed ganglion cysts on her left hand.

“The only things that were visible were like those sort of ganglion cysts [...] I saw them more on my left hand.” (Pianist 3)

Pianist 5 experienced redness and swelling which influenced her wrist injury.

“During playing, the most definite thing I noticed was swelling in my wrists actually [...] redness.” (Pianist 5)

#### **4.1.3.2 Physical symptoms**

Pianists 1 and 2 experienced physical symptoms of pain while practising piano. Pianist 2 specifically referred to a shooting sensation of pain while practising.

“I would play a chord or something and I would physically feel the pain.” (Pianist 1)

“It started just being a kind of shooting pain discomfort in my wrist.” (Pianist 2)

Pianist 3 experienced physical tension with special reference to her wrists.

“There were definitely moments where I felt a bit of tension around my wrist.” (Pianist 3)

“I could just feel the muscles were very tense.” (Pianist 3)

Pianist 5 described how she experienced discomfort and pain in different parts of her body.

“My hands kind-of stiffening and having the shakes.” (Pianist 5)

“My back would get sore.” (Pianist 5)

Pain increased with time for pianists 1 and 2. It did not seem to get better as time passed and they realised they had to act on the pain by first recovering from their injuries.

“That sort of gradually got worse and worse.” (Pianist 1)

“It just got progressively worse.” (Pianist 2)

Some pianists experienced the sensation of soreness before performing or when practising.

“It was actually right before a performance class [...] my finger started feeling sore.”  
(Pianist 3)

“It got very sore, my hands got incredibly sore when I practised.” (Pianist 6)

Pianist 2 had to rest his arm due to the amount of stiffness he experienced.

“It was a kind of stiffness, almost, after which I had to rest my arm just in order to function properly.” (Pianist 2)

A sensation of strain described as “searing pain” was experienced by pianist 3 and a sharp stinging sensation was experienced by pianist 4 with his arm injury.

“It wasn’t like a searing pain that I felt, but it definitely was a strain I was feeling.” (Pianist 3)

“A sharp-like stingy sensation started developing [...] the ulnar-side of the left arm.”  
(Pianist 4)

Stretching after practising caused pain for pianist 1, as explained in his verbatim quote below.

“If I stretch my arms out like this [stretches arms out to front of body] I would feel like there was a pain here [shows inner part of elbow connecting to forearm].” (Pianist 1)

I realised that most injuries that the pianists suffered from came from tension and overuse during long practise sessions without adequate breaks.

## **4.2 Theme 2: Influence of MSD injuries on pianists**

Theme 2 is related to how the pianists' injuries influenced several aspects of their lives. I divided these aspects into three superordinate themes, namely i) routine activities, ii) mental and emotional well-being, and iii) piano careers.

### **4.2.1 Routine activities**

The influence of MSD injuries on the pianists seemed to negatively affect many routine activities that are part of their daily lives, indicated in the following examples as described by the participants.

“This injury was kind of hindering me a lot with just everything I was doing [...]. Sitting on a chair [...], I would feel the tension, like sitting, in my back.” (Pianist 1)

“But also, daily, like having to sit down.” (Pianist 5)

The second daily routine activity highly influenced by an MSD injury was working on a computer.

“Sitting behind a desk and working on the computer wasn't the greatest. So, I always [...] like, find something to prop up against my back.” (Pianist 5)

Pianist 5 elaborated on how the injury influenced mundane activities in her daily life, for example, when lying down or driving a car.

“Even lying down, my back would get sore.” (Pianist 5)

“Even things as small as driving [...]. Your back gets so sore.” (Pianist 5)

In all the above descriptions from the participants, it seems that back injuries were the most common form of MSDs affecting routine activities in their daily lives.

## **4.2.2 Mental and emotional well-being**

Data analysis revealed that MSD injuries affected the pianists' mental and emotional well-being. Several aspects related to this theme emerged, including feelings of frustration and irritability, anxiety, emotionally out of control, and having low self-esteem. The pianists mostly commented on frustration and irritability as a trigger for their mental and emotional well-being. They felt that it took very long for them to recover, which caused frustration. They would also become irritable with others around them during the time of having an injury.

“I was mostly frustrated because things were taking long, and you know, life doesn't stop.”  
(Pianist 1)

“I think, generally, I was more irritable, because you can't practise and you are frustrated with everyone around you.” (Pianist 5)

Rather than becoming depressed, pianist 3 experienced more anxiety during this time.

“I definitely didn't have a huge dip in my mental health but there definitely was a greater sense of anxiety and concern.” (Pianist 3)

Pianist 6 felt that she had less control which lowered her self-esteem during the time she was affected by injuries.

“Emotionally, one sometimes feels a bit out of control, because you can't do everything you want to do.” (Pianist 6)

“You can sometimes feel like a failure.” (Pianist 6)

## **4.2.3 Piano career**

The injuries the pianists experienced had a significant effect on their piano careers. In rare instances, the outcome of the injury had a positive effect, but mostly it negatively impacted their

careers. I derived the following subordinate themes related to pianists' careers: decreased self-confidence, increased stress, inability to practise long sessions, the inability to play difficult repertoire. A novel finding was that two of the participants experienced an increased ability to perform difficult repertoire after recovery.

#### **4.2.3.2 Decreased self-confidence**

Some pianists described how they experienced lower self-confidence after an injury. Pianist 3 gained a sense of cautiousness and pianist 5 explained how the feeling of confidence and comfort dissolved after having to reduce the number of hours she spent practising.

“I would definitely say at first I was still very cautious about *glissando*-playing. It took me a while to regain that confidence.” (Pianist 3)

“Having to scale down on hours and times practising, and even the intensity of practise, made it really hard to actually get focussed and get to a deadline, feeling completely comfortable with myself and confident within myself.” (Pianist 5)

#### **4.2.3.3 Increased stress**

The participants also experienced an increase in stress, from scaling down on practise hours as well as stressing about the physical pain the injury caused during performances.

“There was like a little bit of pain, so that was enough to get me a bit nervous about performing them.” (Pianist 3)

“The fact that I had to scale down on everything was really hard and quite stressful, as a musician you really do have to put a lot of hours in.” (Pianist 5)

Pianist 1 was unable to practise for long sessions and was unable to play challenging repertoire during the time of the injury.

“My practise sessions were broken up a lot. It would be like, half an hour to forty minutes or something, then I couldn't go any more.” (Pianist 1)

“The experience of playing that challenging repertoire was, like, way worse than anything I played before that.” (Pianist 1)

It became evident that the influence of injuries on pianists extended to a larger degree than I anticipated. The pianists’ injuries significantly impacted not only their piano career and playing ability, but also their daily lives as well as mental and emotional well-being in a negative manner.

#### **4.2.3.1 Increased ability after recovery**

A novel finding was that two of the six pianists responded with positive outcomes of the injuries they acquired as they experienced an increased ability to play challenging repertoire after recovering from their injuries. Pianist 4 described how he experienced a feeling of more strength, whereas pianist 5 learned how to relax her arms better. This relaxation improved her overall technique when playing demanding and strenuous repertoire.

“I felt like, my arm was actually even stronger after the recovery.” (Pianist 4)

“I think, after actually being aware of where I need to change my technique a bit, relax my arms a bit, it actually changes the whole demean of how I play a piece, [It] makes it so much easier to actually do a run properly, use my whole body to travel somewhere.” (Pianist 5)

### **4.3 Theme 3: Recovering from MSD injuries**

The third theme relates to the strategies pianists used when recovering from musculoskeletal injuries. In the following sections, I explain and describe these strategies according to the participants’ personal perspectives and experiences.

#### **4.3.1 Medical care**

Due to the painful nature of the injuries all the participants in this study sustained, which impacted their capacity to practise and perform, all consulted medical practitioners to assist them in the diagnosis and recovery process. The support medical professionals provided by diagnosing pianists’ injuries, and the recommendations they made to assist the pianists to recover, are

described and illustrated by verbatim quotes from the participants. The medical diagnosis of injuries the pianists experienced included overuse, tension in the body, tendonitis, and a herniated cervical disc.

“It was due to overuse and overstress of those specific muscles.” (Pianist 1)

“It was mostly just tension on the wrists and the ligaments, so the most probable cause was just over-exertion.” (Pianist 5)

One of the participants had to undergo surgery for a herniated cervical disc involving an artificial disc replacement in her neck.

“For my neck, it was a herniated disc. It burst, [...] so it was confirmed by an MRI.” (Pianist 6)

One of the participants diagnosed himself as he was busy conducting his own research on performance-related injuries in musicians, after which he obtained medical care.

“I think I had tendonitis based on what I read all the symptoms are.” (Pianist 4)

In the following sections, I present the recovery strategies suggested by medical professionals.

#### **4.3.1.1 Support from medical practitioners**

Several of the pianists consulted physiotherapists or chiropractors, who mostly recommended that they do stretching of the muscles to relieve pain.

“The physio just had me do exercises.” (Pianist 5)

“He (the physiotherapist) gave me some stretches and things to help with the tendonitis as well.” (Pianist 1)



“What ended up helping a lot was her [the chiropractor] just relieving some of the tension there was. [...] She also gave me stretches to do.” (Pianist 2)

“This stretching I did for my wrists helped so much. [...] It really does help, and even just relaxing, like literally relaxing my wrists.” (Pianist 5)

“I never became aware of, especially, my shoulder muscles. It is almost [after stretching] as if it is more relaxing.” (Pianist 6)

In the following sections, I describe additional recovery strategies suggested by medical practitioners, such as rest, frequent breaks, medication, acupuncture, and surgery, as experienced by the participants.

- **Rest**

From data analysis, it became clear that the medical professionals prescribed rest as the first route to recovery, as indicated by the participants' responses.

“Mostly it is rest.” (Pianist 4)

“The best thing for me to do was rest.” (Pianist 1)

“Practise less and give my wrists and back a break.” (Pianist 5)

“Often times it was just resting until my arm felt better, over December especially.” (Pianist 2)

“I had to stop playing completely, I could not use my hand at all.” (Pianist 6)

- **Frequent breaks**

Another recommendation from medical professionals was that the pianists take frequent breaks and have shorter sessions of practising in their daily routine.

“He said that the best thing for me to do was rest and to take frequent breaks.” (Pianist 1)

“A practise regime would be a bit shorter.” (Pianist 3)

- **Ice packs, compression and pillows**

Suggestions from physiotherapists included the application of ice packs, gentle compression on affected areas, and the use of pillows while sleeping.

“Apply cold ice-packs to your area of affliction.” (Pianist 4)

“Her main advice was just gentle compression [to my wrist].” (Pianist 3)

“I changed the pillow I slept on.” (Pianist 6)

“The physio gave me a specific way of lying down by putting my pillow at a certain position under my neck.” (Pianist 5)

- **Medication**

Medical practitioners suggested the use of prescribed or non-prescription medication, as explained in the following responses from the participants.

“I got prescribed by the doctor *Inderal*, which is the beta-blocker. It did, actually, help a lot, especially with my hands kind-of stiffening, and having the shakes.” (Pianist 5)

“I would use things like *Deep Heat*<sup>14</sup>, maybe *Panado*. [...] Sometimes, I use these patches called *Dr Lee* if I am feeling a bit of strain, it is [similar to] *Deep Heat*.” (Pianist 3)

---

<sup>14</sup> *Deep Heat* is an ointment that provides pain relief for stiffness and muscle pain. (<https://deepheatsa.co.za/>)

- **Acupuncture**

One of the pianists reported that the physiotherapist advised acupuncture as this is was a standard treatment for injuries musicians are prone to.

“I went to a physiotherapist and he did, like, standard treatments, you know, acupuncture.”  
(Pianist 1)

- **Surgery**

Only one of the pianists required surgery. The medication prescribed by doctors before she received the operation was not very effective, and she struggled to cope with the pain she suffered from a herniated cervical disc. However, the relief she experienced after the disc replacement was fast-acting and highly successful.

“They [the medical team] initially gave me pain medication to relieve pain temporarily.”  
(Pianist 6)

“It costed an operation where they did an artificial disc replacement to relieve the pain.”  
(Pianist 6)

“After the operation, it was gone immediately. [...] The operation was a big success.”  
(Pianist 6)

“I think I accompanied a Christmas service ten days after it.” (Pianist 6)

This participant expressed how she immediately felt relief of her neck pain, and how the surgery restored her ability to perform. As indicated in her comments above, she was able to return to her normal playing activities soon after the operation.

#### 4.3.1.2 Experiences of medical care

The participants in this study generally experienced the treatment they received from medical professionals with positive outcomes. In some instances, however, the treatment needed to be more specific to the injury.

“It definitely did help. [However,] it was a very general diagnosis. [...] I was looking for something a bit more specific.” (Pianist 1)

“To a large degree that was just a means of keeping me able to play.” (Pianist 2)

“A chiropractor ended up being what saved me until I got to Luis [the participant’s piano lecturer].” (Pianist 2)

“I do feel that it was quite effective and did contribute to the healing process.” (Pianist 3)

“It was quite a relief just to be able to go to, like a physio or a chiropractor, and they just help the muscles in your back. All of that really helped.” (Pianist 5)

Pianist 1 did not know where to find proper medical care for his music related injury. He felt as if the generalised treatment he received from a doctor could have been more effective if he rather went to an occupational therapist who could have targeted his injury more specifically, relating it to his occupation as a professional musician.

“Being a musician, and given that I didn’t go to an occupational therapist who really understand, you know.” (Pianist 1)

However, Pianist 6’s neck pain immediately decreased after the surgery she received, enabling her to continue with her performance activities soon afterwards.

“I think I accompanied a Christmas service ten days after it.” (Pianist 6)

## **4.3.2 Non-medical recovery methods**

The participants mentioned several alternative methods related to recovering from their injuries. According to pianist 3, the key aspect was first to accept that she had an injury and to adjust her practising routine and other activities accordingly. In the following sections, I describe the non-medical methods used by participants to recover from their injuries. These include body awareness and relaxation, alternative methods of practising, dietary considerations, and support from other people, as described in the following sections.

### **4.3.3.1 Body awareness and relaxation**

All six pianists referred to becoming much more aware of their bodies when playing the piano, which assisted them to recover from an injury or to reduce the possibility of it from occurring in future. This aspect seemed to be the most prominent recovery method for all the participants, as evidenced from their responses.

“I just became more aware of the fact that I tend to lean forward a lot when I am focusing.”  
(Pianist 1)

“In terms of just becoming more bodily aware of where things might be pinching where nerves might not be quite as they should.”

“That was the main thing, I am becoming a lot more aware of things when I practise.”

“Just being aware and the moment I realise something is hurting.” (Pianist 5)

They explained their growing cognisance of executing technical intricacies, and how using the most economical method reduces fatigue and tension.

“It’s up to me to largely figure out how expressing certain technical things, and what works for me.”

“Just being aware of what is economic, what is the least amount of fatigue. [...] Like tensing up without knowing you’re tensing up.” (Pianist 4)

All the participants described how important it was for them to reduce physical tension in the body while playing. For one of the participants, this meant that piano playing should become “effortless”.

“The moment you feel like you don’t have an effortless performance anymore, something is wrong. So, my magic word for [an optimal performance] is ‘effortless’.” (Pianist 6)

“I am very mentally aware of letting go of the tension and not keeping it all bottled up.” (Pianist 1)

“The moment I kind of relaxed, even both my hands, it just made it so much easier [...] The more stiff you get, the harder it is to do the jumps, the runs, the thirds, everything.” (Pianist 5)

“Getting me to relax my wrists, because that was something that was problematic from the start.” (Pianist 2)

“So, in technique, you have to make sure you have a very flexible wrist. [...] But my wrist in particular was very stiff, so I didn’t have a relaxed wrist.” (Pianist 3)

Moreover, breathing and stretching helped one of the participants to relax, which lessened tension and acted as a coping mechanism in his recovery process.

“Setting reminders for myself, really, like reminding myself to breathe more, and just kind of lessen all of this tension.” (Pianist 1)

“It was also a coping mechanism to make a point of it every time, you know, to do my stretches and to roll out and be more relaxed before I started playing.” (Pianist 1)

Being aware of the placement of the piano on stage assisted Pianist 6 to avoid turning her neck unnecessarily during performances.

“You try to turn your instrument in such a way to cause the minimum amount of movement you have to do with your neck [...] that you can see your soloist or conductor more from the corner of your eye instead of turning [your neck]” (Pianist 6)

#### **4.3.3.2 Alternative piano practising methods**

The participants referred to several alternative methods they applied in their practising regimes, for example, practising with the non-injured hand instead of both hands at the same time.

“When I was injured, [...] if it was my left hand, I would probably focus a bit more on my right hand.” (Pianist 3)

“Practise with the other hand maybe, if you want to. That is good for technique.” (Pianist 4)

“I just took one hand at a time and slowly went through everything, even just learning notes, and doing it slowly.” (Pianist 5)

The participants indicated how they focussed on other aspects of the music during their time of recovery, for example, interpretative nuances. One pianist mentioned the idea of practising at a softer dynamic level to prevent over-exertion of the muscles.

“If I had an injury, I would focus a little bit more on the interpretive stuff in my pieces, and things like dynamics and stuff in my pieces instead.” (Pianist 3)

“When it comes to practising, I just tried playing a bit softer. [...] Just don’t over-exert yourself with *fortes* and *fortissimos* and stuff like that.” (Pianist 4)

Another pianist described how slowing down the pace of learning a new composition took pressure off her hands when recovering from wrist injuries.

“Just slowly, and try to learn notes, because at least learning notes, it doesn’t take a lot of pressure on your wrists.” (Pianist 5)

#### **4.3.3.3 Mental practise**

The participants referred to several strategies involving mental practise<sup>15</sup> during their recovery process. They explained, for example, how they studied the music score away from the piano by analysing the harmonies, listened to recordings, or notated the music from memory.

“Doing more mental practising, analyse the harmonies.” (Pianist 4)

“My teacher told me: ‘Stop, stop playing for ten days’. All I was allowed to do was practise away from the piano. He told me: ‘You have to go sit at a desk’. He expected of me to be able to write the music from memory.” (Pianist 6)

The participants also described how they spent more time on an intellectual level studying the music. Listening to recordings of the compositions they worked on when afflicted by an injury, and making notes on their sheet music while listening to these recordings, assisted them to recover from the injury while growing an intimate knowledge of the piano score. Such mental practise strategies enhanced their understanding of the music.

“If you want to rest your body, focus more on thinking practise, intellectual practise.” (Pianist 4)

“I try and listen to as many recordings as possible, so that is something I felt helped me at least with my aural understanding of what was going on in my pieces.” (Pianist 3)

---

<sup>15</sup> Mental practise involves repetitive cognitive rehearsal of physical movements “without any muscular movements or acoustic feedback” (Iorio et al., 2022, p. 230)



“Sit with the music and listen to my pieces and make notes on my sheet music.”  
(Pianist 5)

“I started actually practising sort of mentally, practising more away from the piano [...] I couldn’t physically, you know, sit and drill the things.” (Pianist 1)

#### **4.3.3.4 Dietary considerations**

Some additional strategies the participants applied during the recovery process include dietary considerations as explained below.

“I inherited my dad’s tendency to [have] a very acidic [metabolism]. I avoided things such as wine or bread that would make my system acidic.” (Pianist 2)

“Eating healthy, being more aware of what is going into your body.” (Pianist 4)

“Eat enough protein, you will recover your muscle injuries a bit better.” (Pianist 4)

#### **4.3.3.5 Support from other people**

For one of the participants, it was crucial to have people who cared about her and who could provide support to carry her through the recovery process.

“Ultimately you need to accept that this is what happened and come up with a pro-active plan.” (Pianist 3)

“Knowing they [family and friends] are there to help and support you is really, really important.” (Pianist 3)

### **4.4 Theme 4: Preventing a musculoskeletal injury**

This theme emerged as the participants explained their experiences after gaining an injury, and how they realised that they needed to take preventative measures to avoid future injuries by

developing healthy habits. Several of these themes correspond with the techniques the participants applied during the process of recovery from their MSD injuries. The two superordinate themes related to theme 4 include parameters for an injury-free piano career, and maintaining a healthy body and mind.

#### **4.4.1 Parameters for an injury-free piano career**

The pianists explained several parameters that shape their piano careers, and how they navigate these to avoid playing- and performance-related injuries. In the following sections, I describe these parameters as subordinate themes. First, acquiring a sound piano technique; second, developing a proper piano playing posture; third, applying a balanced practising regime, and fourth, considering repertoire choices with care.

##### **4.4.1.1 A sound piano technique**

The importance of acquiring a sound piano technique is a crucial aspect in avoiding the development of a musculoskeletal injury. For the participants, a good piano technique means using the whole body during piano playing, not only the arms and fingers. The pianists elaborated on this, describing how one bodily movement influences other body parts during a performance.

One of the pianists described how she used arm-weight in her piano playing. She referred to it as the “free-fall-float-off” method.

“That free-fall-float-off sort of method, like, you use a relaxed arm-weight to fall into the notes, and then you control it by lifting up and through.” (Pianist 3)

She described how she would use technical exercises for finger strength and coordination to develop a proper piano technique.

“I would start with Hanon [or] Dohnányi exercises. [...] That was more for finger strength and coordination.” (Pianist 3)

Another aspect raised by the participants was how the adjustment and choice of piano bench influenced their technique, which aids in preventing an MSD.

“I am sure that I do mostly sit in a chair with a back rest, which also takes some pressure off.” (Pianist 2)

“I needed much more power than sitting low would be able to give me.” (Pianist 2)

“I definitely think the height of our chair will have an impact on your octave technique and your technique in general.” (Pianist 4)

#### **4.4.1.2 Proper playing posture**

For all the participants, developing a proper posture in front of the piano is of high importance. The participants had varied views on obtaining an appropriate posture for piano playing. Some pianists prefer to sit more upright while others would bend forward in a “hunched” (Pianist 2) position. However, they all shared the notion that a relaxed posture is vital when playing the piano.

“I think everyone has different posture. [...] Just relaxing into it and not slouching, but just relaxed, and then you just put your arms on the piano and just relax your wrists.” (Pianist 5)

“Sitting in a relaxed position and then dropping your arms next to your waist and then if you just lift your arms and put your arms on the keys with your shoulders still down.” (Pianist 1)

“I feel like, if I have a slightly more upright posture, it is easier to move with your whole body.” (Pianist 3)

“Your feet need to be quite firmly on the ground.” (Pianist 3)

“The sitting position, you know, like sitting halfway on the stool. [...] Your lower body is well balanced.” (Pianist 3)

“A relaxed but erect posture, like, if you imagine being pulled up like this. [...] Almost just like your hips are in line with your shoulders.” (Pianist 3)

“Just generally more upright. I did slouch a lot, but in general I am more aware of sitting upright.” (Pianist 6)

“The more hunched posture allows for much freer arm movement, which helps with relaxation and not sustaining injuries.” (Pianist 2)

Pianists 5 and 6 commented how, after recovery and being aware that they may hurt themselves again, they experienced making postural adjustments during daily activities, which contributed to an overall healthier stance. They referred to activities such as looking down to a mobile phone, or to add support to their backs when sitting upright.

“One must rather not lie in bed too much [while] looking down on your phone.” (Pianist 6)

“When I sit in front of the desk, I do make sure that I crop something up against my back.” (Pianist 5)

#### **4.4.1.3 Balanced practising routine**

The pianists also suggested that it is crucial to maintain a consistent, regular and structured practise routine. In their view, such a routine should be balanced by taking regular breaks.

“I practise much more regularly.” (Pianist 2)

“My practise sessions are more structured now, [...] more goal-oriented.” (Pianist 3)

Some of the pianists explained how regular five to ten-minute breaks after every hour or half an hour of practising reduces physical stress.

“I’ll go for an hour on end and then I try to take a break, like ten to fifteen minutes.” (Pianist 1)

“My practise sessions go better when I have five to ten-minute breaks.” (Pianist 3)

“I mean, you go crazy after a while if you don’t take breaks or socialise for a while and eat something.” (Pianist 4)

“I try to do an hour, sometimes even just half an hour, just to like, practise a certain section. So, it all depends on the day and how I am feeling, [...] even if it is just a bathroom break or a 15-minute coffee break.” (Pianist 5)

“I actually get a lot more done. So sometimes, not trying to push everything in one go, just taking breaks, focussing on one thing.” (Pianist 5)

#### **4.4.1.4 Choice of repertoire**

The participants’ perception was that they could prevent an MSD by choosing different repertoire and limiting the selection of technically demanding repertoire that may cause an increase in physical over-exertion. The idea of incorporating alternative genres, such as jazz and popular music, rather than limiting their performances to classical music, emerged through the data analysis process.

“Play Jazz (laughing). You won’t easily get an injury. It is not technically very challenging. [...] It is, for example, much lighter than Liszt.” (Pianist 4)

“Maybe choose different repertoire if you can.” (Pianist 6)

“Mostly playing jazz and popular music.” (Pianist 1)

“I am not playing something, I guess, that [...] demands the same kind of thing from me anymore.” (Pianist 1)

“Take it slowly, don’t push yourself to that extent, so that is a valuable lesson learned.”  
(Pianist 2)

“I started playing piano when I was seven, so I started breaking away from classical probably around 2019, 2020.” (Pianist 4)

#### **4.4.2 Healthy body and mind**

According to the participants, they need to maintain a healthy body and mind as these are key aspects in preventing musculoskeletal injuries. When they explained their experiences of coping with stress and avoiding future injuries, several codes emerged. They described how they applied relaxation techniques, partook in physical activity, adjusted their diets, and employed somatic practices, as described in the following sections.

##### **4.4.2.1 Body awareness and relaxation**

The participants explained that it is vital to be aware of the whole body when playing the piano, and that this awareness reduces the risk of injury. They reflected that an awareness of one’s body and understanding how the body moves when playing piano can reduce the risk of injury.

“To study the movement of the body, to analyse which movements influence the other parts of the body.” (Pianist 4)

“Your whole body is involved in piano playing, not only your fingers.” (Pianist 2)

“When you’re not like really thinking about your whole body and understanding kind of what is happening with your body, that kind of increases the risk of injury.” (Pianist 3)

Another related aspect that emerged from data analysis was that stress and anxiety lead to tension, major aggravators in the development of performance-related injuries. Relaxation techniques the participants used significantly reduced the stress they experienced and helped them prevent future MSD injuries. The following quotations describe several strategies they apply for this purpose.

One of the participants referred to breathing techniques as a non-medical relief for anxiety.

“[I did] non-medical anxiety relief practices, like breathing.” (Pianist 3)

Relaxing activities seemed to make the pianists feel stress-free, assisting them to be more relaxed when playing the piano.

“Like for me, things that are relaxing, like reading.” (Pianist 3)

“Listening to music.” (Pianist 3)

“Maybe spending a bit of time outside.” (Pianist 3)

#### **4.4.2.2 Physical activity**

Data analysis revealed that concerted efforts from the participants to do physical activity contributed to MSD injury prevention. These activities include, amongst others, walking, hiking, resistance training, yoga, and stretch exercises. The pianists experienced how these exercises assisted them in averting future injuries.

“Being static for that long period of time [in front of the piano]. I try to just move around, like go for long walks, or a hike, or stuff like that.” (Pianist 1)

“Exercise has become a higher priority for me now in terms of preventing injuries.” (Pianist 3)

“Try and do some neck and shoulder rolls. [...] Integrate small exercises and forms of movement.” (Pianist 3)

Playing the piano requires a significant amount of bodily strength from a pianist as it is a physically demanding instrument. The participants explained how strengthening their muscles through resistance training reduced the chances of injuries occurring.

“My body needed to be stronger in general to play piano, because it is a very physically challenging instrument. [...] Build muscle in the gym, [...] it will make me stronger overall to play piano better.” (Pianist 4)

“The big thing is to strengthen your neck muscles. All the doctors told me that our neck muscles aren’t strong enough.” (Pianist 6)

Pianist 5 also focussed on strengthening her muscles by doing yoga as a form of exercise.

“I started doing quite a lot of yoga and literally, my back and everything has never felt better. [...] It does strengthen all muscles.” (Pianist 5)

Stretching around practise sessions reduced the amount of strain in the muscles for Pianist 3.

“I do these nerve stretches to make sure I don’t put too much strain on myself [...] after every hour of practising I try to stretch properly.” (Pianist 3)

#### **4.4.2.3 Dietary adjustments**

Dietary adjustments included that the participants were more aware of their bodies’ needs by remaining fuelled and hydrated during practising sessions. For some of the pianists, this included nutrition, hydration, as well as limiting their intake of caffeine.

“I also picked up during my injury and recovering, was to stay hydrated.” (Pianist 1)

“I would get a snack if I am being hungry, but usually my main goals when I am resting is drink some water.” (Pianist 3)

Pianist 1 specifically reduced his amount of caffeine consumption.

“I try to cut back on the caffeine a bit as well.” (Pianist 1)



#### **4.4.2.4 Somatic practices**

The participants described how they started using somatic practices to relieve physical and mental stress, for example, prayer, hypnosis, and meditation, thereby reducing the possibility that they gain another injury.

“I would really encourage practices like prayer and mindfulness to help you at least recognise what you are feeling emotionally and physically.” (Pianist 3)

“Before I play an exam or I do a concert or competition or whatever, I always lie down on the floor with my back stretched out, and I do a hypnosis session which is about fifteen minutes. [...] It just relaxes your whole body.” (Pianist 5)

#### **Chapter summary**

In this chapter, I presented the findings according to the participants' lived experiences. Four main themes emerged. Firstly, pianists' playing- and performance-related injuries; secondly, the influence of MSD injuries on the pianists in relation to their well-being and piano careers; thirdly, recovering from MSD injuries, and fourthly, preventing a musculoskeletal injury. It became evident that different strategies work for individual pianists, and that a combination of such strategies may best contribute to the prevention of developing an MSD.

In the final chapter, I discuss the findings in relation to relevant research literature. After answering the research questions, I explain the limitations of the study and suggest ideas for future research.

# **Chapter 5:**

## **Discussion, Conclusion and Recommendations**

In this chapter, I discuss the findings attained through data analysis of the one-on-one semi-structured online interviews with the six pianists in relation to relevant research literature. I present answers to the research questions according to the findings of the study, after which I explain how I dealt with limitations encountered during the data collection process. I then offer recommendations for future research as critical questions to continue the debate on this important topic, and end the dissertation with a conclusion.

### **5.1 Discussion of the results**

In this section, the findings are related to relevant research literature. Topics discussed include the causes of MSD injuries in pianists, the influence of such injuries on classical pianists, and the role of piano pedagogy to inform pianists about MSDs. Furthermore, I provide an in-depth discussion of available support for MSD injuries in pianists.

#### **5.1.1 Theme 1: Pianists' playing-related MSD injuries**

Data analysis revealed that, without certain circumstances or causes, the pianists would not have incurred their MSD injuries in the first place. Therefore, there is a direct link between a pianist's education about playing-related MSDs and knowing how to prevent such injuries. In the following sections, the findings of the study regarding causes of MSDs in pianists are discussed in relation to relevant research.

- **Overuse**

After analysing the data derived from the interviews with the six pianists, overuse of muscles as a contributor to an MSD was a prominent emerging theme throughout. The findings of the current research revealed that professional musicians often subject themselves to long hours of practising, overusing their playing abilities and causing injuries. This concurs with Mizrahi's (2021) research related to professional musicians in general, as well as to Allsop and Ackland's (2010) survey investigating the prevalence of MSDs in professional and non-professional pianists, namely that MSDs are caused by overuse when playing. Similarly, Lister-Sink (2016) found that overuse or misuse of muscles played a role in the development of MSDs among pianists.

- **Incorrect posture**

Good posture is vital to prevent or overcome MSDs (De Gast, 2009; Kaur & Singh, 2016; Turon, 2000). The findings from the current study revealed that pianists diagnosed with MSDs only became aware of their incorrect posture after developing their injuries.

- **Piano technique**

As tension of the muscles and stiffness in the upper body often leads to the development of injuries, piano pedagogues should teach their pupils to avoid such tendencies during their early years. The study findings revealed that unnecessary movement in the upper body contributes significantly to the development of MSDs. The study findings revealed that extreme and unnecessary neck movements while playing the piano causes severe pain and injury. These findings substantiate Wristen's (2000) belief that pianists' should use bodily movements in the most economical manner to avoid injuries. Similarly, Foxman and Burgel (2006) concur that extreme movements contribute to MSDs.

- **Lengthy practise sessions**

The findings of the current study revealed that lengthy practise sessions are a significant cause of MSDs. This confirms the results from other researchers (Bosi, 2017; Ioannou and Altenmüller, 2015; Kaufman-Cohen et al., 2018; Ling et al., 2018; Tchernik, 2017; Turon, 2000). Additionally, when the participants ignored the initial symptoms of their MSD injuries, the pain increased and made the recovery process longer. This substantiates findings by other scholars including Brandfonbrener (2003), Ledeman (2003, and Warrington (2003), who suggest that ignoring the symptoms may impact the recovery process, and that not recovering from an MSD properly result in poor long-term health.

“Musicians spend much more time practicing than performing and it is likely that most musculoskeletal injuries are related to practicing” (Dommerholt, 2009, p. 311). In this study, the participants all experienced severe pain and injuries due to lengthy practise sessions without taking proper breaks. This concurs with the findings of other researchers, namely that long practising hours without regular breaks lead to the development of MSDs (Bosi, 2017; Ioannou and Altenmüller, 2015; Kaufman-Cohen et al., 2018; Ling et al., 2018; Tchernik, 2017; Turon, 2000). Additionally, a sudden change of the practice regime by drastically increasing practice hours increased the possibility of developing an MSD, as supported by Welch's (2016) study.

- **Omitting warming up before practising**

Avoiding warming up properly before performing or practising is another trigger for developing an MSD, concurring with findings from other studies (Bosi, 2017; O'Neil, 2019). Apart from warming up, the participants in the current study suggested that the pianist does some stretching exercises before practising or performing as these activities reduce the risk of MSDs (Mayon, 2017; Stassijns et al., 2015).

- **Awareness of causes and prevention methods of MSDs**

The findings from the data analysis in this study revealed that most of the pianists were not aware of the causes and prevention methods of MSDs. They only became more conscious of it after they developed an injury. This directly relates to the findings of Redmond and Tierman (2001), who recommend that health care professionals and piano teachers should collaborate to increase education on injury prevention. Piano teachers are in the perfect position to teach students about preventing playing-related injuries (Turon, 2000) and attaining a good posture in front of the piano (Ajjadahun, 2011)

- **Stress**

Similar to Westgaard's (1999) study, stress contributed to the development of MSDs in the participants of the current research. Furthermore, Stassijns et al. (2015) and Bosi's (2017) research concluded that performance anxiety, a competitive environment, and practising for performances, increase a musician's stress level. Ranelli et al. (2015) also agree that performance-associated emotional stress increases the risk of playing-related musculoskeletal problems. Moreover, stress causes muscle tension, and during data analysis, I found that tension and stiffness is a severe cause of MSDs, most frequently occurring in the pianist's upper body, concurring with the research findings of Corrêa et al. (2018) and Willis et al. (2017).

- **Switching from an upright to a grand piano**

The study findings revealed that playing on a different type of piano raises the possibility for a pianist to obtain an MSD injury. According to one of the participants, the movements required when playing on an upright piano change when playing on a grand piano as the pianist requires increased energy and effort to produce the larger sound. This relates to Lister-Sink's (2016) findings that there is a mismatch between the size piano keyboard and the pianist, and that this may lead to the development of an MSD. As female pianists are usually physically smaller than

men, they are twice as prone to MSDs than men (Brown, 2004; Furuya et al., 2006; Gong et al., 2014; MacRitchie & Baylis, 2016).

- **Challenging repertoire**

All the pianists in the current study performed repertoire with a high level of technical difficulty such as rapid finger passages and arpeggios. Pianist 3 described how she, after recovering from her injury, used arm weight to reinforce the execution of *glissandi* instead of merely using her fingers. Similarly, James' (2012) findings reveal that arm weight adds sustainability to piano technique by using gravity.

Pianists 1, 2, 4 and 6 all experienced an increase in MSD development from large intervals and chords as well as consecutive octaves in the repertoire. This links to the findings of Sakai (2002) who found that the thumb and fifth finger undergo hyperabduction to reach such large stretches. Due to the many repetitions of these strenuous movements, there is an increase in force and stretching of the hand (Kaufman-Cohen et al., 2018; Kaur & Singh, 2016; Mariotti, 2014; Rosety-Rodriguez et al., 2020).

Research results of the current study indicate that MSD injuries are prevalent in a pianist's upper body (Corrêa et al., 2018; Redmond & Tierman, 2001; Willis et al., (2017), and that MSDs in classical pianist mainly affect the neck, spine and upper limbs (Bruno et al., 2008; Kok et al., 2016). Panebianco (2017) identifies the lower spine, upper spine, left and right forearms as key areas of injuries, while Ajidahun et al. (2019) refer to the back, neck and shoulders. The participants in the current study experienced injuries in all these areas of the body. Only two of the pianists in this study were aware of any visual symptoms, confirming Revak's (1989) study which showed that visibly noticeable symptoms in the hand and arm are rare.

The pianists in this study became aware of their injuries through physical symptoms, such as a shooting sensation while practising, physical tension, increasing pain, soreness, stiffness, strain, stinging, and pain while stretching their upper limbs, are all symptoms of playing-related injuries. This concurs with the findings of Ajidahun's (2011) research. Pianist 6 specifically experienced her injury between the second and third finger joints when playing repertoire requiring large stretches. Such large stretches and awkward hand and finger positions place stress on joints, therefore making them weaker and more prone to developing an injury (Foxman & Burgel, 2006).

### **5.1.2 Theme 2: Influence of MSD injuries on pianists**

The results of the current study revealed that injuries negatively influenced the pianists when performing routine activities in their daily lives through actions such as driving, lying down, sitting, or working on a computer. Regarding pianists specifically, Panebianco-Warrens et al.'s (2015) study showed that these musicians are the least likely of all performers to utilise health-promoting behaviours. Furthermore, research literature indicates concern for all performing musicians in South Africa as they are compelled to supplement their incomes with non-music related jobs (Devroop, 2014; Hohls, 2010). Having a performance-related injury hinders everyday activities and makes it difficult for musicians to participate in other occupations, adding additional psychological stress. Kaufman Cohen et al. (2018) highlight how psychological factors, such as stress and anxiety, raise pain levels experienced by injured pianists, making it even more difficult for them to recover and resume the performance obligations that form part of their piano careers.

The elongation of the time of injury experienced by the pianists affected their mental and emotional wellbeing as described in chapter 4 of this study. The negative influences experienced by the participants, such as frustration, irritability, anxiety, out-of-control feelings, and lowered self-esteem, corresponds with findings from Kaufman Cohen et al.'s (2018) study, who noted that these mental and emotional aspects exacerbate and heighten the physical pain experienced by pianists.

Another factor that negatively influenced the pianists was that they were forced to cut down on practising hours during the time of injury and recovery. This increased the level of mental and emotional stress and led to lowered self-confidence as they had less time to prepare for performances. Similarly, Bosi's (2017) findings indicate that pianists often avoid taking time-off due to performing demands, impacting negatively on their psychological state. However, in order to recover, pianists need to reduce playing time (Bosi, 2017; Stassijns et al., 2015) and take a break after every hour of practising (Brandonbrener, 2003; Lederman, 2003; Warrington, 2003).

A novel finding in this study is that two of the pianists who suffered from MSD injuries experienced an increased ability to play challenging repertoire after they recovered from their injuries. I have not been able to find any corroborating findings in other studies, making this a significant finding that needs further exploration. However, this increased ability after an injury could have taken place if the pianists developed the correct technique and strength for challenging repertoire during their early years of piano training.

### **5.1.3 Theme 3: Recovering from MSD injuries**

The findings of the data analysis in this study came across the following methods for injury support from medical professionals: acupuncture, stretches, exercises, frequent breaks, rest, ice packs, gentle compression, and the use of a supportive pillow for the neck for the individual pianists' injuries. Brandfonbrener (2003) also recommended that the use of ice application to injured muscles after playing, the wearing of night splints as well as the stretching of muscles all play an important role in the recovery of an injury and connects with what the pianists found helpful as well.

The medical practitioners who supported the pianists in this study prescribed that their patients obtain sufficient rest during the recovery period, as well as to rest in between practising sessions once they resumed their playing activities. This connects with Klickstein's (2019) research, indicating that medical professionals would prescribe a short period of complete rest followed by relative rest for injuries. An example hereof is where a doctor or physical therapist would suggest an appropriate time when the musician can start playing again after taking several days off, and would advise that they start off with short sessions of playing and gradually prolonging these periods as the musician's recovery progresses.

The findings of this study addressed how sleeping on a supportive pillow reduced pain and enhanced recovery for some of the pianists. According to chiropractor Dr Lawrence Woods an orthopaedic pillow helps to reduce discomfort when sleeping by aligning the spine. The correct sleeping pillow will support your head, neck and shoulders which prevents pain and enhances one's quality of sleep (Woods, L., 2022).

Although scholars recommend that pianists should avoid surgery for MSD injuries, if possible (Brandfonbrener, 2003; Lederman, 2003; Warrington, 2003), severe MSD cases may require such treatment. These concerns may be due to surgery negatively impacting several performance abilities, such as mobility, strength, and stability. However, pianist 6 underwent surgery and experienced a full recovery, partly due to her surgeon being acutely aware of the impact of the surgery on her performance abilities. Similarly, Sheibani-Rad et al.'s (2013) findings stress the importance of a surgeon's awareness of what a pianist need to be able to do after the injury, and not to limit their range of movement in such a way that they cannot pursue their career.

Overuse of muscles due to highly repetitive movements is a major source of MSD development and contributed to the development of tendonitis in several study participants. This corresponds with the findings of Allsop and Ackland (2010), who found that MSDs were caused by overuse rather than a smaller hand span, a factor often regarded to cause MSDs in pianists.

- **Body awareness and relaxation**

Body awareness and relaxation as alternative methods to injury recovery and prevention was a prominent theme in the findings of this study. Noulis (2014) found that if pianists are more aware of their internal, mental, physical, and psychological actions, it may support a healthy piano technique. Pianist 6 described how she became aware of the impact of certain activities on her neck injury, for example, looking down at her mobile phone that caused unnecessary tension on the neck. In this regard, US chiropractor, Dr Dean Fishman, warns that the average person spends approximately 1,400 hours looking down at their smartphones every year, unconsciously putting the neck in an overstressed forward curve (Optimal Chiropractic, 2021).

Using a holistic approach to piano playing, pianists may increase their mindfulness and achieve a higher level of observation, enabling them to identify what may be contributing to their pain (Lister-Sink, 2015). In López and Martínez' (2013) study, students followed a year programme with warm-ups, stretching- and postural exercises to develop body awareness. They identified this "body mapping" as an effective injury prevention technique for musicians, allowing them to learn how to move their bodies healthily and mindfully to improve the effectiveness of playing for better overall musical artistry (Bindel, 2013). Pianist 4 specifically referred to how being more aware of his body movements during playing, increased his economical playing ability. This relates to Lister-Sink's (2016) findings, showing that the use of muscle in an efficient manner uses physical energy economically to limit the amount of stress on the neuromuscular system for pianists while playing.

- **Breathing**

In the current study, one of the pianists used breathing techniques as an alternative method towards recovering from an injury. He set reminders for himself to breathe more, assisting him to relax and release tension. This relates to Lister-Sink's (2016) findings that pianists need to be aware of their natural breathing state while releasing tension in their shoulders and neck when sitting at the piano.



- **Mental practice**

As physical practise on the piano is only one aspect of being a performing artist, the participants described how they added mental practice to support and recover from their playing-related injuries. Mental practice allows the musician to anticipate a physical movement before performing it (Fine et al., 2015), thereby reducing the possibility of being injured. Mental practice strategies referred to by the participants in the current study included, amongst others, analysing the score, identifying harmonies, and notating the music score from memory. Yang et al. (2021) recommend “smart” practising strategies for musicians, including mental practice, that allows them to preserve their “musculoskeletal strength and energy” (p. 210). Heremans et al. (2014), for example, found that world-renowned pianists, Rubinstein and Horowitz, implemented a mental practice regime during their careers. Furthermore, Iorio et al. (2022) suggest that musicians combine mental and physical practice regimes to reduce playing-related injuries.

- **Practising at a slower tempo and softer dynamic level**

The input force of a finger on a musical instrument is directly linked to the dynamic level of the sound (Dutton, 2022). Consequently, pianists in this study used a slow tempo and softer dynamic level when practising during the recovery time to reduce energy and muscle effort. Practising in a slower and softer manner meant that, apart from exerting less energy and effort, the participants gained more bodily awareness which in turn prevented tension and strain. Similarly, participants in Dutton’s (2022) study revealed that “slow practice with gradual speed up” (p. 52) assisted approximately 90% of them in easing the pain they suffered during recovery from playing-related injuries.

- **Dietary adjustments**

Dietary adjustments such as drinking less coffee, avoiding acidic foods and eating plenty of protein were part of the participants’ strategies to overcome their injuries and prevent further disablement. These findings concur with Kloubec and Harris’s (2016), who found that proper nutrition reduces inflammation and oxidative stress, playing a critical role in recovering and healing from an injury. The body naturally produces antioxidants, but more antioxidants are required to keep inflammatory responses under control during injury recovery. These authors recommend that musicians have healthy diets that include a variety of fruits, vegetables, whole grains, legumes, lean meats, poultry, fatty fish, and nuts and seeds, to ensure adequate intake of important nutrients (Kloubec & Harris, 2016).

Pianist 3 expanded on her use of beta-blockers to prevent physical symptoms such as tension and shakes during performances to reduce her chances of an additional injury occurring. Similarly, Nelson (2010) notes that professional musicians experience stress during performances and the use of beta-blockers help keep debilitating physical symptoms under control.

#### **5.1.4 Theme 4: Preventing a musculoskeletal injury**

The findings of this study indicate that pianists only pay attention to playing- and performance-related MSD injuries after it has developed. As I interpreted the research results, I realised that the lack of education in correct piano technique and awareness of injury prevention significantly contributes to pianists' performance-related musculoskeletal injuries and wellness problems. Therefore, piano pedagogues should make their pupils aware of possible injuries that may occur so that they develop healthy practising schedules. However, six years ago when Rennie-Salonen and de Villiers (2016) published their research, South African universities did not offer any "courses in musician's health" (p. 1), a situation that has not changed significantly to date.

Several researchers advocate that professional musicians establish deliberate and healthy practice regimes for themselves early on in their careers to prevent MSD injuries (De Vroop, 2014; Panebianco-Warrens et al., 2015.) The ideal would be that a piano pedagogy course focuses "on the whole human being behind the instrument, including analysing and changing life attitudes and routines" (Fugazza, 2019, p. 1). Tertiary institutions should integrate the following three components during a piano pedagogy course to develop their students into flourishing musicians. These are i) developing and sustaining a proper piano technique, ii) nurturing a healthy body, and iii) reducing mental and physical stress. The findings of this study revealed that several aspects should form part of piano pedagogy during the education of pianists. In the following sections, I describe these findings in relation to relevant research literature.

- **Education in performance-related musculoskeletal injuries**

All the participants in this study experienced performance-related musculoskeletal injuries. However, none of them had education on this topic before their injuries, confirming Salonen-Rennie and de Villiers' (2016) research findings. Although most of the pianists in this study positively experienced their medical help to recover from their performance-related injuries, some of them found medical treatments as "generalised" and not necessarily precise to address a specific injury. MacRitchie (2015) notes that the lack of piano teachers' knowledge of "hand span, finger length, or choice of techniques" (p. 172) hinders injury-free piano tuition. Such problems

could be prevented if piano pedagogues educate themselves on all aspects of a healthy piano practice (Lister-Sink, 2015; MacRitchie, 2015), appropriate piano technique and posture (Fraser & Ardan, 2003; Kaur & Singh, 2016; Lister-Sink, 2015 & 2016; MacRitchie, 2015; Miller, 2011; Turon, 2000; Wristen, 2000), piano practising regimes and warming up (Chan, 2014), physical exercise and stretching of muscles (Chan, 2014; Frederickson, 2002), mental practice strategies (Iorio et al., 2022), dietary considerations (Barton & Feinberg, 2008) and to collaborate with medical professionals to educate their piano pupils about MSDs (De Vroop, 2014; Turon, 2000).

- **Piano technique**

Miller (2011) describes musical technique as “a form of embodied knowledge – in this case, an embodied knowledge of how to interact with the piano” (p. 268). Aspects on piano technique should include proper posture in front of the piano with an appropriate bench height, relaxation techniques, a healthy practicing regime that allows for frequent breaks, and using alternative practising strategies such as mental practice. Several scholars refer to how pianists should also be taught from an early age what musculoskeletal injuries are, how they can be prevented, and to identify them (Allsop & Ackland, 2010; Cruder et al., 2020). Moreover, the piano pedagogue should foster habits of a healthy body and healthy mind in their pupils.

The pianists in this study especially referred to the importance of piano technique to prevent injuries in terms of using the whole body instead of individual limbs, and applying arm weight in their technique. This relates to the ‘Taubman Approach’ (Milanovic, 2011), where the finger, hand and forearm work in a unified movement to allow effortless playing. James (2012) emphasises how the pianist can use arm weight as a form of gravity to sustain energy while playing.

- **Posture**

The findings of this study revealed that good posture is a vital ingredient in preventing MSDs, reaffirming the results of various other studies in this field (Kaur & Singh, 2016; Turon, 2000). Pereira et al. (2014) argues that “muscle tension and discomfort [are caused by] wrong posture” (p. 115) when musicians play their instruments. Apart from having a good posture as an important part of long-term health (Wang, 2016), the whole body should have an ideal skeletal alignment when playing the piano (Lister-Sink, 2016). The pianists in this study reflected that having a relaxed upright position without being too erect when sitting in front of the piano, leads to a healthy playing posture.

The participants in the current study stressed that increased bodily awareness aids in preventing the development of MSDs from occurring. The ideal posture in front of the piano concurs with Lister Sink's (2016) suggestion that pianists should have a lengthened spine, that they should release tension in the shoulder and neck, and that the arms should hang in a relaxed way from the shoulders. For this study's participants, the piano is a physically demanding instrument and they need to incorporate muscle-strengthening exercises such as resistance training or yoga to help prevent injuries from occurring. Muscle strengthening of the spine can contribute to a healthier posture for pianists (Stassijns et al., 2015). Similarly, Kaufman-Cohen et al. (2018) recommend an exercise programme with strength training to support the spine and shoulder muscles through light resistance, and this may aid pianists in high repetition actions required during performances.

- **Balanced practising regime**

An overuse injury can occur easier with a sudden increase in practise load and time spent playing the piano (Cordell, 2009). The pianists in this study also experienced this occurrence when their injuries developed. Pianist 2 and 3 both agreed that, since their recovery from an MSD, they have a much more regular and structured practise routine to prevent a sudden practise load increase.

- **Switching pianos and bench height**

One of the pianists described how it was difficult for her to switch from an upright piano at home to a grand piano, and that this required more effort and strain. In a similar vein, Dommerholt (2009) argues that "switching from lighter to heavier instruments [...] requires more muscle strength and altered playing postures" (p. 313). Therefore, piano pedagogues should allow opportunities for their pupils to play on different sizes and types of pianos to make them aware of such variances. This will enable them in advance to make the necessary modifications during practice sessions on a different piano if they are required to do so during a performance.

Several participants in this study remarked that the height of the piano bench is crucial to allow a healthy posture and height for the arms above the keyboard, and that this reduces the possibility of developing a playing-related injury. Research by Bragge (2006) also indicates that sitting too low or high causes wrist tension and that the bench height should be in such a manner that the forearms are parallel to the floor when playing. However, Welch (2016) found that "no single bench height is ideal for all pianists" (p. 34). Therefore, the piano pedagogue should allow the pupil freedom to experiment with different bench heights until a perfect fit for the pianist's specific body size is found.

- **Challenging repertoire**

The pianists in this study generally referred to choosing different repertoire that is technically less demanding to prevent an injury. However, pianists 1 and 4 took it a step further and explored the world of jazz and popular music. They both argued that classical music contains some technical aspects that pushes them to an extensive physical limit. Although several scholars regard classical music to be technically more challenging (Bennett, 2016; Leech-Wilkinson, 2020), jazz requires an immense understanding of chord formation (Young, 2006). Furthermore, to be able to apply chord formation creatively while improvising in real-time during a performance is a different kind of challenge, especially at mental level (Young, 2000). Shechter (n.d.) adds to this by comparing complex passages in classical music with jazz. In Baroque fugues, for example, each hand plays multiple voices. However, since jazz is improvised, it is not that practical to come up with numerous parallel passages like that at the same time.

- **Physical activity**

The participants in this study described how they partook in various physical activities to reduce the possibility of gaining another MSD injury. For example, they did physical activities such as walking, hiking, yoga, or stretching and muscle-building exercises. In addition, Chan et al. (2014) suggest that it would be “beneficial for professional orchestral musicians” (p. 181) to take part in an exercise program. Such activities could strengthen the muscles, increase mobility, and boost the musician’s postural alignment which would positively impact pianists’ physical health and body alignment.

- **Dietary considerations**

The findings of the current study revealed that diet and hydration are important aspects in injury prevention for the pianists, as they may experience low energy and become dehydrated during long practise sessions. This resonates with Chan and Ackerman’s (2014) research, who stresses that musicians should include carbohydrates, protein and fat in their diets to remain energised during long rehearsals and practise sessions. Furthermore, water intake is important to keep the body hydrated as dehydration can lead to “tiredness, muscular weakness [and] headaches” (Chan & Ackerman, 2014, p. 4). Similarly, Masento et al. (2014) suggest that inadequate hydration impairs cognitive function. Since dehydration is a stressor to the body, it lowers the levels of serotonin – the hormone that boosts mood – thereby negatively impacting a person’s frame-of-mind (Masento et al., 2014).

- **Stress reduction**

Stress reduction techniques mentioned by the pianists in this study included reading, listening to music, spending time outside, prayer and mindfulness. By reducing stress, the pianists experienced a decrease in their injury occurrence and better recovery. Similarly, Yang et al. (2021) suggest that musicians include leisure activities and maintain a work-life balance to counteract the stress of a performing career. As professional classical musicians continuously work in “stressful and very competitive environments” (Dommerholt, 2009, p. 315), they need to acquire stress management skills during their piano training.

## **5.2 Answering the research questions**

In the following sections, I first present answers to the five secondary research questions that provided smaller steps of exploration in the research process. After that, I offer the answer to the main research question.

### **5.2.1 Secondary research questions**

The following five secondary research questions assisted me to explore the research topic:

- **What symptoms did the participants experience with their playing and performance-related MSDs?**

The participants experienced a variety of visible and physical symptoms. Visible symptoms included redness and blistering; redness and swelling, and ganglion cysts. The physical symptoms included pain while practising, muscle tension, pain increase over time, soreness, stiffness, sensation of strain, a sharp stinging sensation, and the sensation of pain when they stretched after practising. It is evident that the pianists experienced the physical symptoms more prominently than the visible symptoms of their MSDs.

- **How did the participants conclude that they have MSDs?**

The pianists started experiencing the above-mentioned visible and/or physical symptoms of an MSD. They lacked the physical capabilities to perform actions with ease, or at the standard they were able to before they started suffering from an MSD.

- **What factors did the participants experience as contributing to their MSDs?**

The factors that the pianists believe contributed to their suffering from MSD(s) included three different scenarios. The first scenario was what happened in the practise room with regards to the lengthy practise sessions, improper posture, overuse/incorrect playing, improper bench height, ignoring initial symptoms, stress, tension/stiffness in the upper body, unnecessary movement, sporadic/inconsistent practise hours as well as improper warmup. The second scenario was the lack of their education as musicians with regards to MSDs. This included that they lacked proper pedagogy in piano technique, as well as a basic education regarding playing-related injury prevention. The third scenario focused on challenging repertoire which they, as professional pianists, perform. Such repertoire requires large hand stretches, octave stretches, large voicing stretches, rapid finger passages, difficult repertoire, *glissandi* technique as well as arpeggiated passages.

- **What are the participants' experiences of the strategies they used that, in their view, contributed to their recovery process?**

Some pianists used medical care, and for most of the pianists, this was a positive experience as it assisted them to effectively recover from their MSDs. When they used alternative methods, they also experienced the pain decreasing. Findings revealed that the medical care and alternative methods used were speeding up the recovery process.

- **What are the participants' experiences of how they can prevent further MSDs in their piano careers?**

The pianists experienced the prevention strategies they applied for further MSDs as highly effective. Strategies they used include a healthy posture, reduction of mental and physical stress, physical activity, dietary adjustments, as well as the implementation of proper piano technique.

### **5.2.2 Answering the main research question**

The main research question that guided this investigation was:

**What are the lived experiences of South African classical pianists diagnosed with MSDs regarding the identifying, recovering from, and preventing of playing- and performance-related injuries?**

The pianists experienced MSD identification while playing and practising the piano with symptoms ranging from visible to physical symptoms. Although the recovery process was – in most instances – long, disruptive and challenging, they found it to be efficient through both medical care and alternative methods. They carefully considered the measures and strategies they would implement in their future practising regimes and daily lives to prevent further MSD injuries, with specific strategies being more suitable for some pianists than for others. The most prominent aspect emerging from the findings is that proper piano pedagogy and education about musculoskeletal injuries and prevention strategies thereof, are vital in the education of classical pianists to limit the occurrence of playing- and performance-related injuries.

### **5.3 Limitations**

Limitations of this study included that I only interviewed six pianists. Therefore, generalisations cannot be made from the results of this study. The goal of this study, however, was to gain an in-depth insight about a specific phenomenon as experienced by a limited number of participants rather than finding generalised trends over a broad population group. Due to Covid-19 restrictions, I was compelled to use an online platform to conduct the one-on-one interviews. However, in-person interviews would have been more ideal as certain physical descriptions could be demonstrated in more detail. For example, I would have been able to probe further and perhaps see a demonstration at the piano from different angles to obtain a better understanding of what a pianist was explaining rather than a one-sided angle that the online interview format allowed.

### **5.4 Recommendations for future research**

This research delved into the experiences of professional classical pianists in South Africa regarding musculoskeletal injuries they acquired from piano performance activities. Several



related studies can be explored to continue this research topic as presented in the following critical questions.

- What are the lived experiences of South African children learning to play the piano in preventing and recovering from playing- and performance-related injuries?
- To what extent are South African music teachers aware of strategies to prevent playing- and performance-related injuries in South African piano students?
- What is the standard piano pedagogy education of tertiary music students in South Africa with regards to playing- and performance-related injuries in pianists?
- What are South African jazz pianists' lived experiences of preventing and recovering from playing- and performance-related injuries?
- What are South African chamber musicians' lived experiences of preventing and recovering from playing- and performance-related injuries?
- What is the relationship between musculoskeletal injuries and music performance anxiety in pianists?

## **Conclusion**

The current study explored different aspects of six South African classical pianists' experiences of musculoskeletal injuries, thereby extending knowledge and a deeper understanding of this phenomenon. Additionally, the study contributes to possible prevention and recovery strategies that may aid pianists in future. It is vital that South African curriculum designers for instrumental music programmes consider musculoskeletal injuries so that music educators and pedagogues adequately equip their students with knowledge and skills to prevent such injuries. Moreover, piano pedagogues should teach young pianists the correct piano technique, sitting position, and appropriate methods of practising during the early years of piano training. Similarly, tertiary-level piano students should receive piano pedagogy classes to ensure that they are aware of playing-related musculoskeletal injuries and know what preventative actions to take. This should safeguard the knowledge so that all classical pianists are well-educated about the symptoms, causes, recovery, and prevention of playing- and performance-related MSDs, minimising the risk that they suffer such injuries. This should allow professional classical pianists to potentially experience long-term problem-free playing for continuous artistic development.

*Don't push it too far, know your limits.  
The better you know yourself, the better your body heals itself.*  
(Pianist 4)

## References

- Ajidahun, A. T. (2011). *Guidelines in designing a warm up program for the prevention of playing related musculoskeletal disorder among instrumentalists* [Masters' thesis, University of the Western Cape]. UWC Electronic Theses and Dissertations Repository. <http://etd.uwc.ac.za/>
- Ajidahun, A. T., & Phillips, J. (2013). Prevalence of musculoskeletal disorders among instrumental musicians at a center for performing arts in South Africa. *Medical Problems of Performing Artists*, 28(2), 1-5.
- Ajidahun, A.T., Myezwa, H., Mudzi, W., & Wood, W. A. (2019). A scoping review of exercise intervention for playing-related musculoskeletal disorders among musicians. *Muziki*, 16, 8-23.
- Allsop, L., & Ackland, T. (2010). The prevalence of playing-related musculoskeletal disorders in relation to piano players' playing techniques and practising strategies. *Music Performance Research*, 3(1), 61-88.
- Arthur, M., Lee, S. H., Wristen, B., Berenson, G., & Riley, K. (2013). Piano technique. *Medical Problems of Performing Artists*, 28(2), 115-117.
- Austin, Z., & Sutton, J. (2015). Qualitative research: Data collection, analysis, and management. *The Canadian Journal of Hospital Pharmacy*, 68(3), 226–231.
- Barton, R., & Feinberg, J. R. (2008). Effectiveness of an educational program in health promotion and injury prevention for freshman music majors. *Medical Problems of Performing Artists*, 23(2), 47-53.
- Bennett, D. (2016). *Understanding the classical music profession: The past, the present and strategies for the future*. Routledge.
- Bernard, H. R. (2002). *Research methods in anthropology: Qualitative and quantitative approaches* (3rd ed.). Alta Mira Press.
- Biggerstaff, D. & Thompson, A. R. (2008). Interpretative phenomenological analysis: A qualitative methodology of choice in healthcare research. *University of Warwick Institutional Repository*, 5(3), 214-224.
- Bindel, J. (2013). *The collaborative pianist and body mapping: A guide to healthy body use for pianists and their musical partners* [Doctoral thesis, Arizona State University]. Arizona State University Digital Repository.
- Bitsch, V. (2005). Qualitative research: A grounded theory example and evaluation criteria. *Journal of Agribusiness*, 23(1), 75-91.
- Booker, E., & Boyle, R. (2011). Piano keyboards—one size does not fit all! Pianistic health for the next generation. In *Proceedings of the 10th Australasian Piano Pedagogy Conference – Leading notes to effective teaching: Resolving the past-exploring the future*, Crawley, Australia (pp. 2-29).

- Bosi, B. (2017). The reality of injuries in a musician's career. *The American Music Teacher*, 67(1), 16-20.
- Bragge P. (2006). A systematic review of prevalence and risk factors associated with playing-related musculoskeletal disorders in pianists. *Occupational Medicine*, 56(1), 28–38.
- Brandfonbrener, A. G. (2003). Musculoskeletal problems of instrumental musicians. *Hand Clinics*, 19(2), 231.
- Brown, S. L. (2004). *Being a female concert pianist: The problems of the body* [Doctoral thesis, University of California]. Proquest Dissertations and Theses Global.
- Bruno, S., Lorusso, A., & L'Abbate, N. (2008). Playing-related disabling musculoskeletal disorders in young and adult classical piano students. *International Archives of Occupational and Environmental Health*, 81(7), 855-860.
- Cambridge Dictionary (n.d.) *Cambridge Online Dictionary*. <https://dictionary.cambridge.org/>
- Carolan, M. (2003). Reflexivity: A personal journey during data collection. *Nurse Researcher*, 10(3), 7–14.
- Cleveland clinic. (2022). 10 Ways you can relieve stress right now. <https://health.clevelandclinic.org/how-to-relieve-stress/>
- Chan, C., & Ackermann, B. (2014). Evidence-informed physical therapy management of performance-related musculoskeletal disorders in musicians. *Frontiers in Psychology*, 5, 706.
- Chan, C., Driscoll, T., & Ackermann, B. J. (2014). Effect of a musicians' exercise intervention on performance-related musculoskeletal disorders. *Medical Problems of Performing Artists*, 29(4), 181-188.
- Cordell, K. N. (2009) *Piano performance injuries and preventions* [Honors thesis, Quachita Baptist University]. Scholarly commons.
- Corrêa, L. A., dos Santos, L. T., Paranhos Jr, E. N. N., Albertini, A. I. M., Parreira, P. D. C. S., & Nogueira, L. A. C. (2018). Prevalence and risk factors for musculoskeletal pain in keyboard musicians: A systematic review. *The Journal of Injury, Function and Rehabilitation*, 10(9), 942-950.
- Creswell, J. W., & Poth, C. N. (2017). *Qualitative inquiry and research design: Choosing among five approaches*. (4th ed.). Sage.
- Cruder, C., Barbero, M., Koufaki, P., Soldini, E., & Gleeson, N. (2020). Prevalence and associated factors of playing-related musculoskeletal disorders among music students in Europe. Baseline findings from the Risk of Music Students (RISMUS) longitudinal multicentre study. *PLoS one*, 15(12), e0242660.
- Deep Heat. (n.d.). *Deep Heat*. Author. <https://deepheatsa.co.za/>
- De Gast, A.A. (2009). Functional Impingement of the Shoulder Due to Poor Posture in Musicians. *Medical Problems of Performing Artists*, 24(1), 45-46.

- Devroop, K. (2014). Performing arts medicine: A research model for South Africa. *The Journal for Transdisciplinary Research in Southern Africa*, 10(2), 47–56.
- Dommerholt, J. (2009). Performing arts medicine—instrumentalist musicians Part I—General considerations. *Journal of Bodywork and Movement Therapies*, 13(4), 311-319.
- Dutton, L. (2022). *Prevention, early recognition, and intervention techniques for injuries in string players* (Doctoral thesis, University of Georgia).
- Eatough, V., & Smith, J. A. (2017) Interpretative phenomenological analysis. In C. Willig, & W. Stainton-Rogers (Eds.). *Handbook of qualitative psychology* (2nd ed., pp. 193-211). Sage.
- Estrin, R. (n.d.). How to play glissando on the piano. Living Pianos. <https://livingpianos.com/how-to-play-glissando-on-the-piano/>
- Etikan, I. (2015). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1-4
- Finlay, L. (2002). Negotiating the swamp: the opportunity and challenge of reflexivity in research practice. *Qualitative research*, 2(2), 209-230.
- Fischer, C. T. (2009). Bracketing in qualitative research: conceptual and practical matters. *Quantitative and Qualitative Methods for Psychotherapy Research*, 19(4-5).
- Fouché, C. B., & Schurink, W. (2011). Qualitative research designs. In A. S. de Vos, H. Strydom, C. B. Fouché & C. S. L. Delpont (Eds.). *Research at Grass Roots* (pp. 307-327). Van Schaik.
- Foxman, I., & Burgel, B. J. (2006). Musician health and safety: Preventing playing-related musculoskeletal disorders. *American Association of Occupational Health Nurses Journal*, 54(7), 309–316.
- Frederickson, K.B. (2002) Fit to play: Musicians’ health tips. *Music Educators Journal*, 88(6), 38-44.
- Furuya, S., Nakahara, H., Aoki, T., & Kinoshita, H. (2006). Prevalence and causal factors of playing-related musculoskeletal disorders of the upper extremity and trunk among Japanese pianists and piano students. *Medical Problems of Performing Artists*, 21(3), 112-117.
- Gong, H. S., Cho, H. E., Rhee, S. H., Kim, J., Lee, Y. H., & Baek, G. H. (2014). Radial collateral ligament injury of the little finger proximal interphalangeal joint in young pianists. *The Journal of Hand Surgery*, 39(8), 1535-1539.
- Guba, E. G., & Lincoln, Y. S. (1982). *Establishing dependability and confirmability in naturalistic inquiry through an audit* [Paper presentation]. Annual Meeting of the American Educational Research Association, 19–23 March, 1892, New York.
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field methods*, 18(1), 59-82.

- Hadjakos, A. (2012). The essentials of healthful biomechanics for the pianist. In M. Watcher (Ed.), *Proceedings of the Sound and Music Computing Conference*, Darmstadt, Germany (pp. 303-310). SMC.
- Hagglund, K. L., & Jacobs, K. (1996). Physical and mental practices of music students as they relate to the occurrence of music-related injuries. *Work*, 6(1), 11-24.
- Hawker, S. (Ed.). (2006). *Compact Oxford dictionary, thesaurus and wordpower guide*. Oxford University Press.
- Healthline. (2021). *Tendinitis*. <https://www.healthline.com/health/tendinitis#causes>
- Highben, Z., & Palmer, C. (2004). Effects of auditory and motor mental practice in memorized piano performance. *Bulletin of the Council for Research in Music Education*, 58-65.
- Heremans, E., Feys, P., Nieuwboer, A., & Helsen, W. F. (2014). The application of motor imagery in patients with Parkinson's disease: A state of the art. In Kumar, (Ed.), *Textbook of movement disorders*, (pp. 87–91). Jaypee Brothers Medical Publishers.
- Hoffman academy. (n.d.). *How to develop good piano posture*. <https://www.hoffmanacademy.com/blog/developing-good-piano-posture/>
- Hohls, Q. R. (2010). *An investigation into performance-related musculoskeletal disorders of professional orchestral string musicians in South Africa* [Doctoral thesis, Durban University of Technology].
- Hypermobility Syndromes Association. (2015). *What are hypermobility syndromes?* <https://www.hypermobility.org/what-are-hypermobility-syndromes#:~:text=Hypermobility%20is%20the%20term%20used,or%20it%20may%20be%20widespread.>
- Ioannou, C. I., & Altenmüller, E. (2015). Approaches to and treatment strategies for playing-related pain problems among Czech instrumental music students. *Medical Problems of Performing Artists*, 30(3), 135-142.
- Iorio, C., Brattico, E., Munk Larsen, F., Vuust, P., & Bonetti, L. (2022). The effect of mental practice on music memorization. *Psychology of Music*, 50(1), 230-244.
- James, B. (2012). The art of pianism meets science, sustainable performance: Use of arm weight. *Australian Journal of Music Education*, 2, 92-101.
- Johnson, T. P. (2003) Snowball sampling: second edition. *Journal of Official Statistics*, 10, 53-67.
- Kaufman-Cohen, Y., Portnoy, S., Sopher, R., Mashiach, L., Baruch-Halaf, L., & Ratzon, N. Z. (2018). The correlation between upper extremity musculoskeletal symptoms and joint kinematics, playing habits and hand span during playing among piano students. *Plos One*, 13(12).
- Kaur, J., & Singh, S. (2016). Neuromusculoskeletal problems of upper extremities in musicians-a literature review. *International Journal of Therapies and Rehabilitation Research*, 5(2), 14.

- Kok, L., Huisstede, B. M. A., Voorn, V. M. A., Schoones, J. W., Rob, G. H. H. (2016). The occurrence of musculoskeletal complaints among professional musicians: a systematic review. *International Archives of Occupational and Environmental Health* 89, 373-396.
- Klickstein, G. (2019). *Recovering from injury*. The musician's way. <https://www.musiciansway.com/2019/01/recovering-from-injury/#:~:text=For%20injuries%20that%20arise%20from%20misuse%2C%20retrainin g%20is,period%20of%20total%20rest%20followed%20by%20relative%20rest.>
- Kloubec, J., Harris, C. (2016). Whole foods for enhanced injury prevention and healing. *ACSM's Health & Fitness Journal*, 20(2), 7-11.
- Kumar, R. (2014). *Research methodology: A step-by-step guide for beginners*. (4th ed.). Sage.
- Lash, D. (2011). Derek Bailey's practice/practise. *Perspectives of New Music*, 49(1), 143-171. <https://doi.org/10.7757/persnewmusi.49.1.0143>
- Lederman, R. J. (2003). Neuromuscular and musculoskeletal problems in instrumental musicians. *Muscle & Nerve*, 27(5), 549-561.
- Leech-Wilkinson, D. (2020). *Challenging performance: Classical music performance norms and how to escape them*. Kings College London.
- Ling, C. Y., Loo, F. C., & Hamedon, T. R. (2016). Knowledge of playing-related musculoskeletal disorders among classical piano students at tertiary institutions in Malaysia. *Medical Problems of Perform Artists*, 31(4), 201-4.
- Ling, C. Y., Loo, F. C., & Hamedon, T. R. (2018). Playing-related musculoskeletal disorders among classical piano students at tertiary institutions in Malaysia. *Medical Problems of Performing Artists*, 33(2), 82-89.
- Lister-Sink, B. (2016). The essentials of healthful biomechanics for the pianist. In M. Wachter (Ed.), *Proceedings of the National Conference on Keyboard Pedagogy 2015*, Kingston, New Jersey (pp.1-4). <https://www.lister-sinkinstitute.org/wp-content/uploads/2016/05/Lister-Sink-NCKP-2016-Proceedings-biomechanics-.pdf>
- Lister-Sink, B. A. (2015). *A study of students' perceptions of the effectiveness of an interdisciplinary method for teaching injury-preventive piano technique* [Doctoral thesis, Columbia University]. Proquest Dissertations and Theses Global.
- López, T. M., & Martínez, J. F. (2013). Strategies to promote health and prevent musculoskeletal injuries in students from the high conservatory of music of Salamanca, Spain. *Medical Problems of Performing Artists*, 28(2), 100-106.
- Mackenzie, N., & Knipe, S. (2006). Research dilemmas: Paradigms, methods and methodology. *Issues in Educational Research*, 16(2), 193-205.
- MacRitchie, J. (2015). The art and science behind piano touch: A review connecting multi-disciplinary literature. *Musicae Scientiae*, 19(2), 171-190.
- MacRitchie, J., & Baylis, C. (2016). A 3D camera user interface for wrist angle monitoring in piano performances. *Les Cahiers de la Société Québécoise de Recherche en Musique*, 17(1), 51-60.

- Madrical, D. & McClain, B. (2012). *Strengths and weaknesses of quantitative and qualitative research*. <https://www.uxmatters.com/mt/archives/2012/09/strengths-and-weaknesses-of-quantitative-and-qualitative-research.php>
- Mariotti, G. (2014). Beneficial daily technical exercises for university piano students. *Research Bulletin of Tokushima Bunri University*, 88, 63-83.
- Mark, T (n.d.). *Pianist's injuries: movement retraining is the key to recovery*. Association for body mapping education. <https://www.bodymap.org/pianist-injuries-movement>
- Maslen, S. (2013). 'Playing like a girl': Practices and performance ideals at the piano. *Performance Enhancement & Health*, 2(1), 3-7.
- Masento, N. A., Golightly, M., Field, D. T., Butler, L. T., & van Reekum, C. M. (2014). Effects of hydration status on cognitive performance and mood. *British Journal of Nutrition*, 111(10), 1841-1852.
- Mayo Clinic. (2020). *Dystonia*. <https://www.mayoclinic.org/diseases-conditions/dystonia/symptoms-causes/syc-20350480>
- Mayon, A. (2017). Warming up for the warm-up: A case for cardio before scales. *MTNA e-Journal*, 9(2), 11-19.
- Merriam, S. B., & Tisdell, E. J. *Qualitative research: A guide to design and implementation* (4th ed.). John Wiley & Sons.
- Merriam-Webster (n.d.) *Merriam-Webster Online Dictionary*. <https://www.merriam-webster.com/dictionary>
- Middlesworth, M. (2022). *The definition and causes of musculoskeletal disorders*. ErgoPlus. <https://ergo-plus.com/musculoskeletal-disorders-msd/>
- Milanovic, T. (2011). Healthy virtuosity with the Taubman approach. *Proceedings of the 10th Australasian Piano Pedagogy Conference Proceedings. Leading notes to effective teaching: Resolving the past - exploring the future*. Charles Sturt University, Wagga Wagga, 4-8 July 2011.
- Milanovic, T. (2014). *Learning and teaching healthy piano technique: Training as an instructor in the Taubman approach* [Doctoral thesis, Queensland Conservatorium]. Griffith Research Online. <http://research-repository.griffith.edu.au/>
- Mohamed, S. (2011). *Evaluation of piano-related injuries using infrared imaging* [Doctoral thesis, Carleton University]. Carleton University Research Virtual Environment. <https://curve.carleton.ca/>
- Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, 1(1), 48-76.
- Moser, A., & Korstjens, I. (2018). Series: practical guidance to qualitative research. part 3: sampling, data collection and analysis. *The European Journal of General Practice*, 24(1), 9-18. <https://www.doi.org/10.1080/13814788.2017.1375091>

- Neal, S. I., & Fields, K. B. (2010). Peripheral nerve entrapment and injury in the upper extremity. *American Family Physician* 81(2), 147-154.
- Nelson, C. (2010) Is popping pills the sure way to beat performance nerves? *The Strad*. <https://www.thestrad.com/is-popping-pills-the-sure-way-to-beat-performance-nerves/3133.article#:~:text=Many%20professional%20musicians%20are%20worried,p hysical%20symptoms%20of%20this%20stress>.
- Nieuwenhuis, J. (2016). *First steps in research* (2<sup>nd</sup> ed.). Van Schaik.
- Noulis, C. (2014). *Somatic education and piano performance* [Doctoral thesis, Birmingham City University]. Birmingham City University Open Access. <http://www.open-access.bcu.ac.uk/4860/>
- Oikawa, N., Tsubota, S., Chikenji, T., Chin, G., Aoki, M. (2011). Wrist positioning and muscle activities in the wrist extensor and flexor during piano playing. *Hong Kong Journal of Occupational Therapy* 21, 41-46.
- O'Neill, J. (2019). *A study of performance-related injuries among BMus violin students in South Africa* [Doctoral thesis, Stellenbosch University].
- Optimal chiropractic. (2021). *Text neck: the impact of looking down at our phones*. <https://optimalchirond.com/text-neck-impact-of-looking-down-at-our-phones/>
- Osborn, M., & Smith, J. A. (2015). Interpretative phenomenological analysis as a useful methodology for research on the lived experience of pain. *British journal of pain*, 9(1), 41–42. <https://doi.org/10.1177/204946371454164>
- Oxford Concise Medical Dictionary Online. (2014). <https://www.oxfordreference.com/view/10.1093/acref/9780199557141.001.0001/acref-9780199557141-e-3226>
- Paine, R., & Voight, M. L. (2013). The role of the scapula. *International Journal of Sports Physical Therapy*, 8(5), 617–629.
- Panebianco, C. (2017). Musculoskeletal and other performance-related disorders in South African undergraduate music students. *Journal of Occupational Health and Epidemiology*, 6(2), 61-68.
- Panebianco-Warrens, C. R., Fletcher, L., & Kreutz, G. (2015). Health-promoting behaviors in South African music students: a replication study. *Psychology of Music*, 43(6), 779-792.
- Physiopedia. (n.d.) *Trapezius*. <https://www.physio-pedia.com/Trapezius>
- Pietkiewicz, I., & Smith, J. A. (2014). A practical guide to using interpretative phenomenological analysis in qualitative research psychology. *Psychological journal*, 20(1), 7-14.
- Ranelli, S., Smith, A., & Straker, L. (2015). The association of music experience, pattern of practice and performance anxiety with playing-related musculoskeletal problems (PRMP) in children learning instrumental music. *International Journal of Music Education*, 33(4), 390-412.



- Redmond, M., & Tiernan, A. M. (2001). Knowledge and practices of piano teachers in preventing playing-related injuries in high school students. *Medical Problems of Performing Artists, 16*(1), 32-39.
- Reid Jr, E. (2010). *Scapular instability and overuse injury in keyboardists*. [Masters dissertation, New York University]. Proquest Dissertations and Theses Global.
- Rennie-Salonen, B., & de Villiers, F. (2016). Towards a model for musicians' occupational health education at tertiary level in South Africa. *Muziki, 13*(2), 130-151.
- Revak, J. M. (1989). Incidence of upper extremity discomfort among piano students. *American Journal of Occupational Therapy, 43*(3), 149-154.
- Riley, K. (2011). Helping musicians achieve peak performance with surface electromyography/video. *Applied Psychophysiology & Biofeedback, 39*(1), 31-34.
- Rosety-Rodriguez, M., Ordóñez, F. J., Farias, J., Rosety, M., Carrasco, C., Ribelles, A., ... & Gomez Del Valle, M. (2020). The influence of the active range of movement of pianists' wrists on repetitive strain injury. *European Journal of Anatomy, 7*(2), 75-77.
- Sakai, N. & Shimawaki, S. (2010). Measurement of a number of indices of hand and movement angles in pianists with overuse disorders. *The Journal of Hand Surgery, 35E*(6), 494-498.
- Sakai, N. (2002). Hand pain attributed to overuse among professional pianists. *Medical Problems of Performing Artists, 17*, 178-180.
- Savvidou, P., Willis, B., Li, M., Skubic, M. (2017). Assessing injury risk in pianists: Using objective measures to promote self-awareness. *MTNA e-Journal, 9*(1), 3-17.
- Shechter, E. (n.d.). *Is jazz piano harder than classical?* <https://ericplayskeys.com/is-jazz-piano-harder-than-classical/>
- Sheibani-Rad, S., Wolfe, S., & Jupiter, J. (2013). Hand disorders in musicians. *The Bone and Joint Journal 95-B*(2), 1-4.
- Smith, J. A., & Osborn, M. (2004). *Interpretative phenomenological analysis*. In G. M. Breakwell (Ed.). *Doing social psychology research* (pp. 229-254). Blackwell.
- Smith, J. A., & Osborn, M. (2008). *Qualitative psychology: a practical guide to research methods* (2nd ed.) Sage.
- Stanhope, J., Tooher, R., Pisaniello, D., & Weinstein, P. (2019). Have musicians' musculoskeletal symptoms been thoroughly addressed? A systematic mapping review. *International Journal of Occupational Medicine and Environmental Health, 32*(3), 291-331.
- Stassijns G., Uijtewaal J, & Van Brabander L. (2015). Musculoskeletal injuries in dancers and musicians. In A. Glaudemans, R. Dierickx, J. Gielen, & J. Zwerver (Eds.), *Nuclear medicine and radiologic imaging in sports injuries* (pp. 959-968). Springer.

- Steinmetz, A., Möller, H., Seidel, W., & Rigotti, T. (2012). Playing-related musculoskeletal disorders in music students-associated musculoskeletal signs. *European Journal of Physical and Rehabilitation Medicine*, 48(4), 625-633.
- Storck, K. (1907). *The Letters of Robert Schumann*. Translated by H. Bryant. John Murray.
- Sun, L. (2017). *Real-time Sonification of muscle tension for piano players* [Doctoral thesis, University of York]. White Rose eTheses Online. <http://etheses.whiterose.ac.uk/>
- Swart, I. (2016). New developments in neuroscience can benefit the learning and performance of music. *Muziki*, 13(1), 126-127.
- Tchernik, I. (2017). *Healthy piano technique and the prevention of professional injuries: an exploration of the Schmidt-Shklovskaya-Minsker method and its implementation in piano pedagogy* [Master's dissertation, York University]. Yorkspace Institutional Repository. <https://yorkspace-new.library.yorku.ca/xmlui/>
- Tessier, S. (2012). From field notes, to transcripts, to tape recordings: evolution or combination? *International Journal of Qualitative Methods*, 11(4), 452.
- Tobin, G. A., & Begley, C. M. (2004). Methodological rigour within a qualitative framework. *Journal of Advanced Nursing*, 48(4), 388-396.
- Toledo, S. D., Nadler, S. F., Norris, R. N., Akuthota, V., Drake, D. F., & Chou, L. H. (2004). Sports and performing arts medicine. 5. Issues relating to musicians. *Archives of Physical Medicine and Rehabilitation*, 85, 72-74.
- Turon, C. T. (2000). *Educational prerequisites for piano teachers assisting in the prevention, detection, and management of performance-related health disorders* [Doctoral thesis, University of Oklahoma]. ShareOK Repository. <https://shareok.org/>
- Warde, A. (2005). Consumption and theories of practice. *Journal of Consumer Culture*, 5(2), 131-153.
- Wang, C. (2016). *Good posture and its wealth of benefits to the workplace*. Lumo Bodytech.
- Warrington, J. (2003). Hand therapy for the musician: Instrument-focused rehabilitation. *Hand Clinics*, 19(2), 287.
- Welch, S. E. (2016). *Effects of bench height variation on muscle activation in pianists* [BA Mus Hons dissertation, Ohio University].
- Westgaard, R. H. (1999). Effects of physical and mental stressors on muscle pain. *Scandinavian Journal of Work, Environment & Health*, 25(4), 19-23.
- Willis, B., Li, M., & Skubic, M. (2017). Assessing injury risk in pianists: using objective measures to promote self-awareness. *The MTNA e-Journal*, 9(1), 3-17.
- Woo, L. H. (2017). *Building an effective piano technique while avoiding injury: A comparison of the exercises in Alfred Cortot's rational principles of pianoforte technique and Carl Tausig's daily studies for the pianoforte* [Doctoral thesis, University of North Texas]. University of North Texas Digital Library. <https://digital.library.unt.edu/ark:/67531/metadc984147/m1/1/>

- Woods, L. (2022). *8 Benefits of an orthopedic pillow: how to get the most out of your sleep*. The Spinery. <https://thespinery.com/blog/orthopedic-pillow-benefits/>
- WordSense (n.d.) *Enthesopathy*. WordSense Dictionary. <https://www.wordsense.eu/enthesopathies/>
- Wristen, B. (2000). *Avoiding piano-related injury: A proposed theoretical procedure for biomechanical analysis of piano technique*. Faculty Publications: School of Music, 6.
- Yang, N., Fufa, D. T., & Wolff, A. L. (2021). A musician-centered approach to management of performance-related upper musculoskeletal injuries. *Journal of Hand Therapy*, 34(2), 208-216.
- Young, J. O., & Matheson, C. (2000). The metaphysics of jazz. *The Journal of Aesthetics and Art Criticism*, 58(2), 125-133.
- Zhukov, K. (2009). Effective practising: A research perspective. *Australian Journal of Music Education*, (1), 3-12.

## Appendix A: Selection criteria for participants

### Checklist

The participant has participated in a music competition.	
The participant regularly presents public performances as a classical pianist.	
The participant is currently or has in the past been medically diagnosed with a piano playing- and performance-related MSD.	
The participant has a brief understanding of what a playing- and performance-related MSD entails from personal experience.	
The participant has implemented recovery strategies to recover from playing- and performance-related MSD.	
The participant is implementing prevention methods for future playing- and performance-related MSDs if already recovered from such MSDs.	
The participant agrees to be audio-visually recorded during the online interview.	

## **Appendix B: Semi-structured interview schedule**

### **Section 1: General questions to all participants**

A brief introduction with general questions related to the participant's career as a classical pianist, as well as the participant's understanding and knowledge of the term 'playing- and performance-related musculoskeletal disorders.

### **Section 2 for participants Currently Experiencing an MSD**

2.1 Are you experiencing an MSD at present?

If so:

- Where are you experiencing MSD in your body?
- Describe how you became aware of your initial symptoms?  
Prompts: visibly noticeable symptoms / internal symptoms.
- What made you realise that you needed a medical diagnosis?
- What was the medical diagnosis given by your health practitioner?
- What did the medical practitioner/s prescribe to alleviate the symptoms of your MSD? Please describe.  
Prompts: Physical therapy, exercise, medication.
- How did you experience the prescribed medication or recovery strategy?

2.2 Have you experienced your MSD symptoms worsening at some stage? Please provide in-depth details.

2.3 Do you feel as if there was a specific experience or activity that contributed to the worsening of your MSD symptoms? Please describe.

Prompts: stressful environment / numerous performances / long playing and practising hours / large volume of new repertoire.

2.4 Have you at some stage in your career become aware of weaknesses in your technique that could be a possible cause of MSD? If so, please describe and demonstrate these at the piano.

2.5 Were you aware of MSDs and the causes thereof before you got your injury? Please describe.

2.6 What do you think contributed to your MSD? What experiences led you to reach this conclusion?

2.7 What was your daily practising regime before you suffered your injury?

2.8 What is your current daily playing and practising regime while you are still suffering from your injury? Please describe your experiences.

Prompts: Adapted hours for playing and practising; feelings experienced because of the change, any other symptoms, e.g., headaches, fatigue, etc.

2.9 How do you experience taking breaks during your normal playing hours? Please describe.

How do your breaks between playing sessions differ now from before you sustained the injury?

2.10 How do you currently experience playing challenging repertoire? How did this change before and during your injury?

2.11 What kind of challenges do you experience with the above-mentioned repertoire? Please explain and demonstrate at the piano.

Prompts: rapid or repetitive octaves / large chord stretches / tremolos / uncomfortable arpeggios / double thirds / rapid passages or scale-like runs / ornaments / trills

2.12 How did you experience being aware of your posture when you practised or performed before you sustained your injury?

2.13 What do you believe is a healthy posture for piano playing?

2.14 Are you aware of changes to your posture after you sustained the injury? If so, please describe and demonstrate at the piano.

- How do you experience your posture while playing the piano, now that you are aware of the possibility that you may develop an MSD?
- What have your experiences been, trying to adjust your posture after acquiring MSDs? Please describe your experiences and demonstrate these adjustment(s) at the piano.

- How do you feel about your body movements when you are playing since you got the injury? What is your awareness of your body movements now, after the injury? Please elaborate on that while demonstrating at the piano.
- 2.15 What coping mechanisms did you use – or are you currently using – to recover from your MSD?
- 2.16 Have you received medical care for your injury? If so, please describe your feelings and experiences during the medical care.
- 2.17 Did you ever experience trying to ignore the symptoms of your injury? If so, please explain.
- 2.18 What changes have you made with regards to technique in your playing during the recovery time? Please describe and demonstrate these changes at the piano.
- 2.19 How is the recovery process influencing your life and daily routine?
- 2.20 How is the recovery process influencing your emotional well-being?
- 2.21 What have your experiences been regarding financial loss due to the time required for recovery?
- 2.22 Do you feel as if you are implementing any other strategies to prevent more MSDs? If so, please elaborate.
- 2.23 Do you have any experience with somatic approaches to prevent MSDs? If so, please explain your experience.

### Section 3 for Participants who Have Experienced an MSD in the Past

3.1 Have you experienced an MSD in the past?

If so:

- Where did you experience MSD in your body?
- Describe how you became aware of your initial symptoms?  
Prompts: visibly noticeable symptoms / internal symptoms.
- What made you realise that you needed a medical diagnosis?
- What was the medical diagnosis given by your health practitioner?
- What did the medical practitioner/s prescribe to alleviate the symptoms of your MSD? Please describe.  
Prompts: Physical therapy, exercise, medication.
- How did you experience the prescribed medication or recovery strategy?

3.2 Have you experienced your MSD symptoms worsening at some stage?

Please provide in-depth details.

3.3 Do you feel like there was a specific experience or activity that contributed to the worsening of your MSD symptoms? Please describe.

Prompts: stressful environment / numerous performances / long playing and practising hours / large volume of new repertoire.

3.4 Have you at some stage in your career become aware of weaknesses in technique that could be a possible cause of MSD? If so, please describe and demonstrate these at the piano.

3.5 Were you aware of MSDs and the causes thereof before you got your injury? Please describe.

3.6 What do you think contributed to your MSD? What experiences led you to reach this conclusion?

3.7 What was your daily playing and practising regime before you suffered your injury?

3.8 What was your playing and practising regime while you were still suffering from your injury? Please describe your experiences.



Prompts: Adapted hours for playing and practising; feelings experienced because of the change, any other symptoms, e. g., headaches, fatigue, etc.

- 3.9 How do you experience taking breaks during your normal playing hours? Please describe.

How do your breaks between playing sessions differ now from before you sustained the injury?

- 3.10 How do you currently experience playing challenging repertoire? How did this change before and during your injury?

- 3.11 What kind of challenges did you experience with the above-mentioned repertoire? Please explain and demonstrate at the piano.

Prompts: rapid or repetitive octaves / large chord stretches / tremolos / uncomfortable arpeggios / double thirds / rapid passages or scale-like runs / ornaments / trills?

- 3.12 How did you experience being aware of your posture when you practised or performed before you sustained your injury?

- 3.13 What do you believe is a healthy posture for piano playing?

- 3.14 On a scale of one to ten, how healthy do you think was your posture when you were practising or performing before you experienced your injury? Were you aware of changes to your posture after you sustained the injury? If so, please describe and demonstrate at the piano.

- How did you experience your posture while playing the piano when you became aware of the possibility that you may develop an MSD?
- What have your experiences been, trying to adjust your posture after acquiring MSDs? Please describe your experiences and demonstrate these adjustment(s) at the piano.
- How do you feel about your body movements when you are playing since you got the injury? What is your awareness of your body movements now, after the injury? Please elaborate on that while demonstrating at the piano.

- 3.15 What coping mechanisms did you use to recover from your MSD?

- 3.16 Have you received medical care for your injury? If so, please describe your feelings and experiences during the medical care.
- 3.17 Did you ever experience trying to ignore the symptoms of your injury? If so, please explain.
- 3.18 What changes did you make with regards to technique in your playing during the recovery time? Please describe and demonstrate these changes at the piano.
- 3.19 How did the recovery process influence your life and daily routine?
- 3.20 How did the recovery process influence your emotional well-being?
- 3.21 What were your experiences regarding financial loss due to the time required for recovery?
- 3.22 Do you feel like you are implementing any other strategies to prevent further MSD? If so, please elaborate.
- 3.23 Do you have any experience with somatic approaches to prevent MSD(s)? If so, please explain your experience.
- 3.24 What kind of changes – if any – do you feel like you made after recovering from the MSD regarding your playing habits?
- Do you feel like you made any changes after recovering from your injury with regards to your playing hours and frequency of breaks? Please explain.
  - Do you feel like you made any changes after recovering from your injury with regards to stretching your muscles before you start practising? Please explain and show me the stretches you implemented.
  - Do you think that you have adapted your posture to prevent further MSD(s)? Please explain by demonstrating these adjustment(s) at the piano.
- 3.25 To what extent – if at all – do you think you were paying more attention to your body movements when you were playing since you got the injury? If so, please elaborate on that while demonstrating at the piano.

Please feel free to add anything else that relates to the topic. Thank you for your kind participation.

## Appendix C: Letter of Information to Pianists



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA



Faculty of Humanities  
School of the Arts:  
Music  
Date:

Dear Pianist

I am a Masters student in music (Piano Performance) at the University of Pretoria. My research topic is: South African classical pianists' lived experiences of preventing and recovering from playing- and performance-related injuries

Your experiences of musculoskeletal problems will assist me in understanding this phenomenon and I will greatly appreciate your participation.

**Aims of the study:** This research study will investigate classical piano participants' personal experiences of attempting to prevent MSDs and the recovery strategies they use, to increase awareness of the impact of MSDs, and suggest possible prevention and recovery strategies to South African classical piano students.

**What will be expected of you?** You will be one of six South African classical pianists taking part in an in-depth interview. You are invited to richly describe your experiences of identifying, recovering, and preventing playing- and performance-related injuries during an in-depth semi-structured interview, as well as demonstrating such experiences on the piano where applicable. The interview will be audio-visually recorded and will last approximately 90 minutes. Once I have obtained your informed consent, I will arrange the interview at a time, date and venue that is convenient for you. Due to COVID-19 restrictions or travelling constraints, the interview will take place via an online platform with high audio and video quality such as Skype or Zoom. To allow you to demonstrate your practising techniques on the piano, the selected venue used during the virtual interview should have a piano. During the interview, you should place your laptop or tablet in such a way that your position in front of the piano can be captured by the device's camera.

After completing the verbatim transcripts of the interview, I will share it with you so that you can verify that your views have been accurately captured.

**Approval:** The study will only commence after ethical approval from the Ethics Committee of the Faculty of Humanities at the University of Pretoria, has been obtained.

**Risks and benefits:** There are no potential risks or financial benefits to participation in this study and your participation will be kept confidential. Your participation is entirely voluntary, and you can withdraw at any time if you wish to do so. You are encouraged to ask any questions you may have about the study.

**Confidentiality:** The information you share as well as the audio-visual recording will be treated with strict confidentiality. Your identity will not be revealed in any of the research outputs.

**Who will have access to the results of the study?** All information shared by you during the interview will be treated with the strictest confidentiality. The data collected for this study will only be handled for academic purposes by me and my supervisor. You will have access to your data, and should you be interested, the results of this study will be shared with you after the completion of the study. Data may be used for the current research project, and there is a possibility that the transcribed data may be reused in future research. It will be safely stored in a password protected electronic format for a minimum of 15 years at the School of the Arts, University of Pretoria.

Thank you for your willingness to participate in this study and sharing your personal perspectives and reflections of dealing with playing- and performance-related injuries. Your expertise and insight are highly appreciated.

Yours sincerely

Landi Schaap

---

(Signature of Student)  
Researcher Name:  
Landi Schaap  
email: landi.schaap@gmail.com  
Tel.: 076 725 9669

---

(Signature of Supervisor)  
Name of Supervisor  
Dr Dorette Vermeulen  
email: dorette.vermeulen.music@gmail.com

If you agree to participate in this study, please complete the reply slip below to indicate your consent.

.....  
**Informed Consent – Classical Pianist Reply Slip**



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA



Faculty of Humanities  
School of the Arts: Music

Name of Participant: \_\_\_\_\_

Research Topic: South African classical pianists' lived experiences of preventing and recovering from playing- and performance-related injuries

I hereby give my consent to participate in the aforementioned research project. I understand what is required of me during this research project. I agree that the data may be used in current research, and that the transcribed data may be used in possible future research. I am aware that my participation is voluntary, that my responses will remain confidential, and that I may withdraw from the study at any time, should I wish to do so. I acknowledge that it will be safely stored in a password protected electronic format for a minimum of 15 years at the School of the Arts, University of Pretoria.

I agree to be audio-visually recorded.

Yes	No
-----	----

\_\_\_\_\_  
Signature of participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of researcher

\_\_\_\_\_  
Date