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Hypermobility Spectrum Disorder and Performance-Related Musculoskeletal Disorders in Violinists

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Declaration of Originality

Full name: Tamlyn Harker

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Degree: Master of Music

Title of Study: Hypermobility Spectrum Disorder and Performance-Related Musculoskeletal Disorders in Violinists

I declare that this study is my own original work. Where secondary material is used, this has been carefully acknowledged and referenced in accordance with university requirements.

I understand what plagiarism is and am aware of university policy and implications in this regard.

SIGNATURE

30 November 2020

DATE

Abstract

The study aimed to explore Hypermobility Spectrum Disorder (HSD) and the occurrence of Performance-Related Musculoskeletal Disorder (PRMD) in violin players. Six violinists were interviewed, to gain an understanding of their experience of living with the condition and performance-related disorders and injuries.

The study took a phenomenological and constructivist approach to the research. It made use of multiple case studies, with the inclusion of an auto-ethnographic case study. Data were gathered through semi-structured interviews, and a self-interview. The data were analysed through IPA analysis, as proposed by Smith, Flowers and Larkin (2009).

It was found that knowledge of HSD is limited, but understanding is gradually developing. Similarly, research into PRMD occurrence in hypermobile violinists is insubstantial. Participants had little in-depth knowledge of HSD, and it was, therefore, challenging to draw meaningful conclusions between HSD and injury in violin players.

The most common loci of pain included the neck, shoulder, back, hand, and wrist. Although injury and pain are common, participants tended to avoid or dismiss their pain for several reasons. None of the participants are currently able to play without pain, and the emotional effects of injury are extensive.

This study concludes that the existing knowledge of HSD among violinists and healthcare professionals, specifically in relation to musicians, is limited. This may be a large contributor for the occurrence of injury in this group. Actions can and need to be taken to address the paucity of research into this field in order to reduce the occurrence of injury in hypermobile violinists.

Keywords: *Hypermobility Spectrum Disorder, violinists, Performance-Related Musculoskeletal Disorder*

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Chapter 1

Introduction

1.1 Introduction and background to the study

Hypermobility Spectrum Disorder (HSD) is defined as an abnormal and excessive range of joint movement (Grahame, 2007). Many people who have hypermobility colloquially call their extra level of suppleness "double-jointedness" (Pocinki, 2010). Hypermobile joints are relatively common amongst the population in general, but the incidence of excessive hypermobility is not as common, and symptoms of this condition vary greatly from person to person (Hakim & Smith, 2015). According to Hakim and Smith (2015), hypermobility is most common in children and females, and tends to lessen with age.

For most of the population, hypermobility bears no consequence to daily life, and is often used as a positive selection tool for gymnasts, dancers and musicians, since they can often move their bodies with an ease that non-hypermobile people cannot (Hakim & Smith, 2015; Grahame, 1999). In general, however, hypermobility can also be a hindrance, because of the associated joint and ligament injuries, pain, fatigue, and other negative symptoms which often accompany the condition (Hakim & Smith, 2015). When a person experiences pain or musculoskeletal symptoms as a result of hypermobile joints, they used to be diagnosed as having hypermobility syndrome (Quarrier, 2011). It has since been discovered that even this definition of the condition is too simple (Castori et al., 2017). In recent research, it has been found that hypermobility is not a syndrome, but rather a spectrum of disorders, and each individual who experiences hypermobility symptoms fits into the spectrum uniquely. In many cases, HSD resembles the symptoms of Ehlers-Danlos syndrome (EDS) (Hakim & Smith, 2015), characterised by skin hyper-extensibility, joint hypermobility and tissue fragility (Yen et al., 2006), Marfan syndrome,

characterised by joint hypermobility, mitral valve prolapse, and Arachnodactyly (Dean, 2007), and in some cases, Osteogenesis Imperfecta, characterised by scoliosis, joint hyper-extensibility leading to dislocation of joints, and aortic root dilation and mitral valve prolapse (Gertner & Root, 1990)HSD is categorised as a connective tissue disorder and is characterised by chronic musculoskeletal pain, as a result of joint hyper-extensibility (Kumar & Lenert, 2017). The disorder is relatively rare, with a prevalence of about 3% in the general population, but is often left undiagnosed because of its high variance of clinical symptoms, and the absence of a clear confirmatory diagnostic test (Kumar & Lenert, 2017). Comparatively outdated research shows that hypermobility was often seen to be an advantage for musicians (Grahame, 1993), but this has since been negated, with more recent evidence showing that about 40% of musicians are affected by the disorder, and that musicians with hypermobility are more prone to performance-related musculoskeletal disorders (PRMD) than those who are not hypermobile (Grahame, 2007).

I was born with hypermobility, and I am naturally flexible. This ability was useful growing up, particularly for dance lessons. I did not experience hypermobility as disadvantageous. Rather, I saw it as an advantage since I could easily complete exercises that my classmates could not. In the beginning stages of learning to play the violin, I did not physically struggle to play large stretches and found creating the necessary frames in my left hand easier than my peers. However, I regularly battled with my shoulders getting tired and painful quickly, which often meant that I avoided practising. As I got older, my violin teacher encouraged me to strengthen my shoulders and back with general strength exercises, such as swimming, but even this did not alleviate the pain. Due to a lack of knowledge regarding the full effects and ramifications of hypermobility, no one around me was able to see that the injuries and pain I experienced were possibly a result of this condition.

At 16, I sustained a rotator cuff injury in my left shoulder, which led to the discovery of a case of thoracic outlet syndrome. My symptoms progressed and I consulted a neurosurgeon for treatment. I was diagnosed with a neural compression of the brachial plexus, which was related to playing the violin. The doctors that I consulted, a general practioner, doctor of Chinese medicine and homeopathy, neurosurgeon and neurologist, implied that this was likely exacerbated by my hypermobility. I still struggle with shoulder pain when I practise and play, despite the strength I have developed through general strength training and improved playing technique.

During my undergraduate music studies, I found research to suggest that there is a more common link between hypermobility and injury in musicians than what I had originally believed (Grahame, 2007; Larsson et al., 1991; Sheibani-Rad et al., 2013). I suspect that my multiple injuries may be as result of HSD. The impetus for this study is, therefore, inspired by my own experience of hypermobility and injury, and aims to delve into the condition in musicians and to establish whether this is common in other violinists with hypermobility who have sustained performance-related musculoskeletal disorders.

1.2 Aim of the study

The aim of the study is to explore Hypermobility Spectrum Disorder and the possible subsequent development of performance-related musculoskeletal disorder or injury in violinists Multiple case studies of selected violinists[1] with HSD will be explored. Furthermore, the study aims to understand violinists' experiences of living with the condition and performance-related injuries.

[1] Violinists in this study refers to musicians who have played the violin for at least 10 years. It does not assume professional status.

1.3 Research question

What are the lived experiences of violinists with Hypermobility Spectrum Disorders and Performance-Related Musculoskeletal Disorders?

1.4 Methodology

A brief overview of the methodology used is provided in this section. Chapter 3 contains a detailed explanation of the research methodologies used in the study and the procedures followed.

The research was qualitatively based, combining constructivist and phenomenological frameworks. Auto-ethnography has been included in the study to examine my own experience of the phenomenon being investigated. Interpretative Phenomenological Analysis was used to analyse the data collected.

Six participants were used in the study: one self-study and five case studies. The participants were purposively selected according to the following criteria: participants should be violinists, who have been playing the violin for a minimum of ten years. Participants should have Hypermobility Spectrum Disorder, or a score of at least 4/9 on the Beighton scale (this will be explained in chapter 2), and must have experienced a Performance-Related Musculoskeletal Disorder.

Participants were recruited through an online form, in which symptoms of hypermobility and performance-related disorders could be selected through a checkbox system. Eligible participants were contacted via email, and semi-structured interviews were scheduled. The interviews of the five cases were conducted, and a self-interview of the auto-ethnographic case was taken.

Recordings of the in-depth semi-structured interviews were transcribed and analysed according to the Interpretative Phenomenological Analysis model, set out by Smith, Flowers and

Larkin (2009). The emergent themes were categorised into four superordinate themes: the background and context of the participants' musical lives and experiences prior to injury; the knowledge, experience and impact of hypermobility; hypermobility and the experience of pain; and the participants' attempts to manage pain.

The research complied with the standards for ethics, as set out by the University of Pretoria. Letters of informed consent were signed by all participants prior to the interviews. Participants were assured of confidentiality, and the research was published with the use of pseudonyms.

1.5 Limitations of the study

The reader should bear in mind that, in this study, "violinist" refers to a person who has studied and played the violin for at least 10 years, rather than a person who plays the violin professionally. The current research is exploratory in nature, given that little is known about HSD among South African musicians.

1.6 Chapter outline

Chapter 1 is an introduction to the study and includes the background, aims and research questions.

Chapter 2 provides an overview of the existing body of literature which relates to Hypermobility Spectrum Disorder, Performance-Related Musculoskeletal Disorders, and the disorders specific to violinists. This chapter also addresses South African focused research in this field. The paucity of research into the cross-section of these topics is displayed.

Chapter 3 presents the methodological procedures used for the research and provides discussions around the research paradigm, design, participants, data collection, data analysis and ethical procedures.

Chapter 4 is a presentation of the findings of the analysis.

Chapter 5 discusses the emergent themes and relates them to the current body of literature.

Chapter 6 concludes the research and provides a summary of the research findings, as well as the limitations of the study and recommendations for further research.

The study ends with a list of appendices, including the letters of informed consent, the interview schedule, a transcribed interview, and an example of the analysis.

Chapter 2

Literature Review

2.1 Introduction

Music is a beautiful art form. Its intention is to create an experience of beauty, or to instil emotion in those who experience it. To make this music experience possible, musicians are required to embody notes placed in a specified order to create sounds. To generate this embodiment of sound, musicians are required to complete years of training to master an instrument. This takes many hours, repetition of movements, and perfecting these movements to such an extent that, on many occasions, musicians experience repetitive-use injuries, which often lead to permanent damage (Watson, 2006). This literature review will examine the existing literature on Hypermobility Spectrum Disorder (HSD), revise current research in musicians' health in general, focusing on the injuries and disorders related to violinists specifically, and briefly discuss the emotional effects of injury. South African based literature in these fields will also be discussed. The review will then highlight the need for research into the injuries experienced by violinists who have hypermobility.

2.2 Hypermobility Spectrum Disorder

The following subheading has been divided into the following sections: Hypermobility Spectrum Disorder; recent developments in HSD research; HSD in South Africa; and HSD in musicians.

Hypermobility, as a condition, has been studied for many years, with the first mention of Joint Hypermobility Syndrome (JHS) being coined in 1967 by Kirk, Ansell and Bywaters. From this initial naming of the condition, it has undergone several changes as understanding of the phenomenon grew. The condition has always been closely linked to Ehlers-Danlos Syndrome

(EDS) (Forghani, 2019), and as such, has often been seen as a less severe version of the syndrome, rather than a condition in its own right. In 2017, the diagnostic criteria for EDS was updated, and the differentiation between types and presentation was greatly improved, allowing for a greater discernment between EDS and Joint Hypermobility (as it was then known) to be made (Forghani, 2019).

In 1999, it was suggested that the two ends of the metaphorical hypermobility scale were: asymptomatic, or benign joint hypermobility; and joint hypermobility syndrome (Grahame, 1999). Later, it was proposed that Joint Hypermobility Syndrome and Hypermobile Ehlers-Danlos Syndrome (hEDS), a form of EDS, were the same condition (Castori et al., 2014; Ross & Grahame, 2011). However, in recent years, it was discovered that the differences between the conditions were too vast to consider them as the same condition. In 2017, a framework for classifying joint hypermobility and the genetic features of joint hypermobility was established, creating a spectrum which works as an umbrella, encompassing all the features of joint hypermobility and joint hypermobility syndrome, as well as everything in-between (Castori et al., 2017). From this point onwards, the syndrome is referred to as Hypermobility Spectrum Disorder (HSD), and provides a diagnosis for all those who do not meet the criteria for hEDS, but who show symptoms of hyperextension and secondary musculoskeletal manifestations (Forghani, 2019).

HSD includes several symptoms which all sufferers may share to varying degrees. Some of these symptoms include (Grahame, 2007; Hakim & Smith, 2015; Pocinki, 2010):

- Regular injury of ligaments and tendons
- Partial or full dislocation or subluxation of joints
- Structural defects in the connective tissue leading to repeated injuries in the tissue, which never fully heal
- Experience of acute and persistent pain throughout the body

- Abnormal skin, i.e. very thin; bruises easily; stretch marks occur very easily
- Gastrointestinal issues
- Autonomic nervous system issues
- Bladder problems
- Severe fatigue because of muscles having to work harder than usual to stabilise weak joints
- Poor proprioception
- Anxiety, phobic states, and depression
- Soft tissue rheumatism, which is the inflammation of soft tissue in excessive amounts
- Varicose veins
- Hernia
- Uterine or rectal prolapse

One of the earlier methods of diagnosis for the condition is the nine-point Beighton Scale for hypermobility screening (Pocinki, 2010) (see Figure 1). In this diagnostic tool, each positive result for the tests displayed below, counts as a point. If a person scores at least 4/9, they are considered to be hypermobile. The higher the score, the more hypermobile a person is.

Specific joint laxity	YES		NO
1. Passive apposition of thumb to forearm	☐ Left	☐ Right	☐
2. Passive hyperextension of V-MCP > 90°	☐ Left	☐ Right	☐
3. Active hyperextension of elbow >10°	☐ Left	☐ Right	☐
4. Active hyperextension of knee >10°	☐ Left	☐ Right	☐
5. Ability to flex spine placing palms to floor without bending knees	☐		☐

*Each "YES" is 1 point. A score ≥ 4 out 9 is generally considered an indication of JH. (MCP: metacarpophalangeal).

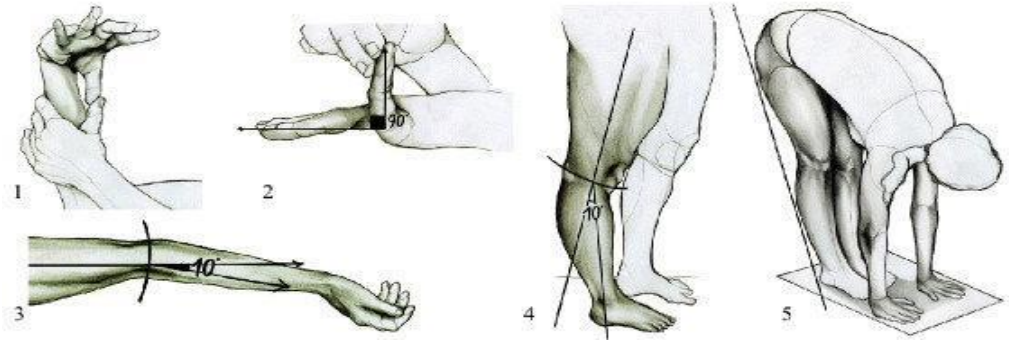

Figure 1: A Pictographic Representation of the Beighton Scale

A more recent scale, the Brighton Criteria, was developed in 1998 as an extension of the Beighton Scale. The Beighton Scale was used as a baseline for testing, but a selection of other criteria was added, which included a list of major and minor criteria which needed to be met in order for an individual to be diagnosed with hypermobility syndrome (Quarrier, 2011).

In 2003, Hakim and Grahame created a five-part questionnaire diagnostic tool which could be used for rapid screening of hypermobility Syndrome (Quarrier, 2011). This (Hakim and Grahame') s screening system was widely accepted. But, according to Hypermobility Syndromes Association, new methods of diagnosis are constantly being developed, to create a more definitive test including all disorders on the spectrum (Hypermobility Syndromes Association, 2017).

Although the incidence rate of reported cases of hypermobility syndrome, in one or another form, and to varying degrees, is at 3%, it is commonly underdiagnosed (Kumar & Lenert, 2017). It is possible that several cases are unreported.

Recent developments in Hypermobility Spectrum Disorder research

From 2017 onwards, there has been much research into a more accurate and decisive way of measuring and diagnosing HSD. Since this research is relatively recent and progressive, there are not many sources which explain the new understanding of the condition. The Hypermobility Syndromes Association (Hakim, 2017) provides a clear update and summary of the changes made to the understanding and diagnosis of the spectrum of disorders, and explains the importance and significance of presentations for clinicians. Diagnosis of the condition is not a simple process, and clinicians are encouraged to look beyond the standard joints which are included in previous diagnostic criteria, as hyper-extensibility may also present itself in other joints. In general, there has been an increase of research into HSD over the last few years, but

understanding of the condition and dissemination of relevant information to clinicians is still being developed.

In a statement released in 2017, the British Society for Rheumatology stated that they had received a significant number of requests for a diagnostic and management guideline for HSD. At the time, however, there was insufficient evidence to support the development of a guideline for the condition (British Society for Rheumatology, 2020).

Recently, the Hypermobility Syndromes Association (HMSA), a charity based in the United Kingdom, offering information and support for people with HSD, has become a major source of information for both sufferers and professionals (Hypermobility Syndromes Association, 2020). The HMSA has developed the Kent Model, assisting medical professionals in understanding, diagnosing and supporting patients with HSD and related disorders (Bull & Hypermobility Syndromes Association, 2020). This model provides steps to accurately diagnose and help patients with management of the condition, including masterclasses from medical advisors of the association, offering information regarding the most up-to-date research about HSD and related disorders.

The need for a relevant diagnostic tool has been emphasised in recent years. A study about the prevalence of diagnosed EDS and HSD, showed that a mean of 14 years passes between the first manifestation of hypermobile symptoms and diagnosis; 25% of patients in the study waited over 25 years for a diagnosis; and at least 56% of patients were given a misdiagnosis, resulting in inappropriate treatment of symptoms (Demmler et al., 2019). Although the prevalence findings of this study are debated regularly (Hypermobility Syndromes Association (HMSA), 2019), and are often not seen to be accurate, the findings about diagnosis with regards to HSD and EDS display that many people with the condition often suffer for far longer than would be necessary if a more effective diagnostic tool were created.

Hypermobility is often thought to be an inherited condition, since the familial association and occurrence is strong, with the pattern of inheritance implying that the condition is heritable (Malfait et al., 2006). However, in the last 15 years, it was found that the genetic basis of the condition is largely not understood (Malfait et al., 2006). There are many genetic conditions, such as EDS, Marfans Syndrome and Osteogenesis Imperfecta, in which joint hypermobility is a symptom, but hypermobility, as a condition in its own right, has not yet been fully understood (Malfait et al., 2006). As of 2017, this is still the case (Castori et al., 2017), with the most recent understanding of HSD showing that there are still gaps in the research which need to be filled.

Hypermobility Spectrum Disorder in South Africa

In South Africa, specifically, there is little easily accessed information about both HSD and EDS. When searching for a hypermobility or EDS specialist, or for South African-focused research into either of the conditions, the information which can be found is minimal and outdated, with the most recent information referring to the condition as Joint Hypermobility, rather than using the current nomenclature (Gotlieb, 2001; Maharaj, 2020). The Ehlers-Danlos Syndromes Zebras of Southern Africa (EDSZSA), a South African EDS syndrome support group, does not have enough information, support, or members, to have a fully realised and maintained website (Peacock-Smith, 2020). This could mean that the information which is available is not easily accessed, or that there needs to be a larger output of research into this field in South Africa.

Hypermobility Spectrum Disorder in musicians

Since HSD is so often left undiagnosed, many people are unaware of the effects of the condition, as well as the symptoms. Since musicians make extensive use of their joints, particularly in the neck, spine, and upper limbs, it would easily be assumed that musicians with hypermobility would be more susceptible to injury, and specifically to musculoskeletal injury.

Larsson et al. (1991), through a study of the benefits and disadvantages of joint hypermobility in musicians, showed that hypermobility, while holding its own risks, was a benefit for musicians. A number of musicians with hypermobility experienced less performance-related stiffness and pain than non-hypermobile people (Larsson et al., 1991). However, more recent studies have negated this finding, and have instead found that musicians with HSD are at a greater risk for developing injury through playing (Grahame, 2007). Hypermobility, or hyper-laxity , is often referred to as a risk factor when assessing the likelihood of the occurrence of injury in musicians (Zaza & Farewell, 1997), and is listed as an injury in itself in other studies (Rennie-Salonen & De Villiers, 2016; Žuškin et al., 2005).

In one particular study addressing disorders of the hand in musicians, researchers discussed the effects of Joint Hypermobility Syndrome, an outdated term for HSD, on musicians. They found that hypermobility of the joints of the hand could lead to chronic ligamentous stress of the first metacarpal and carpometacarpal joints of the hand, an occurrence common in string, woodwind, and piano players (Sheibani-Rad et al., 2013). Because of this increased laxity of the joints of the hand, excessive load is placed on the thenar muscles (found in the palm of the hand, at the base of the thumb) to compensate for the lack of stability, causing pain, fatigue and spasm of the hand (Sheibani-Rad et al., 2013).

In general, research into the regularity and severity of injury related to hypermobility in musicians is minimal and could stand to be further researched. There is enough evidence to suggest that people with hypermobility are more likely to experience injury, but not enough research has been conducted into the occurrence of hypermobility-related injury in musicians, both locally and internationally.

2.3 Performance-Related Musculoskeletal Disorders

This subheading has been divided into the following sections: Performance-Related Musculoskeletal Disorders; Overuse/repetitive strain injuries; Musician's health and wellness in South Africa; PRMD in violinists; and Injury among violinists in South Africa.

Musicians, like sportspeople, engage in high levels of physical activity for long periods of time. Similarly to sportspeople, musicians put their bodies through hours of rigorous training to attain a certain outcome, often leading to a feeling of immense joy and success, but also commonly leading to injury due to the high level of intense physical and cognitive energy required. What differentiates sportspeople and musicians? Whenever a sportsperson practises, there is a coach who works with them to improve their technique, and monitor their movements to prevent injury (Kids & Ways, 2010; Quarrier, 2013; Talpey & Siesmaa, 2017). Musicians, on the other hand, tend to have one contact session a week with their "coach", and are expected to practise and perfect, alone, that which they have learnt during the lesson (Quarrier, 2013).

Performance-Related Musculoskeletal Disorder (PRMD) is a common name for a collection of painful experiences which may afflict performers. The term is referred to regularly, but it is challenging to define conclusively. Zaza, Charles and Muszynski (1998) found that a PRMD is any pain, numbness, weakness, tingling or symptom which interferes with a performer's ability to play their instrument at the level which they are used to. It was also found that PRMD may pose personal, chronic, and disabling health problems, affecting the physical, emotional, occupational, and social life of the sufferer (Zaza et al., 1998). However, there is much research into this field, and definitions are often adapted to suit the research (Kok et al., 2016), with researchers choosing to focus on the "performance-related" or "musculoskeletal" aspects of the term individually. It has been seen that there is substantial variation among individual studies, and case definitions remain unstandardised (Wu, 2007).

Most musical instruments are not ergonomically developed for players' physical bodies, meaning that they hinder the player's ability to work in the most efficient way (Manchester, 2006). This forces musicians to play with an unnatural posture. Many instrument makers and people working in performing arts medicine have proposed changes which can be made to instruments to improve ease of playing, and to suit a larger variety of body types, since the population of people who play instruments has changed substantially since these instruments were first created (Manchester, 2006). Because of the type of motions required to play musical instruments, along with poor ergonomic positions, musicians often experience pain, sensory damage, and a loss of coordination as their career progresses (Gembris, Heye & Seifert, 2018). It has been widely recognised that injury for a performer can be career limiting, or destroying, depending on the severity of the injury (Žuškin et al., 2005).

There are a number of studies which have been conducted into the frequency of injury in musicians (Ackermann et al., 2012; Barnes et al., 2011; Foxman & Burgel, 2006; Fry, 1986; Guptill, 2011; Hagberg et al., 2005; Jabusch & Altenmüller, 2006; Maric et al., 2019; Middlestadt & Fishbein, 1989; Moraes & Antunes, 2012; O'Neill, 2019; Paarup et al., 2011; Thaele, 2016; Zaza, et al., 1998), indicating that this is a common problem among musicians. According to Hyde et al., the performance of music requires a high level of greatly developed and integrated sensorimotor and neuromuscular body system activation. These systems are practised and honed through intense training and repetition (Hyde et al., 2009; Watson, 2006), to such a degree that musicians are often highly susceptible to injury, and specifically neuro-musculoskeletal injuries (Brandfonbrener, 2010).

Research has shown that the global measure of injuries reported in this profession is high, and that injuries are thought to be related to the playing requirements of individual instruments (Ackermann et al., 2012; Leaver, Harris & Palmer, 2011; Middlestadt & Fishbein, 1989; Paarup et al., 2011). A common complaint of pain among orchestral musicians is as a result of overuse

syndrome (Watson, 2006). Overuse syndrome is a term used to define pain for which there can be no diagnosis, and which can be ascribed to overuse through one's occupational habits (Maric et al., 2019). It often refers to any type of breakdown of tissue, whether tendon, muscle or ligament, and is as a result of prolonged repetitive motions, or through consistent stationary load bearing (Sternbach, n.d.).

Overuse/repetitive strain injuries

Overuse syndrome has been studied extensively for many years, and researchers have found that musicians are especially susceptible to this phenomenon. Fry (1986) conducted a study of musicians in symphony orchestras, in which the occurrence of overuse syndrome as reflected by the pain experienced by the performers was examined. In this study, Fry found that players tended to underestimate the severity of their injury, and tolerated the pain they experienced, provided that it did not interfere with their ability to play their instrument (Fry, 1986). Three hundred and twelve participants were examined, with an incidence rate of 50%, and the severity of their injuries was assessed and categorised in order to see the link between age, gender and length of time with the injury (Fry, 1986). It was generally seen that pain may interfere with the technical abilities of the instrumentalist, which could affect their ability to practise or perform. The occurrence of weakness and loss of dexterity was not always linked to the pain experienced (Fry, 1986). Most injuries occurred between the ages of 20 and 30, and the author surmised that this could be because this is a period in which many young musicians aim to establish themselves and their careers (Fry, 1986). Young musicians often play for many hours at a time, and do not acknowledge or address any pain they experience to avoid loss of perceived respect from older musicians.

Pereira et al., (2010) saw that 64% to 76% of musicians experienced repetitive strain, caused by the repetitive use of muscles and tendons in a similar pattern habitually and for

long periods of time, which is common and required among musicians. It was also seen that common PRMDs included overuse issues, pain, weakness, stiffness, numbness, tingling, loss of muscular control and peripheral nerve entrapment syndromes (Zaza et al., 1998). While much of the research regarding musicians' injuries have been conducted abroad, more researchers are focusing on this in a South African context.

Musicians' health and wellness in South Africa

In 2011, Barnes et al. (2011) found that 84.4% of the Free State Symphony Orchestra members reported playing related injuries. The majority stated that playing their instrument exacerbated their symptoms. Despite the pain experienced, roughly two thirds of the participants continued to play their instrument. The study explored pain intensity and found that most of the 38 participants complained of aching pain, stiffness, numbness, and a stabbing pain also being common. Most musicians experienced pain both before and after playing, indicating that their playing could be affected by their injury. Several factors were found to contribute to the exacerbation of the injuries experienced, including insufficient rest periods between playing sessions, continued playing while injured, and continuous repetition of the same movements. Of those who experienced injury, 44.7% chose not to seek treatment. The researcher surmised that there is a possibility of a common mindset among performers, where artists are expected to suffer in silence because "the show must go on", leading participants to not respond appropriately to their injuries.

Classical instrumentalists at the South African College of Music experienced an 88.8% performance-related injury rate (Thaele, 2016). In this study, a large correlation was found between the instrument level and the current experience of a performance-related musculoskeletal disorder. The researcher specifically looked at the areas of the body which were most commonly found to be affected by injury related to performance, and found that

the shoulder, back, neck, hand or wrist, and fingers were the most frequently injured. It was seen that of the participants, music students at a third-year level were the most affected by injury, and the prevalence of injury in females was higher than in males, as is consistent with existing literature (Middlestadt & Fishbein, 1989; Paarup et al., 2011). Interestingly, roughly half of those injured had consulted a medical professional, with most opting for non-invasive therapeutic treatment methods. The research also found that there was a greater show of self-reliance than of trusting of expert recommendations. Participants tended to opt for therapeutic treatment approaches, over the recommendations of medical professionals, and many of the treatment strategies adopted tended to focus more on self-reliance than medical intervention (Thaele, 2016).

In 2017, it was found that of 145 undergraduate music students at the University of Pretoria, 83% experienced musculoskeletal and non-musculoskeletal health-related problems. The four most common problems were related to excessive tiredness, difficulty concentrating, disturbed sleep patterns and headaches (Panebianco, 2017). Over and above these complaints, many of the 83% cited having experienced orofacial issues such as sinus pain, pain experienced in the lower and upper spine, as well as in the left and right forearms (Panebianco, 2017). Through this study, it was concluded that the musculoskeletal issues, and general health-related problems experienced by undergraduate music students at the University of Pretoria were consistent with the global standard, but the likelihood of these students seeking medical assistance was lower than the global standard (Panebianco, 2017).

When compared to other groups of instrumentalists, string players are often most at risk of developing a PRMD, and as such, show a larger prevalence of injury (Kok et al., 2018; Sousa et al., 2017; Zaza & Farewell, 1997). It has also been seen that when comparing injury prevalence in string players, violinists are among the group which are connected with the most frequent experience of pain (Zięba et al., 2019).

Performance-related musculoskeletal disorders in violinists

Some of the most commonly found injuries in violinists include overuse injuries, nerve compression, or thoracic outlet syndrome, and focal dystonia (Moraes & Antunes, 2012). There are several common injuries which occur, such as tendon-related issues, nerve-related injuries, and dermatitis. Below is a brief description of some of the most commonly found injuries, and how they manifest. The injuries include: tendonitis, tendinosis, DeQuervain's Tenosynovitis, tenosynovitis (trigger finger), rotator cuff injury, the "pinky problem", Temporomandibular Disorders, (TMD), Thoracic Outlet Syndrome, Carpal Tunnel Syndrome, Cubital Tunnel Syndrome, and dermatitis. This is, however, not a complete list of the injuries experienced by violinists. These are some of the most frequently mentioned injuries and conditions specific to violinists, though the list of possible injuries does continue very much more extensively. For the sake of this study, only the most frequently mentioned injuries were included in this list for further research.

Tendon-related issues

There are two possible types of tendon injuries which may occur in violinists: tendinopathy, which can result in tendonitis, tendinosis, tendon rupture and tendon tear; and tenosynovitis, which is the inflammation of the tendon sheath, which can result in either trigger finger, or De Quervain's tenosynovitis (O'Neill, 2019).

Tendinopathy is a fairly common injury among sportspeople and musicians, and is caused by repetitive strain of the same tendon through repetitive practice (Bass, 2012). A common misconception about this injury is the name it is given. Colloquially, we refer to an injury of the tendon as tendonitis, which is the inflammation of the tendon sheath, while tendinosis is the degeneration of the tendon. Tendinopathy is an umbrella term for all the tendon-related injuries sustained (Bass, 2012). Violinists mostly experience such injuries in the wrists.

A list of possible tendon-related injuries includes:

- Tendonitis:

  This is the name given to a condition in which there is inflammation of the tendon sheath, an injury which is common in both sportspeople and musicians (Almekinders & Temple, 1998). It is commonly caused by chronic mechanical loading of a tendon, a common injury related to overuse syndrome (Almekinders & Temple, 1998). The condition occurs as a result of micro-tears of the tendon, when the musculotendinous unit is overloaded with very heavy or sudden tensile force (Bass, 2012). The pain experienced because of tendonitis is vastly different from that of tendinosis, but the two are often confused, and named interchangeably. There is research to suggest that people who suffer from HSD are more likely to develop tendonitis than those who do not (Braden & Coughlin, 2018).

- Tendinosis:

  Although these two terms are similar, there is a large difference between the two injuries. Where tendonitis is the inflammation of the tendon, tendinosis is the degeneration of the tendon, specifically the collagen in the tendon, in response to overuse (Bass, 2012). This is a common injury among musicians, and occurs as a result of constantly repeated motions. It is aggravated when the patient does not provide enough time for the tendon to heal after it has been injured, leading to long-term tendon degeneration which cannot be cured (Bass, 2012).

- DeQuervain's Tenosynovitis:

  This is inflammation of the tendon sheaths surrounding the tendons which control the thumb, causing pain and hampered movement in this finger (Jones & Armitage,

2014). This condition is also frequently an overuse injury, created through repetitive motions using the same tendon, as is common in musicians. In DeQuervain's tenosynovitis, there is pain and swelling at the base of the thumb, and any movement of the wrist or thumb can cause a pinching, grasping or wringing pain (Jones & Armitage, 2014).

- Tenosynovitis (trigger finger):

Trigger finger is the common name given to a condition which is caused by inflammation of the A1 pulley in one's finger (O'Neill, 2019). The condition presents as a "popping" or "locking" motion of the finger when it extends or flexes, and the popping sound is where the condition derived its colloquial name from, since it resembles the sound of a trigger popping (Makkouk et al., 2008). The cause of this condition is not always known, but is often associated with people who regularly use their hands for fine-motor movements, as with musicians (Makkouk et al., 2008).

- Rotator Cuff Injury:

The rotator cuff, situated in the shoulder joint, along the capsule of the joint, inserting on the head of the humerus (O'Neill, 2019), is one of the largest tendinous structures in the body, and is an important part of the movement and stability of the shoulder joint (Tytherleigh-Strong et al., 2001). The major exertion these tendons are required to undertake may result in a number of injuries occurring, including tendonitis, tendinosis, bursitis, frozen shoulder and calcific shoulder (Mantiri et al., 2018; O'Neill, 2019).

The pinky problem

While this issue may sound trivial, it is a complication many violinists face when playing, and is discussed on various violinist forums. The "pinkie problem" is when the middle joint of the left pinkie finger collapses in when the finger is used to play a note, causing the knuckle to "lock", which sends a shooting pain up the finger and into the hand (Wilson, 2018). The reason for this phenomenon is debated, with one common theory involving an anatomical abnormality in the hand. In some instances, the function of the flexor digitorum superficialis (FDS) in the fourth finger (pinkie) is not optimal, or even present in some cases (Godwin et al., 2014). However, it was found that an absent FDS function in the general population is prevalent 13.7% of the time (Townley et al., 2010). Only 3.3% professional musicians have this condition, with none of the participants in the relevant study showing an absence of function in their left hands (Godwin et al., 2014). This would infer that having a functional FDS system should put a person at an advantage when playing the violin. Yet, there are many forums discussing how to address the problem, and providing exercises which help with the locking motion (Reddit.com: Discussion Forum, 2018; The Strad, 2015; Violinist.com: Discussion Forum - Technique and Practising, 2019; Wilson, 2018). At present, there is little concrete evidence to explain what causes this phenomenon, or whether there is a permanent, long-term solution. However, many resources are available to help build strength in the fourth finger.

Temporomandibular disorders (TMD)

This collection of disorders comprises a wide variety of clinical problems which can manifest in the mastication mechanism, temporomandibular joint, and the associated orofacial structures (Jang et al., 2016). Put simply, this is a collection of disorders of the jaw and its motion. There are five main factors of TMD which are referred to in the literature, including occlusal condition (which refers to the way in which the teeth meet when the upper and lower jaw come together (Foster, 2020)), trauma, deep pain input, parafunctional habits (which are

any abnormal functions of the jaw, such as clenching and excessive gum chewing (Fale et al., 2018)), and emotional stress (Amorim & Jorge, 2016). In violin and viola players specifically, a large amount of pressure is exerted onto the chin-rest, through the left side of the jaw (Amorim & Jorge, 2016), supporting the instrument and holding it in the correct position for playing. Because of this, the muscles of the jaw and surrounding areas work harder than the normal physiological function requires (Amorim & Jorge, 2016). This unnatural pressure requirement is seen as a large contributor to the occurrence of TMD in violinists and violists, and often leads to compression of the right temporomandibular joint and the subluxation of the left temporomandibular joint (Amorim & Jorge, 2016).

In a study which evaluated the prevalence of symptoms of TMD in a group of violinists, compared with those found in a control group, it was seen that pain in maximum mouth movement, parafunctional habits and the occurrence of TMD sounds (such as clicking and popping sounds) were more prevalent in the group of violinists than in the control group (Rodríguez-Lozano et al., 2010). The same study did, however, also find that the number of hours of weekly practice, and years of professional experience playing the violin did not impact the likelihood of the occurrence of TMD in the violinists (Rodríguez-Lozano et al., 2010). Interestingly, it was also seen that only 2.87% of the violinist participants were aware of the potential relationship between violin playing and temporomandibular injury (Rodríguez-Lozano et al., 2010), indicating that the chance for injury could be higher because of a general lack of knowledge regarding the injury.

Nerve-related injuries

Injury of the nerve is often found in violinists, and is commonly aggravated by pre-existing structural abnormalities, or through repetitive strain of the nerve (Winspur & Wynn Parry, 2000).

A list of possible nerve-related injuries includes:

- Thoracic outlet syndrome (brachial plexus compression):

  This refers to a condition in which nerves are restricted on their way from the neck to the armpit (National Institute of Neurological Disorders and Stroke, 2019). This neurovascular compression can be caused by chronic repetitive motion in the upper extremities and shoulder (Demaree et al., 2016). The condition can be difficult to diagnose, since the symptoms are similar to other disorders, and vary from patient to patient (Thaele, 2016). Common symptoms include loss of muscle tone in the thumb, numbness and tingling in the arm and or hands, pain in the neck, arm or hand, as well as weakness in the arm (Mayo Clinic, 2019). This condition is often profoundly serious and may require surgery. In one study, five elite violinists and violists, who had developed thoracic outlet syndrome through years of intense practice, were examined (Demaree et al., 2016). All the participants were treated using various surgical methods, and all made a full recovery, returning to playing after their surgical treatment.

- Carpal Tunnel Syndrome:

  The carpal tunnel is a small passageway inside the wrist, formed by the carpal bones and the transverse carpal ligament along the top of the tunnel (American Academy of Orthopaedic Surgeons, 2019). The median nerve, which controls most of the movements of the hand, runs through this tunnel. In some cases, the tendons of the wrist swell, causing pressure to be placed on the median nerve, leading to numbness, pain and weakness of the hand (American Academy of Orthopaedic Surgeons, 2019). A number of studies list this as being a regularly occurring injury

in musicians (Lee et al., 2013; Panebianco, 2017; Quarrier, 1993; Quarrier, 2011; Rennie-Salonen & De Villiers, 2016; Sheibani-Rad et al., 2013; Watson, 2006). Interestingly, HSD is often a predisposing factor for carpal tunnel syndrome (Quarrier, 2011).

- Cubital Tunnel Syndrome:

  Like carpal tunnel syndrome, this is a condition in which the nerves of the arm are trapped between swollen tendons. The cubital tunnel is created by the bones of the elbow and the forearm muscles (Alexander, 2017). The entrapment of the ulnar nerve through the cubital tunnel can be caused by the swelling of the lining of the tendons, the dislocation of the elbow joint, fracture, or arthritis. Common symptoms of this phenomenon include pain in the arm, hand and/or fingers of the affected arm, weakness, and loss of control (Alexander, 2017). The symptoms are often exacerbated by repetitive bending of the elbow. For violinists, this can occur regularly, due to prolonged periods of holding the left elbow in a bent position to facilitate playing.

Dermatitis

While dermatitis is not a musculoskeletal injury, it is relevant in this study because of the higher tendency to bruise and the sensitivity of skin, both of which are common in hypermobile people (Grahame, 2007; Hakim & Smith, 2015; Pocinki, 2010). The discolouration found on the left side of the neck, just under the jaw bone on violinists and violists is called a dermatitis. This injury is often colloquially called a “violin hickey” because of its resemblance to a love bite. Academically, this condition is referred to as “fiddler’s neck”. The condition is a benign, dermatological disease, which is a type of allergic contact dermatitis, manifesting as a lesion similar to that of eczema (Chowdhry, Chand & D’Souza,

2018). The lesion usually occurs on the neck, just under the jaw, in the submandibular area. Less commonly, it may also occur on the clavicle (supraclavicular region), which may be found on the left side of the neck, where the back of the violin rests (Chowdhry et al., 2018). Depending on the severity of the dermatitis, it can cause a lump, scaling, a change of colour, or even scarring. In some instances, the irritation can lead to acne in the affected area (Chowdhry et al., 2018). While dermatitis is not a musculoskeletal injury, it is relevant in this study because of the higher tendency to bruise and the sensitivity of skin, both of which are common in hypermobile people (Grahame, 2007; Hakim & Smith, 2015; Pocinki, 2010).

It was found that string players are four times more likely to develop a PRMD than other instrumental groups (Zaza & Farewell, 1997). Researchers have found that violin and viola players are not only more susceptible to shoulder injuries than other instrumental groups, but also when compared to other instruments which fit into the strings family (Ackermann et al., 2012; Leaver et al., 2011; Paarup et al., 2011). Violinists experience four times more pain in their right forearm than pianists (Foxman & Burgel, 2006), and are two times more likely to develop pain in the neck, right shoulder, and left arm than pianists (Hagberg et al., 2005). Between 50% and 88% of violinists are prone to upper limb performance-related injuries or pain (Ackermann, Adams & Marshall, 2002). In some performers, the required static position and repetitive loading of the left arm, left shoulder and right upper arm can cause pain across both of the upper limbs, with prolonged, uneven use of the cervical spine sometimes causing degenerative changes to the cervical spine and creating neck pain (Fry, 1986).

Injury among violinists in South Africa

More research is being conducted into the performance-related musculoskeletal disorders and injuries experienced by musicians in South Africa, but there remains a scarcity of research when looking specifically at those injuries experienced by violinists in South Africa. However, a recent

MMus study examined the PRMDs experienced by third and fourth year BMus violin students as well as those who graduated in the year prior to the study, from various universities around South Africa. The study investigated both the prevalence and the type of injuries sustained in this country (O'Neill, 2019). It was found that, when compared to the international standard, South Africans experience a higher rate of performance-related injuries, with over 80% of musicians in South Africa reporting that they have experienced such injuries in the previous 12 months (Barnes et al., 2011; Thaele, 2016). Musicians erroneously believe that injury is a normal part of musicianship (Horvath, 2010; Marxhausen, 2006). In O'Neill's (2019) study, 100% of the violinists experienced a PRMD in the previous 12 months. Only 64% of the participants reported that their university offered a course on musicians' health and wellness. However, the attendance rate of the offered classes was only 67%, showing a tendency among South African student musicians to disregard the issue of musicians' health and wellness (O'Neill, 2019).

Injury does not only affect the physical aspect of musicianship, but can cause emotional health problems, as well as social isolation (Guptill, 2011). If left untreated, injuries may have a significant impact on a musician's livelihood (O'Neill, 2019). However, it was seen in a study in 2016, that musicians are largely unaware of the health responsibilities, exercise and occupational health education available in South Africa (Rennie-Salonen & de Villiers, 2016), which could be an indicator for why our level of PRMD experiences is so much higher than the number of injuries sustained in other countries. Devroop (2014) highlights the lack of research into performing arts medicine in South Africa, but highlights that which is available. This paper serves as a collection of the occupational health and musicians' injury resources which are available in South Africa.

2.4 Emotional effects of injury

The emotional effects of injury are extensive, and affect not only injured musicians in South Africa, but all musicians worldwide. Although substantial research has been conducted into the psychological effects of injury on sportspeople, significantly less research is available regarding the effects of the same phenomenon on musicians. However, there are enough similarities between the requirements of both activities that conclusions may be drawn for both.

Often, when a sportsperson sustains an injury, their recovery involves more than just rehabilitation of the injured body part, since there are significant psychological effects which can also occur. Research has shown that injured sportspeople experience a number of psychological events, including re-injury anxiety, symptoms of depression, and loss of identity (Sheinbein, 2016). Sufferers may experience these symptoms long after the physical injury has been rehabilitated. Similarly, musicians experience extensive psychological stress related to injury. Rickert et al. (2014) detail the lived experiences of three orchestral musicians who underwent rehabilitation of performance-related injury. It was found that a theme of hiding one's injury until one physically cannot play anymore is a common method for dealing with injury in an orchestral environment (Rickert et al., 2014). As with sportspeople, a period of not playing can have a distressing effect on the musicians' sense of self-worth and perceived role in the workplace (Rickert et al., 2014).

Injury to sportspeople can affect their ability to perform, their confidence, and, in some cases, their livelihood, and this is no different from injury to musicians. In a study conducted in 2005, it was found that musicians who experienced an injury which affected their ability to perform experienced similar psychological symptoms to those mentioned above (Siebrits, 2005). This study found that participants experienced fear of further injury; fear of failure as a musician, because of their delay in advancement caused by injury; fear that the injury was imaginary, created by the participants' brains in order to cope with the stress and workload of their

profession; and loss of joy, excitement, motivation, self-confidence, self-esteem and enthusiasm (Siebrits, 2005).

Injury for sportspeople and musicians is common, and the emotional and psychological effects of this are extensive. In many cases, there are several injured people who choose to give up their chosen career because of the damaging psychological effects of an injury. Siebrits (2005) found that some of the emotional effects the participants experienced could have been reduced or prevented if more accurate and timely diagnoses and treatment regimens had taken place.

2.5 Summary

The literature review above has shown that Hypermobility Spectrum Disorder is a risk factor for the occurrence of musculoskeletal injury in musicians. This connective tissue disorder has been researched for many years, but has recently been given more attention. Subsequently, new symptomatic and diagnostic understanding of the condition has developed. There is still a scarcity of research into the condition in South Africa.

There is also evidence to suggest that musicians with HSD are at risk of developing performance-related musculoskeletal disorders. However, the need for more research into this field is apparent. Over and above the risks created by HSD, musicians are at risk of sustaining an injury from playing their instrument for long periods of time. Violinists are among some of the most injured instrumentalists. A selection of the most common injuries sustained by violinists was discussed in detail. The emotional and psychological effects of injury were also briefly discussed.

From the literature review above, it can be seen that there is research into the three facets of this study: Hypermobility Spectrum Disorder, Performance-Related Musculoskeletal Disorders and Injuries, and PRMDs in violinists. Furthermore, there is research into the cross-sections of two of the three topics, but little to no research into the cross-section of the three topics.

Chapter 3

Research Methodology

3.1 Introduction

This chapter includes details of the theoretical and conceptual framework on which this IPA study is based; a discussion of the research methodology, research approach and design; the sampling strategy; method for collection of data; as well as an analysis of the data collected.

3.2 Theoretical and conceptual framework

The theoretical foundation of this study draws on constructivism and phenomenology. Constructivism is a worldview, or paradigm, which focuses on the formation of an understanding of phenomena through the subjective view of the participants in the study (Creswell & Plano Clark, 2011). In this worldview, research is formed from a "bottom up" perspective, where individual accounts of experiences lead to broad patterns, from which broad understandings can be gained (Creswell & Plano Clark, 2011). From an ontological point of view, constructivism allows for the inclusion of multiple realities, as provided by multiple perspectives from participants (Creswell & Plano Clark, 2011). Because of the nature of constructivism, this worldview is used predominantly with qualitative data (Kaushik & Walsh, 2019).

Phenomenology is the study of lived experience (Hodges, 2017). For some, the field is the discovery of parts of the world which usually go unnoticed (Christensen, 2012). Christensen posited that phenomenological enquiry delves into the depths and complexities of human experience and existence, and creates a sense of wonder and awe (Christensen, 2012). Lester defined the field as being the study of experience from the perspective of the individual, looking largely through the paradigm of personal knowledge and individual subjectivity (Lester, 1999). A number of philosophers have worked to create a definition which is more concrete, within the

constraints of the abstract nature of philosophy, and have aimed to show the importance of phenomenology in the understanding of life and our experience thereof. Phenomenological research involves setting aside biases and preconceived ideas in order to fully experience the world (Frost, 2011). When working in a phenomenological framework, researchers focus on understanding people's perceptions of the world, and what these mean to them as individuals (Landridge, 2007).

This study makes use of a combination of these worldviews, since the research aims to consult multiple participants who will be asked to provide an account of their experience of a phenomenon, which is inherently phenomenologically focused, and from which conclusions will be drawn, as is standard in a constructivist approach.

3.3 Research approach and design

The study used a qualitative approach. Astalin (2013, p. 118) describes qualitative research as being a "systematic scientific inquiry which seeks to build a holistic, largely narrative, description to inform the researcher's understanding of a social or cultural phenomenon". Qualitative research looks at the "real-life" individual experience, and aims to create patterns and forms from the data collected (Cropley, 2019).

An Interpretative Phenomenological Analysis (IPA) approach to research was used. In IPA, there are three main theoretical underpinnings which dictate how the research is viewed and carried out. These three underpinnings are phenomenology, hermeneutics and idiography (Shinebourne, 2011). Through these three underpinnings, the researcher sees that the understanding of an event or phenomenon is mediated by the socio-historical and cultural context of the time, and that one's experience of an event cannot be removed from this (Eatough & Smith, 2008). The researcher also understands the role of personal bias in the interpreting of events, in that the participant attempts to make sense of their experience, and then the researcher attempts

to make sense of this account, leading to a concept called “double hermeneutics” (Smith, 2004). To lessen the effect of this, it is essential to focus on the phenomenon itself, rather than the account thereof (Shinebourne, 2011). The third and final underpinning, idiography, dictates that there should be a focus on the details of each account, meaning that a small sample should be used to ensure the inclusion of as many details in the account of a phenomenon as possible (Shinebourne, 2011).

The study made use of multiple case studies, with the inclusion of auto-ethnography. Case study is a widely used qualitative research design, and has been used by many researchers to achieve a deep understanding of a specific phenomenon (Zach, 2006). The use of a case study design allows for the comprehensive understanding of the event being studied, but also allows for the development of general theoretical statements about commonly-found regularities in the phenomenon being observed (Fidel, 1984). Case studies are intended to bring a more vivid description of the phenomena under inspection, and this is often more effective than other analytical methods (Marshall & Rossman, 1999). A multiple case study allows for another angle of analysis to take place, with the possibility for comparison of cases, in order to identify unifying features (Zach, 2006).

Furthermore, an auto-ethnographic case study was included in the study. In this, I discussed my own experience of hypermobility and playing-related injury. Auto-ethnography is designed to examine the experience of a phenomenon from the perspective of self, with the intention to understand the phenomenon, as well as the self within that phenomenon (Adams et al., 2014). I chose to make use of auto-ethnography in this study, because the aspects being addressed have affected me directly, and my personal experience not only sparked my interest in the three facets being investigated, but could also be used to research the link between hypermobility, performance-related musculoskeletal disorders and violinists. Given the inclusion of my own

lived experience with the syndrome, I endeavoured to remain as objective and impartial as possible during the research process by bracketing my experience.

3.4 Sampling strategy

Purposive sampling and snowball sampling, or "chain method" sampling, were used in this study. This combination of sampling styles is a cost-effective method and allows access to subjects who would otherwise be difficult to find (Naderifar et al., 2017). Initially, recruitment emails were sent to potential participants, with the intention of word being spread to other violinists, so that more participants could be recruited through word-of-mouth. This proved unsuccessful, and after no participants were found, the researcher chose to create a simple Google form (Appendix E), which included the steps of the Beighton scale (Pocinki, 2010) as a simple diagnosis tool, as well as a checklist of possible symptoms of performance-related pain.

Data collection focused on understanding the participants' perception of living with hypermobility and performance-related musculoskeletal disorders. Since knowledge of HSD in South Africa appeared to be limited, the inclusion criteria did not require a medical diagnosis of HSD. Because this formal diagnosis was not required, the investigation could also explore the existing knowledge of hypermobility among South African violinists.

The selection criteria for this study included violin playing experience of at least 10 years or more; a score of at least 4/9 on the Beighton scale; symptoms of hypermobility; and a performance-related musculoskeletal disorder or injury. Potential participants were asked to complete an online form which contained the Beighton scale, as well as a checklist of possible injuries or disorders which they may have experienced. From the provided data form, the researcher identified all violinists who had a score of four out of nine on the Beighton scale, and who had indicated (checked) that they had experienced any of the possible disorders or injuries.

The study aimed to include at least four participants, including the researcher's self-interview. Overall, 44 individuals completed the form, with nine meeting the requirements for inclusion. All nine individuals were contacted for inclusion in the study, and seven responded. All seven were interviewed, and five were included in the study. As a result, six participants (five interviewees and the researcher's auto-ethnographic account) were included in the study. All six of the participants were between the ages of 18 and 25. Three of the participants are male and three of the participants are female. The participants' age, gender and ethnicity are not relevant to this study, and were subsequently not included in the inclusion requirements.

A small sample has been chosen, as a smaller pool allows for a more in-depth understanding of each of the participants' cases, rather than a shallow understanding of many cases. Shinebourne (2011) suggests the use of small sample, in order to accommodate the detailed and intensive focus on the individuals' accounts.

3.5 Data collection

Data were collected through semi-structured interviews, along with an auto-ethnographic self-interview. Semi-structured interviews are conversational interviews with participants, where one participant is interviewed at a time. The researcher asks a combination of closed and open-ended questions, which are often accompanied by follow-up questions which allow for the inclusion of more information (Adams, 2015). One of the main advantages of this method of interview is that there is freedom for the interview to move around the general topic, allowing the researcher to discover the independent thoughts or experiences of each individual participant (Adams, 2015).

At the time of data collection, COVID-19 had spread throughout the world, and all members of the population had been placed in lockdown. As a result, all interviews took place online via video conferencing. Generally, it is advised that interviews be conducted in a safe and familiar setting for the participant, in order to create a comfortable environment where they may feel

more relaxed, and willing to address sensitive topics (Smith et al., 2009). However, it is possible that this situation may have led the participants to feel more at ease, since online data collection can help create environments which are comfortable and nonthreatening (Nicholas et al., 2010). All the interviews were audio recorded, and transcribed verbatim to ensure accuracy of the information collected.

According to Allett, Keightley and Pickering (2011) a self-interview involves the individual responder answering a selection of interview questions, without the use of an interviewer. In some studies, this method has been used to allow the respondent time to think about their answers, and perhaps to go back and reminisce. In this study, the researcher audio-recorded a self-interview to answer the same semi-structured interview questions which were posed to the confidential participants. The self-interview was conducted before the semi-structured interviews, to prevent the discussion of the researcher's own experience being affected by the discussion of others' experiences.

3.6 Construction of the interview schedule

The research data was collected via semi-structured interviews. Each participant was asked a series of predetermined open-ended questions, designed to gather information about different aspects of the research questions. The questions were designed to give the participants space to interpret and answer as they saw fit. During the interview process, follow-up questions were asked, based on the participants' responses, to encourage more in-detail reflections. After the first two interviews had been conducted, an unexpected topic, sports involvement, had been mentioned in both. I chose to include this as a question in the following studies. Some participants included this topic on their own, while others were asked specifically.

When designing the schedule, I followed the suggested sequence for producing an interview schedule, as proposed by Smith et al. (2009). The interview schedule was formatted to encourage

answers to the research questions, which would be analysed and contextualised later, rather than asking the research questions verbatim. I selected the topic areas which I wanted to cover, and started crafting questions which would encourage detailed descriptions of these topics. I chose to sequence the interview in a way which would spark a thought, and then allow the participant to reflect and speak about it, in detail, later in the interview. Open-ended questions were formulated, accompanied by possible prompts, which could be used to lead the conversation in the desired direction, without limiting the participants' responses.

Prior to conducting the interviews, I decided that the process would be as free and conversational as possible, to create a comfortable environment in which the participants could answer the questions. I had not intended for the interviews to take place online, but due to lockdown restrictions caused by COVID-19, this was unavoidable. I aimed to create comfort by setting a conversational atmosphere, where the participant and interviewer could interact freely. However, the interview schedule was essential in guiding the topics of discussion, ensuring that a detailed data set was obtained.

3.7 Data analysis and interpretation

3.7.1 Transcription process

The analysis and interpretation were largely guided by the process set out by Smith et al. (2009). The IPA analysis process, while being open to adaptation to suit the study, includes several simple steps. After conducting interviews with each participant, the interviews were transcribed verbatim using a transcription service website named Temi.com. The electronically transcribed interviews were then edited, while listening to the audio, to ensure accuracy.

3.7.2 Data analysis process

The process of data analysis took place in six basic steps, as proposed by Smith et al. (2009): reading and rereading, initial noting, developing emergent themes, searching for connections across emergent themes, moving to the next case, and looking for patterns across cases. These steps were adapted to suit the study at hand. I decided to analyse my own interview according to the same process, to ensure that the interview would form part of the body of data which was collected, and that the analysis remained consistent across all the interviews.

Step 1: Reading and rereading

Once the interviews were transcribed, the analysis process began immediately. I worked to ensure that I immersed myself in the interview. Interviews were read and reread, and important points were highlighted on the transcript. During the first reading, the aim was to remember the connection with each participant, and to draw on their meaning. In the second reading, initial notes of specific, potentially important features were made. In this step, I aimed to become familiar with the texts in a broad sense, so that when I investigated the data at a deeper level, I would be guided by the general picture of the interview.

Step 2: Initial noting

In this step, interviews were placed into a table with three columns, which allowed for detailed notes to be made alongside the interview. This was very time-consuming, as it required reading each sentence and breaking it down into relevant points. Smith et al. (2009) state that there are no rules regarding what needs to be noted in this step, but that it is important to engage with the text as deeply as possible. Each interview was worked through individually, to make sure that each stood alone, and that the comparison of cases only occurred later in the analysis process.

Step 3: Developing emergent themes

Through the previous step, the data was broadened to create a model of the interview. From this broadening, a familiarity with the text developed, with provisional notes being made about what could potentially be important information. The detail of the notes was reduced, while retaining the complexity of the information. The funnelling of data began during this step. Smith et al. (2009) state that through the identifying of emergent themes, the narrative flow is arranged into discrete sections of transcript.

During the development of emergent themes, the phenomenon of "hermeneutics" became particularly apparent. At this stage of the analysis process, the data set became more removed from the participants, and more closely linked to my interpretation of their words. At first, this felt like an intimidating prospect, since I felt that I could not convey the participants' intention completely accurately. Through further research, I was reminded that my understanding cannot be removed from the analysis process, and that it is inherently a collaboration of the intention of the participants and my interpretation of their description of their lived experience. Smith et al. (2009) state that this is to be expected, and that it is a key part of the IPA process.

Each set of notes (which had been constructed in small phrases) was placed into a spreadsheet and then colour-coded, so that similar notes could be grouped into broader categories (see Appendix D for colour-coded spreadsheet). Some interviews were significantly longer than others, containing more groupings than shorter interviews. From this process, case-specific codes were developed. Initially, there were too many ideas to be classified as "emergent themes", as proposed by Smith et al. (2009). These were refined more effectively before the emergent themes were decided upon. Throughout this process, the original texts were referred to regularly, to ensure that the true intention of the speakers was maintained. By the end of this step, six lists of emergent themes had been identified: one list for each case.

Step 4: Searching for connections across emergent themes

At this point, all the emergent themes were organised in their six lists, but were still arranged chronologically. Abstraction was used to group emergent themes. These themes were then put into larger clusters and given new titles.

Step 5: Moving to the next case

The process in Step 4 was repeated until new clusters had been formed in each list. This process involved taking all the case-specific themes, establishing how they applied to the other cases, and deciding how they could apply to the research questions. Some of the individual case themes were not relevant to the general study, and were subsequently not included in the collection of subordinate themes. A discussion of the emergent themes for each case is provided below.

Once all the case-specific emergent themes had been arranged, a list of cross-sectional emergent themes was compiled. The emergent themes were assessed and grouped together in a method suggested by Smith et al. (2009). From this list of emergent themes, the collection of subordinate themes was formed. The purpose of a subordinate theme is to represent aspects of the study which are shared by the participants (Foxcroft, 2014). After working with the six cases and compiling six lists of emergent themes, I looked through the cases to find relationships between the emergent themes. Through this method, a list of 13 subordinate themes was compiled. A theme was included in this list if it was common in two or more of the cases.

During the process of organising the data into sections, which in turn were funnelled down into subordinate themes, a spreadsheet was used to create a colour-coded system. This allowed for the simple organisation of information across the data set. While the amount of codes was overwhelming, the colour-coded system made the data easier to sift through.

Step 6: Looking at patterns across cases

Once the subordinate themes had been formed, several patterns across the cases emerged. After numerous rearrangements, the subordinate themes were grouped to form superordinate themes.

A superordinate theme is a theme that applies to all the participants involved in the body of data, and can be found in different forms within each of the cases. After identifying the subordinate themes, abstraction (Smith et al., 2009) was used to identify patterns between the subordinate themes. These were then grouped into new clusters with an overarching title which would be a superordinate theme. After this process, four superordinate themes were identified. These superordinate themes covered four aspects of the research questions: the background factors and context of the participants' musical lives prior to injury, their understanding and experience of hypermobility, their experience of pain and injury, and their attempts to manage the pain they experienced.

Step 7: Write-up of the analysis

Finally, the write-up of the analysis took place. First, the order of the superordinate themes was decided, moving chronologically through the participants' lives and experiences. Then, the subordinate themes were ordered in a manner allowing the data to be most logically displayed. A table was drawn up, containing the superordinate themes, their corresponding subordinate themes, and raw data to support these themes. This table helped to keep the display of the data organised and methodical. Once this table created, the analysis began.

Each subordinate theme was worked through methodically, in terms of each emergent theme within the category. In this sense, the analysis was first aimed at the whole, after which the focus progressively moved deeper into the specifics of the data. In order, this showed the

superordinate theme, the subordinate theme, and the emergent theme, which was analysed more elaborately, allowing for a detailed description of the participants' experiences and views. Each theme was discussed in this manner. Some participants provided more detailed descriptions of phenomena than others. These descriptions were prioritised in the analysis since they provided more information about the topic. The process was time-consuming, but provided an in-depth understanding of the participants' lived experiences.

3.8 Ethical considerations

The ethical procedures detailed by the University of Pretoria were followed strictly. After agreeing to take part in the research project, and before the interview took place, each participant was asked to sign a letter of informed consent (Appendix B). The signed letters of informed consent detailed that the participants understood that their participation in the study was voluntary and confidential, and that they could withdraw at any time. It was also stated that the data collected from the study was for academic research purposes, and would be stored by the University of Pretoria for a period of 15 years, as is stipulated in the ethical guidelines of the university.

3.9 Validity and Reliability

Smith et al. (2009) propose the use of a guide, created by Lucy Yardley, to assess the validity and reliability of qualitative research. I worked according to this guide to substantiate the quality of my research.

Yardley (2000) proposes four principles when assessing the quality of qualitative research: sensitivity to context, commitment and rigour, transparency and coherence, and impact and importance of the study.

The first principle, sensitivity to context, has been shown through my handling of the data collected. Smith et al. (2009) state that IPA analysis creates a sensitivity regarding the participants and the data collected from them. A good IPA study makes use of a significant amount of verbatim extracts from the participants' accounts, which allows the reader to confirm the associations which are being made, so that the participants' true intentions may be portrayed (Smith et al., 2009). In all the subordinate themes, I have used multiple quotes from all participants to provide a clear view of their experiences. Since I was also a participant in the study, I was able to relate to the participants. I believe that this added to their comfort level, since I had also experienced similar problems. However, I am aware that this may also have created bias when analysing the data, since my own experiences would inform my interpretation to some extent. To avoid this bias when analysing the data, I conducted my self-interview first. This also prevented my responses from affecting those of the other participants. I bracketed my experiences, and tried to understand each participant's experiences as individually as possible.

The second principle, commitment and rigour, is also shown through the use of IPA. Smith et al. (2009) propose that an IPA researcher should be attentive to the participant during interviews, and careful with the data during analysis. To ensure the quality of the data collected, I listened to and interacted with participants, aiming to make them as comfortable as possible during the interview process. I worked carefully and methodically with the data, to ensure that the essence of the participants' words was respected. Smith et al. (2009) also state that a rigorous study is one which is thorough, and which answers all aspects of the question. My sample was selected purposively, aiming to create a group of participants who had a wide range of injury experiences, but shared similar backgrounds regarding violin and hypermobility. The goal was to ensure a rich data set, which was also homogenous enough for the researcher to be able to draw valuable conclusions.

The third principle, transparency and coherence, was met through adherence to the ethical and methodological processes defined in the IPA protocol, as well as in my dissertation. I communicated openly with participants and was as transparent regarding the data collection and analysis as possible. The coherence is specifically shown in Chapter 5, where the connection between the literature in Chapter 2 and the findings in Chapter 4 is made.

The fourth principle, impact and importance of the study, is displayed through the literature review. There is a paucity of research into this field, specifically in terms of the experiences of hypermobile violinists who have experienced a performance-related musculoskeletal disorder or injury. This study was conducted with the intention of being a preliminary study into the field, which will be further researched in a later, more comprehensive study. Results have been varied enough to warrant continued research of the topic.

3.10 Summary

This chapter provides a detailed account of the methodological processes followed in the research project. The theoretical and conceptual framework were defined, followed by a detailed description of the research approach and design, sampling strategy, and data collection method. The data analysis process was defined and explained, outlining the thought processes and methods which were followed to analyse the data. Finally, the ethical considerations, and validity and reliability of the research were presented.

Chapter 4

Findings

4.1 Introduction

Chapter 4 provides the findings of the inductive analysis of the transcribed interviews. The chapter provides an individual case summary followed by the superordinate themes and subordinate themes.

4.2 Individual case summary

A brief discussion of each of the cases is provided, to contextualise the results. Six cases were studied, one of which was an auto-ethnographic self-interview.

4.2.1 Case 1: Joel

Joel is a 21-year-old male who has been playing the violin for 15 years. He currently studies engineering and plays violin casually. The amount of time Joel spent practising increased exponentially over time, especially during high school. Although he still plays informally, Joel does not practise as often as he did in high school. Joel's Beighton scale score was 5/9, and he mostly experiences hyperextension in his elbows and knees. Prior to completing the Beighton scale test, Joel was aware that he was more flexible than his peers, although his knowledge of hypermobility was limited. He does not believe that hypermobility has had any effect on his life, beyond conversations regarding the hyperextension in his elbows. He posits that this hyperextension, however, has not played a role in his ability to play the violin. His mother also has hypermobility, as well as rheumatoid arthritis.

His violin teachers have never addressed his hypermobility, but he has struggled with a "pinkie problem" for most of his violin career. His left pinkie often locks at the second joint. Similarly, the right pinkie creates problems with bowing. Joel's teachers gave him exercises to strengthen his fingers, but he has been unable to solve the problem completely. His teachers have also worked with him extensively to improve his posture, and to keep his neck as straight as possible while playing.

In general, Joel experiences stiffness and fatigue while playing, but does not see this as an injury. He compares the pain he feels to the muscular fatigue one would feel after a workout or exercise session. Joel did not take part in sports during school. He experiences regular neck pain, which he attributes to the strains of everyday life, as well as poor posture while working on the computer.

While playing the violin, Joel can play for three to four hours without experiencing pain. He states that he experiences mental fatigue before he becomes aware of physical fatigue and pain. When he does experience pain and fatigue, he lowers his violin and stretches briefly. Joel feels no need for medical treatment.

4.2.2 Case 2: Keith

Keith is a 19-year-old male, who is pursuing a degree in the sciences. Keith started playing piano at a young age and began playing the violin shortly thereafter. The amount of time he dedicated to practice increased as he matured. Music has always been a hobby for him, and he has played in orchestras and ensembles for nine years. Keith has a limited awareness of hypermobility. He has used his hypermobility as a party trick, impressing people with his ability to hyperextend his joints, but he has little understanding of the condition itself. He scored 8/9 on the Beighton scale. Keith and his mother are the only two members of his direct family who have hypermobility.

Although Keith believes that there are no specific ways in which hypermobility has impacted his ability to play the violin, he has struggled with pain in his lower back, as well as muscle fatigue. He describes this sensation as “more tired than painful”. Keith’s left pinkie finger locks regularly and painfully while playing. He has not addressed the issue specifically, and has not given the problem much thought.

Keith can play for a period of 45 minutes to an hour, without experiencing pain. When pain begins to set in, he rests, leans back in his chair, and tries to relax. In lessons, his teacher has addressed neither the pain he has experienced, nor his hypermobility. However, he does not feel that his hypermobility needed to be addressed, as he does not believe that it has affected his playing ability. Keith’s teacher did, however, address his posture while playing and worked to improve this. Keith believes that he has not experienced any specifically violin-related injuries and has not seen a doctor for any pain. Interestingly, he has taken dance classes in a variety of disciplines for several years, and has experienced injury and pain through these exercises on several occasions. In one such instance, Keith felt intense knee pain, due to dancing on a hard surface. He has also experienced general body pain.

Keith states that his hypermobility has not influenced his life, neither positively nor negatively. He did, however, speak about how he was more flexible than his peers, with little to no pain experienced, while he was dancing. In general, Keith does not believe that the pain he feels while playing is a significant part of his violin experience. Rather, he describes it as tiredness, implying that it is nothing beyond the pain which is to be expected through playing the violin.

4.2.3 Case 3: Samantha

Samantha is a 22-year-old female, pursuing a degree in education. Samantha has been playing for 15 years. She played frequently during her schooling, but does not play as

regularly now. She has played in orchestras and ensembles for five years, but does not do so at present. Samantha scored 6/9 on the Beighton scale. Prior to scheduling the interview, she had no knowledge of hypermobility, but she elected to research the topic before the interview took place. She has not been formally diagnosed with hypermobility and has never seen a doctor for the condition.

Initially, Samantha experienced no pain while playing the violin. Her first experience of pain was around the ages of 16 and 17, presenting itself as back and shoulder pain. While in school, Samantha experienced intense pressure to play, because of both academic and orchestral requirements. She would often be required to play for long periods of time, and felt her worst pain while sitting and playing. Specifically, Samantha's injury was on her left side, from her head, into her shoulder and arm, as well as into her wrist and hand. Her back and spine also actively hurt while playing. She could not play for longer than half an hour without experiencing pain. Samantha described her pain as being warm and uncomfortable. She said that the pain in her arm felt like a pulling sensation, which was sometimes "tingly". She felt numbness in her arm, as well as a shooting pain in her arm and back. She did think that her pain was unusual, but believed that it was a normal consequence of playing the violin.

Samantha spoke to her mother and violin teacher, and together, they established a stretching and relaxation routine in an attempt to address her playing-related pain. She also used a selection of symptomatic treatment methods and light exercise to address the pain. Samantha felt that the help she received from her teacher in dealing with the pain was highly effective, but, nonetheless, she experienced the pain for a period of a few months. To aid with pain management, her teacher suggested a change in violin playing technique. They specifically suggested that she play without a shoulder rest. Samantha found this to be more comfortable, helping to ease some of the pain. Despite not playing with a shoulder rest, Samantha says that

she manages to maintain a relatively straight neck position. Her teacher also worked with her for many years to address her playing posture.

Although Samantha consulted a general practitioner to treat the pain she experienced, she rather developed her own coping mechanisms to deal with the problems she encountered. She found that she could prevent further injury by adjusting her violin technique. She advocates the need for body awareness, so that injuries can be acknowledged and addressed as quickly as possible, to prevent long-term injury. Currently, Samantha feels less pain while playing, but there has been consistent discomfort in her left shoulder since her initial injury. She is aware of the injury and pain she experienced, but does not believe that hypermobility played a role.

4.2.4 Case 4: Amanda

Amanda, a 24-year-old female, has played for the last 16 years. She is completing an architecture degree. Amanda grew up playing the violin and practised regularly. Since starting university, she has not played as much as she did before. When she was in school, Amanda played for many hours a week, for long periods of time. She now plays every few months, but no longer takes part in any chamber or orchestral groups.

While taking lessons, Amanda faced several problems while playing. She struggled to form an effective and controlled bow hold, and had problems with finger control in both hands. Her teacher worked to improve her posture, as well as her bow hold and finger control. Amanda experienced difficulty with her left pinkie finger, which locked in place regularly. When her finger locked, she needed to adjust it manually, but this was not always possible in the middle of a piece of music. She felt that this finger was unreliable, and that she often struggled to play in tune. Her fourth finger lacked the strength to execute vibrato confidently and consistently. Because of this, Amanda learnt to avoid using her fourth finger, and changed her

fingering so that her fourth finger would not be necessary. Prior to partaking in this study, Amanda did not know that she had hypermobility, and was not aware of the condition in general. She scored 4/9 on the Beighton scale.

Amanda experienced a great deal of pain related to playing, but did not seek medical attention. She regularly experienced jaw pain and toothache. She also experienced regular back and neck pain, and was often distracted by the pain while playing. She described the pain as uncomfortable and intense. Amanda could not play for more than 20 minutes without experiencing pain, but found that if she pushed through the pain, her body adjusted to it and she could play for longer. She compared it to breathing, saying that when one becomes aware of one's breath, one notices it a lot, but eventually the body forgets, and one can carry on as normal. In order to maintain momentum while practising, she would ignore the pain as much as possible so that she could play for longer.

Amanda experienced nerve pain regularly. She remembers no specific time when her first injury occurred, even though she felt most of her pain in high school. Amanda describes her nerve pain as a random shooting sensation. When this occasionally occurred, it lasted for a long period of time, temporarily forcing her to stop playing.

Amanda's teacher aided with pain management and technique adjustment, focusing mostly on exercises and stretches, the improvement of posture, and adjustment of her violin set-up. The assistance was sporadic and provided when necessary, rather than on a regular basis. Her teacher never made any mention of hypermobility, and did not address the struggles related to the condition.

From an early stage, Amanda remembers feeling uncomfortable playing the violin. Her shoulder rest regularly fell off her violin, and she did not feel that it was tall enough for her neck. No change to her set-up helped her to feel more comfortable while playing, and this,

along with her pain, caused frustration. The difficulties she felt in general caused her to feel annoyed, discouraged and often exacerbated her anxiety. Amanda took part in sport throughout school, and experienced some sports injuries. She believes that these injuries did not affect her playing. While learning to play tennis, her coach showed her how to self-adjust and click her back, which is a technique she still employs to provide temporary relief for back pain.

Both Amanda and her brother have hypermobility, but she believes that her brother has not put his joints and fingers under the same stress, since he does not play the violin. She suggests that this could be why he has not experienced any injuries or pain. Her father has also experienced long-term shoulder injuries, due to high-intensity sport, but Amanda is unsure whether this is due to sport, or whether it may be genetic. Amanda has not sought out medical treatment, and has not found any long-term solutions or treatments for the problems she faces. She has found ways to cope with the pain: the predominant solution being to ignore it. She still regularly struggles with general body pain, and can only play for 15 minutes without feeling pain.

Amanda had a negative relationship with her pain, and regularly avoided her symptoms. She thought the pain she felt was a normal consequence of playing, and convinced herself that she should not worry about the discomfort and pain. She complained to her teacher and family about her pain, but did not take her complaints further. Amanda believes that violinists often underestimate the role of conditioning in the perception of pain, and that the way they view pain is unhealthy, breeding a culture of ignoring pain, rather than addressing it.

4.2.5 Case 5: Yannick

Yannick, a 25-year-old male, studying towards an architecture degree, began playing at an early age, and soon became serious about the violin. He practised for long periods of time,

and played regularly in high school. In his Grade 10 year, he toured with orchestras, both locally and internationally, and played for up to 17 hours a day on these tours. This year was extremely strenuous and took a toll on Yannick's body, causing pain in his lower back and neck. Throughout high school, Yannick took part in multiple ensembles and orchestras, and played for an average of 10 to 15 hours a week. Both before his injury and during the height of his painful experience, his teachers were supportive and provided exercises to improve technique and strength, in relation to violin, as well as general body strength. Prior to this study, Yannick was unaware that he was hypermobile, and thought that the symptoms he experienced were normal. He scored 4/9 on the Beighton scale. His legs and arms hyperextend, but he says that this has had no effect on his playing. He has, however, experienced pain in his pinkies while playing, with his fingers regularly locking at the second joint. Yannick's mother also has hypermobility.

At the age of 16, Yannick played for long periods of time, and frequently carried heavy objects while on tour. His lower back, wrist, knees, and neck were affected, and he experienced the most pain in his lower back. He had to stop playing at times because the pain was so severe. To address the pain, Yannick received physiotherapy. He says that the treatment helped to ease the symptoms, but did neither fix the problem, nor provide long-term solutions. Throughout his journey with this injury, Yannick has found no long-term solutions for the problem.

Yannick took part in several sports during school, and sustained a few sports-related injuries, including shoulder and elbow pain. He has experienced knee pain, which he relates to the back pain.

To resolve some of the issues causing back pain while playing, Yannick has worked to improve his posture and playing technique. He has experienced other problems while playing,

including difficulty controlling his bow hold and finger position on the bow. For years, Yannick avoided the symptoms of pain, and often dismissed them as being a normal part of practising and playing the violin. He says that the violin requires an unnatural playing position, making pain inevitable.

Yannick has experienced the same back pain for a period of six to seven years, and has tried various methods to ease the pain and eradicate the symptoms. He still does the exercises which he was given by his physiotherapist and teacher, and sees his physiotherapist when necessary. He intends to consult a chiropractor to ease the pain, which he still has not managed to treat, despite having reduced the amount of time spent playing the violin. The long-term effects of his injury have played a substantial role in his day-to-day life.

4.2.6 Case 6: Self-interview – Tamlyn

I am a 23-year-old female, and have been playing for 17 years. I did not practise regularly for much of my early violin career, although I participated in consistent lessons and small chamber groups. Since completing school, I have obtained a degree in music and work as a freelance musician and violin teacher. I practise regularly and perform as an orchestral violinist.

I have been aware of my hypermobility for several years, scoring 9/9 on the Beighton scale, although I did not understand the full extent of the condition until recently. Through research, I have come to believe that some of the injuries I have experienced stem from hypermobility. I believe that hypermobility has led to my shoulder movement being restricted, a focal dystonia developing in my left hand, and my fingers locking while playing. My mother has also had hypermobility for all her life, and now suffers with fibromyalgia, ankylosing spondylitis, and rheumatoid arthritis.

I participated in sports regularly. At the age of 16, my first experience of pain occurred while swimming. I sustained a rotator cuff injury in my left shoulder, which was regularly treated by a physiotherapist for a year, but did not heal completely. During this period, other neurological symptoms began to manifest, including pain and numbness into my left arm and hand, twitching of the middle, ring and pinkie fingers of the left hand, and involuntary shoulder movements. The consulting physiotherapist referred me to a neurosurgeon.

I was sent for diagnostic tests by the neurosurgeon, all of which showed no unusual activity, and no concerning markers. A neurologist did nerve conduction tests to assess nerve function in my left arm. These also showed no unusual activity. After no remarkable results were found, the neurosurgeon suggested a process-of-elimination style of diagnosis, to establish which activity was causing the pain and injury. After a six-month period, it was established that violin was most likely causing the pain and neurological symptoms. I regularly felt that the doctors who treated me did not believe that my symptoms were real, but I also doubted my own understanding of my symptoms, often trying to convince myself that I was fabricating my pain as a way of explaining why no test could discover what was wrong with me.

Eventually, it was established that the symptoms which could be seen, but not proved, seemed to be caused by a compression of the brachial plexus. The neurosurgeon I consulted suggested that I stop playing the violin, to prevent further injury. While seeing this neurosurgeon, my mother and I enquired about whether hypermobility could have played a role in the development of this injury. The neurosurgeon stated that there was a likelihood that it had exacerbated the injury, but he provided no further understanding of the relationship or how to help prevent further development.

After obtaining this diagnosis, I consulted a physiotherapist, and an acupuncturist, who is qualified as a doctor of Chinese medicine and homeopathy. Through consulting these two

medical professionals, it was found that by reducing the amount of inflammation in my body, the symptoms could be slightly diminished.

I worked closely with my teacher to adjust my playing technique in order to keep my neck straighter, we worked to avoid unnatural twists or positions which might exasperate further compressions of the brachial nerves. Through my injury, as well as through an injury of her own, my violin teacher now watches her students carefully to avoid similar injuries.

My pain is still present, but I have learnt body awareness and have developed techniques to reduce and prevent pain as much as possible. I have found no permanent long-term solution, but rather adopted several coping techniques.

I was frustrated that there did not seem to be a clear reason for why my pain had started, and because there did not seem to be any medical solution or treatment for the problem. Throughout this time, hypermobility was implied to be involved in the injury, but the medical professionals displayed limited knowledge regarding the condition and its involvement in my injury. Since this time, I have experienced several hypermobility symptoms, unrelated to the injury, but which have affected my quality of life.

I did not speak about the pain that I experienced, as I felt that I would be perceived as weak or inadequate by others. My experience of injury occurred over six years ago, but my memory of the incident is incomplete, and much of what I remember is from short glimpses of incidents, and from what I have pieced together from my mother's retelling of the story.

I have conducted more research into my case and have found that it is likely that I have thoracic outlet syndrome in my left shoulder, as well as a focal dystonia in my left ring finger. Various academic sources include descriptions of the symptoms which I have experienced. A physiotherapist, homoeopathist, and general practitioner, have confirmed that these diagnoses are likely to be correct. However, I still doubt that there is anything medically wrong with me,

since there has been no true diagnosis, confirmation or treatment provided by medical doctors who are experts in the field.

The accounts above provide context for the cross-case analysis which follows. There are several similarities across the participants' experiences, which will be displayed in more detail below.

4.3 Superordinate themes

The analysis process revealed 12 subordinate themes, which were categorised into four superordinate themes. Table 1 shows the superordinate themes, with the corresponding subordinate themes, as well as raw data to support the subordinate theme divisions.

The first superordinate theme relates to the beginning of the participants' musical life, together with the experiences which led them to the injury they experienced. The second superordinate theme presents the participants' understanding of hypermobility, and the ways in which hypermobility has affected their lives and, specifically, their ability to play the violin. The third superordinate theme details the participants' perceptions and descriptions of their injuries and pain experiences, in relation to hypermobility. Finally, the fourth superordinate theme provides a description of the participants' attempts to alleviate and treat the problems they faced because of injury.

Table 1: Superordinate themes, subordinate themes, and raw data

Superordinate theme 1: Background and context of the participants' musical lives and experiences prior to injury	
Subordinate themes	**Raw data**
1. Formative experiences	*I really grew up with the violin…* [Amanda] *I started getting serious about it around Grade 3, Grade 4...* [Yannick] *I didn't really practise that much when I started* [Keith]

2. Sport, exercise, and injury impacting violin playing	*I have had knee injuries… from football that affected my spine, which affected my violin playing.* [Yannick] *I played netball on a Saturday, danced Monday and Wednesday afternoon, swam every morning, and I had swimming training every afternoon.* [Tamlyn] *I was mostly just an academic and cultural student.* [Samantha]
3. Familial hypermobility	*My brother and I both have this [arm overextension].* [Amanda] *…my mom's very hypermobile, she can do the thumb thing.* [Joel]
Superordinate theme 2: Knowledge, experience, and impact of hypermobility	
Subordinate themes	**Raw data**
1. Participants' perceptions and knowledge of hypermobility	*…through my own experience… there's a lack of knowledge around hypermobility… in South Africa.* [Tamlyn] *I was told that, you know, I was double-jointed* [Keith] *When my knees would bend backwards, I just thought it was normal* [Yannick]
2. Participants experience of medical diagnoses of hypermobility	*…but it's not… something I've been diagnosed with.* [Samantha] *...doctors… very casually said oh well I guess yeah it probably has something to do with that [hypermobility]…* [Tamlyn]
3. The impact of hypermobility on violin playing	*…my pinkie finger… always went in and not perfectly round [locks in place] …* [Joel] *...my pinkie finger, it locks, with my bow hold. It makes the stability a bit difficult.* [Amanda] *…apart from my finger locking on the occasion, there wasn't much opportunity to show… what my fingers do* [Keith]
Superordinate theme 3: Hypermobility and the experience of pain	
Subordinate themes	**Raw data**
1. Experience of pain and discomfort	*Sometimes [violin] does lead to more pain than usual because it does hurt a lot while I'm playing* [Tamlyn] *…it was once I started playing in orchestra that I started experiencing a lot of lower back pain and [shoulder pain]* [Samantha] *…feel uncomfortable then my jaw would get sore…* [Amanda]
2. Individual response to pain	*You know, it just went on as per usual as a violinist.* [Samantha] *I don't tell people about the pain...* [Tamlyn] *…when I was younger, I used to get very frustrated.* [Amanda] *…you will get tired… I just thought it was normal.* [Yannick]
3. Effect of HSD-related pain and injury on playing ability	*I can't last longer than 10 to 15 minutes… back is so sore.* [Amanda] *…if I'm standing and playing too long then my lower back will get a bit sore.* [Keith]

	I didn't play for a couple of months, which meant that I lost a bit of my technique [Tamlyn] *At one stage it was so bad I couldn't play.* [Yannick]
Superordinate theme 4: Participants' attempts to manage symptoms of HSD and pain	
Subordinate themes	**Raw data**
1. Medical diagnosis and treatment	*I was taken to a doctor... and he just gave me the next best stress reliever pain medication* [Samantha] *...my muscles are quite compressed, and they need to be released...* [Yannick] *...went to the neurosurgeon and he immediately decided that he knew what the problem was.* [Tamlyn]
2. Playing-related pain, coping strategies and adjustments	*...whenever I notice it now, I go, okay, yeah, I'll, I'll spend about 5 or 10 minutes just strengthening my finger again.* [Joel] *But once I was injured, she [teacher] did help quite a lot with changing the way that I played.* [Tamlyn] *Funny enough, I actually got rid of my shoulder rest.* [Samantha]
3. Strategies for pain management and the need for body awareness	*I lived on painkillers from about Grade 9 right up until first year, because nothing fixed it.* [Tamlyn] *My spine clicks easily. I can click it here, by myself.* [Yannick] *...finding healthier ways like that to, you know, learn to read and understand your body as well* [Samantha]

4.3.1 Superordinate theme 1: Background and context of the participants' musical lives and experiences prior to injury

The cross-case analysis showed that participants described background factors, providing a context within which to understand their experiences of hypermobility and pain. The following subordinate themes will be discussed under this superordinate theme: Formative experiences, Sport, exercise, and injury impacting violin playing; and Familial hypermobility.

Subordinate theme 1: Formative experiences

All the participants began playing the violin between the ages of five and nine. The majority also stated that, at first, they did not take practising very seriously. This was related to their age and lack of interest in practising. Over time, the duration of their practice sessions

increased, as they became more serious about the instrument. Five participants took music as an elective in school, which resulted in extended and more intense practice sessions.

> I got to choose music as a subject and I continued with music until matric. And [in] high school I really got serious about music, because it was now suddenly not just a part-time hobby. It was part of my academics. It was something, I'm always very serious about my academic work, but it was one of my favourite subjects in academics because I was already on a level where I could comfortably do things and explore and learn more. So, it was one of my favourite subjects at school. (Joel)

> And in Grade 7 I got serious and I wanted to join the [provincial] youth orchestra. So then there I played with them and I joined. So then from Grade 7 to matric, I was playing with the [provincial] orchestra. (Yannick)

All the participants are currently at university, although only one participant is studying music. The others play casually, as a hobby, rather than as their profession.

> I don't play as much anymore, after I left school. Especially because I took music as a subject in high school, it required so much from me, so much time and, I loved it. I just decided to take a bit of a break after school because I went into teaching. So I'm in my third year of studying teaching at the moment and I don't play it as often now, and it's a little bit more difficult from where I stay to get involved in orchestras and that sort of thing. So, I don't play as frequently now as what I used to, but I am still playing. (Samantha)

> I went to study engineering, and by this point I'm kind of inseparable with music. It's, it's, I call it the thing that keeps me sane. And I, I never really, I considered studying music, but that, that was very short lived. It was, it was considered "no I want to keep, I want to keep music as my hobby. I don't want to be reliant on it for my work". So, I went to study engineering and so I got less and less time to practise, but I made more effort to get time to practise. (Joel)

All the participants have played in, or currently play in an orchestra or chamber group. In general, when participating in an orchestra or chamber group, rehearsals are between one and three hours long. This results in one to three hours of intense violin playing, at least once a week, besides individual lessons and personal practice schedules. The individual experience of the participants in an ensemble ranged from 6 to 10 years.

> Plus, on Fridays we had five-hour rehearsals with [provincial orchestra]. So, I practised a total of at least more than 10 hours a week with school and orchestra. That's about 15 hours a week of rehearsals. (Yannick)

Participants shared memories of their involvement in eisteddfods, competitions, music exams, and performances.

> I got invited to the top thing of the … it's, it's the thing where the top music students from a couple of schools get invited to, to perform their pieces in front of, like, an audience of younger school children to inspire them. (Joel)

> So, I've managed to finish and complete and do all my exams for violin and theory. (Samantha)

Most of the participants began playing the violin at an early age, and as the instrument became more important to them, they placed more importance on practice. All the participants have had experience in orchestral or chamber groups, although the number of hours they have spent in these ensembles varies.

Subordinate theme 2: Sport, exercise, and injury impacting violin playing

Prior to the interview process, there was no intention to investigate the role of sport or exercise in the injuries experienced. However, the theme of sport and exercise as part of the participants' background experiences became salient. Some of the participants specifically mentioned ways in which sport and exercise may have impacted injury and violin playing.

Although these activities may have exacerbated injury, they were not necessarily related to violin playing.

Yannick, Amanda, Keith, and I took part in regular exercise both in primary school, and across the period when injury occurred. Between the participants, there was no common sport, and the cases shared no commonalities beyond playing the violin and beginning at a young age. Yannick played football and basketball, Amanda played hockey, Keith and I danced, and I swam and played netball. The other two participants stated that they did not partake in sports and tended to focus more on academic and cultural endeavours.

> So, I actually did sport as well, but it obviously wasn't as important as my violin. So, violin, I mean, I'd have my, I do multiple violin engagements. But with sports, I always was playing a sport. (Amanda)

Two of the participants, Yannick and I, experienced injuries related to sport, which had an indirect effect on our ability to play the violin. I sustained the first injury to my shoulder while swimming, and later also exacerbated the injury while swimming.

> And on one occasion, I had a very long [swimming] training day, I think I had [swimming] training in the morning for an hour and a half, and then [swimming] training in the afternoon for two hours, and then [swimming] training after that for I don't know how long. Um, and, I was in the second training session of the day, and I was busy swimming backstroke, and it was at school, and while I was swimming, I felt my shoulder getting uncomfortable, and then this intense pain in my shoulder, but I just assumed I was tired because I'd been swimming a lot all day, so I thought my shoulder was probably just tired from all the work that I'd been doing. So, I carried on swimming anyway. Then at training later that afternoon, at club training, my shoulder got even more sore, and then I just sort of told them "nah, it's fine" and just carried on swimming. Um, and then the pain persisted a couple weeks after that. (Tamlyn)

Yannick had knee injuries and pain because of football, and this impacted his back pain, which ultimately affected his playing ability.

> And because I'm an avid sportsman also. Cause, like, I have had knee injuries and stuff from football that affected my spine, which affected my violin playing. (Yannick)

Keith and I were the only two of these four sporting participants who took part in a similar activity. We both spoke about injuries we had sustained while dancing, although neither of us believed that our dance injuries had affected our ability to play the violin.

The sporting and exercise habits of the interviewees vary. Not all the participants took part in these activities, but they still experienced similar injuries to the other participants. The three participants who took part in sports and exercised most regularly are also the three whose injuries were the most extensive.

Subordinate theme 3: Familial hypermobility

All the participants stated that a direct family member also has hypermobility, emphasising the possible heritability of the condition. The participants shared the Beighton scale test with family members, and four of the six said that their mothers scored at least four out of nine on the test.

Two of the participants' siblings were able to complete some of the exercises stipulated in the inclusion test, but were not specific about how many of the tests they were able to complete. One participant said that her sister could complete more of the stipulated tests than she was able to, and had been called "double-jointed" on many occasions.

> They've [strangers] commented on my younger sister being flexible, double-jointed, and that sort of thing… She's got no knowledge of hypermobility at all. But people have always commented her on her double-joints and her flexibility, and that sort of thing. (Samantha)

Another participant, Amanda, shared that she and her brother were able to complete a similar number of tests on the inclusion. Her brother did not play an instrument. Amanda hypothesised that her brother's lack of instrumental activity could explain why he did not experience pain and injury in the way she had, since their hypermobility was similar, but he had never been injured.

> So, my brother and I both are, like, the same animal …we both have…this [arm overextension]. And I think, I think his fingers also fall [overextend], but he, he never did an instrument as much as, I don't think he's used this thing [extension of the fingers, as associated with violin playing] as much, I don't know. His fingers seem a little sturdier to me. (Amanda)

Joel and I both stated that we had heard of hypermobility previously, although Joel referred to the condition as "double-jointedness", a colloquial name for the condition. Joel shared that his mother had asked if he could do certain exercises, such as overextending his arms, and encouraged him to control the overextension.

> …my mom's very hypermobile, she can do the thumb thing. Not anymore, because rheumatism, but when I was very little, she would go, "Oh, can you do this?" And like, "yeah, no, I can do that and do a couple of those tests and things". And she said, "no, don't, don't do that with your elbows. It's, it's bad for your joints". (Joel)

My mother [Tamlyn] had always been more flexible than her peers. I saw her advanced flexibility and assumed that all people were as flexible as she was.

> So, I've known that I have hypermobility from a very young age. My mom has always been able to touch her toes… and put her hands flat on the floor. And I mean, growing up, I always thought that everybody could do that because I could just bend over, put my hands flat on the floor. I could always sit on my bum and put both legs behind my ears without any effort whatsoever. (Tamlyn)

Two of the participants, Joel and I, revealed that our mothers had chronic conditions. Both our mothers have rheumatoid arthritis. While there is no quantifiable proof that hypermobility is linked to the occurrence of chronic conditions, Joel hypothesised that his mother's rheumatoid arthritis could be because of hypermobility. None of the other four participants' parents suffer from rheumatoid arthritis, but Amanda spoke about a long-standing shoulder injury which her father had sustained, which, she theorised, may be linked to hypermobility.

> She [mother] has ankylosing spondylitis and fibromyalgia, and rheumatoid arthritis. (Tamlyn)

> Not, not as far as I know. It [hypermobility] might contribute to the rheumatism. Oh, arthritis. It might, it might be contributing to that. (Joel)

> And my dad has bad shoulder problems though, really bad shoulder problems. But he was also, so he's a sportsman. He was a big sportsman. He used to throw javelin and he, I think it was overworking. So, I'm not sure how much it is a, like, a hereditary, pre-existing thing or, like, an overworked thing. But I think he's, but he is quite vulnerable. Even in his other shoulder. (Amanda)

There are many commonalities in the participants' familial hypermobility. All the participants have a direct family member who scored at least four on the Beighton scale, showing that they have hypermobility. Two of the participants' mothers have chronic conditions, which may be related to hypermobility. No other accounts shared this finding.

This theme showcases the background experiences of the participants' early musical life, and provides context for the injuries they experienced, by discussing the general events which occurred prior to their injuries. All the participants have played the violin for at least 10 years, and have taken part in orchestras or ensembles. Four of the six participants participated regularly in sports, while the other two did not. Two of those four sustained sports-related injuries which impacted their violin playing. All the participants have a direct family member with hypermobility, with four of the six mentioning their mother, and the other two

mentioning a sibling. Three of the participants' parents have conditions or injuries which may have been related to hypermobility, but this has not been clinically diagnosed, and is an assumption from the participants. Two of these parents have rheumatoid arthritis, and one also has other movement-impairing chronic conditions.

4.3.2 Superordinate theme 2: Knowledge, experience, and impact of hypermobility

The following section presents the patterns found across the cases, with regards to the participants' experience and knowledge of hypermobility, as well as the effect that it has had on their lives in general. Themes of participants' perceptions and knowledge of hypermobility; participants' experience of medical diagnoses; and the impact of hypermobility on violin playing will be discussed under this superordinate theme.

Subordinate theme 1: Participants' perceptions and knowledge of hypermobility

When asked about their knowledge of hypermobility, the majority of the participants said that they had either never heard of the condition, or knew of it as "double-jointedness".

> And not, not specifically by that name. I normally call it "double-jointed". (Joel)

> I didn't see it as a massive thing. I just saw it as, you know, I'm one of the people that have [hyper-extensive] joints. Like, there's just, like, someone would have a certain type of fingerprint pattern. And I never considered that as a possible thing that could play a role in my playing. (Amanda)

All but two of the participants said that they were unaware of hypermobility prior to being contacted for the interview. These four participants stated that they did not know they had hypermobility, but shared stories about occasions when strangers had pointed out their overextended joints and had commented on how it seemed strange.

> Whenever, I would, like, lean on a desk. Like, I'd lean in, my elbow would go very far over and then, like, whoever's desk I was leaning on, they would look at me like, "what is wrong with your arm?" But yeah. So yeah, my knees, my fingers, my elbows, I was told that, you know, I was double-jointed, so that's, yes (Keith)

I was the only participant to refer to the condition with its most current nomenclature, Hypermobility Spectrum Disorder.

Joel said that his mom (who also has hypermobile joints and who is a paediatric neurologist) had pointed out his hyper-extensive joints throughout his life, and had prevented the overextension from becoming worse by teaching him good posture. She did not specifically give the overextension a name.

> … but when I was very little, she [mother] would go, "Oh, can you do this?" And like, "yeah, no, I can do that and do a couple of those tests and things". And she said, "no, don't, don't do that with your elbows. It's, it's bad for your joints". So, I can't objectively say that I, there was this moment where I went, "Oh yeah, I'm hypermobile". It's, it's something that I kind of grew up with and knew, Oh, well I shouldn't be doing this with my elbow the entire time. (Joel)

I had a similar experience. My mother taught me about my hyper-extensive joints and encouraged me to dance and to make use of my flexibility. After I was injured, however, through investigation we found that hypermobility was a condition that needed to be monitored, and that it may have contributed to the injuries and pain which I experienced.

> And then, doing research for this thesis was when I realised that it's actually far larger than I had understood it to be. It's not even just a little condition, something simple that, like, you just have, and it makes you cool. It's actually a spectrum of disorders, and I'm pretty high up on the spectrum, so I'm not like EDS type of high up, but I am fairly high up there. I have all the markers on the Beighton score, and a lot of the other symptoms have been developing. (Tamlyn)

Across all the data sets collected, it was apparent that there is a general lack of knowledge regarding HSD. Most of the participants stated that they had been told that they were double-jointed, but they had never known much about the condition or that it was something to be concerned about.

The effects of HSD are not restricted to one part of the body, and as such, the effects of the condition are not restricted to only one aspect of life. The participants' limited knowledge of the condition meant that their perception of the impact of hypermobility on their lives was restricted to a few incidents and stories.

Keith and I both participated in dancing and spoke about the advantages of hypermobility in this activity. We both had advanced flexibility, which allowed us to complete tasks others could not.

> Actually, there's one specifically that I remember when I was sitting on the floor and I had to slide my arms backwards as if I'm lying down, and because my elbows and shoulders moved a bit more. Yeah, it was easier to slide down like that and then pull myself back up. Yeah. (Keith)

I was the only participant to mention any of the other symptoms associated with hypermobility, such as gastrointestinal problems, and hormonal imbalances.

> I have all the markers on the Beighton score, and a lot of the other symptoms have been developing. So, the gastrointestinal problems, I've had to cut gluten and lactose, coffee, alcohol, and fizzy drinks out of my diet because it was making me so sick… And a lot of the things that I've experienced throughout my life when you research hypermobility spectrum disorder or things that I've had and problems that I've experienced, so heightened anxiety and reproductive hormonal issues and stuff… (Tamlyn)

Although their knowledge and understanding of hypermobility were not as extensive as mine, the participants' accounts of their experiences provide valuable insight into the

experience of living with hypermobility, and into the manner in which knowledge of the condition can affect one's life.

Subordinate theme 2: Participants' experience of medical diagnoses

None of the participants had obtained a formal diagnosis of hypermobility as they felt that they did not have any need to go to a doctor for a diagnosis of their hypermobility.

> I had heard about it before, but it's not, it's not ever something I've been, like, diagnosed with, you know. (Samantha)

However, the medical professionals who were consulted for treatment of hypermobility or of an injury did not refer to hypermobility as a contributor or cause of injury. When I consulted a neurosurgeon about the injuries which I had sustained, hypermobility was dismissed as a possible contributor.

> And then, we'd pointed out to all the doctors that I'd seen that "yeah I'm hypermobile", and every single one of them very casually said "oh well I guess yeah probably has something to do with that. Like you probably find that the hypermobility just sort of like had an effect". But not one single doctor took it any more seriously than saying "oh it could have been. Ugh, it might have been that. It's probably nothing". (Tamlyn)

Participants did not receive a formal diagnosis of HSD from healthcare providers. This is partly due to the participants not identifying a need for a diagnosis, and partly because of healthcare practitioners' dismissal of the condition.

Subordinate theme 3: The impact of hypermobility on violin playing

Because many of the participants were either unaware that they had hypermobility, or were not aware of the effects of hypermobility, their perception of the effects of the condition on their playing ability varies significantly.

I was the only participant who spoke specifically about the difficulties hypermobility created while playing.

> With hypermobility… my shoulder strangely enough, just doesn't move past a certain angle. It's like… your elbow is supposed to come around a certain way so that you can, like, bring your hand around the top parts of the G string and you're supposed to rotate, like, your elbow's supposed to move a lot while you're playing. And my shoulder does not allow for that movement. Like, it just sort of stops once it rotates past a certain point and then it really hurts and if I push… (Tamlyn)

I did, however, state that I did not believe that hypermobility created challenges in playing, but rather led to injuries, which affected my ability to play. In this sense, my perception of hypermobility and my playing ability was similar to that of the other participants. Many of the participants stated that they did not believe that hypermobility affected their ability to play the violin.

> I think it does. I don't know. Like I said before, it's the, I don't think it affected while I'm playing… But it does affect the injuries that I've experienced (Tamlyn)

> I've never actually noticed it specifically influencing my violin playing. (Joel)

> But in terms of my joints, I know my legs didn't really affect my playing. Unless I stood to play. (Yannick)

Keith detailed that hypermobility had not affected his playing ability, as he did not develop any injuries because of the condition. Keith's perception of the possible effects of hypermobility on his violin experience were related to pain and injury, rather than to difficulties which may occur while playing.

As far as I can remember, not extensively. Like, I haven't gotten an injury from it. Like, if I'm standing and playing too long then, like, my lower back will get a bit sore. But that's really about it. It's not, yeah, it hasn't caused me major injury in any way. (Keith)

Although some of the participants did not even know that hypermobility existed, many complained about locked fingers or a pinky problem, in which their left pinkie finger, and other fingers in some cases, locked at the second joint while extending to reach notes on the fingerboard. Some participants' right pinkie fingers also locked, creating a lack of mobility both in the hand and on the bow. This was also an inconvenience while playing, since mobilising the locked joint was often difficult and time-consuming, as well as painful and uncomfortable.

The biggest thing that might actually be attributed to hypermobility is my pinkie finger, which a lot of that, yeah, that, yeah, wait, wait [locking in place]. But so, mine always went in and not perfectly round and that is, I've something I really had to work on. I'm still working on it. (Joel)

…my pinkie finger, it locks, you know, with my bow hold. It makes the stability a bit difficult. (Amanda)

Once again, like, sometimes my pinkie finger locked. So, I avoided playing with my pinkie, my fourth finger, at all costs. Any opportunity, any opportunity I got, I would do a lovely, like I could not vibrato with my pinkie finger. It's just not reliable. I don't know. Like, you know, I can't, I just can't rely on it to have that control in terms of intonation and tone quality, you know, so I always would just use my third finger as much as possible. (Amanda)

…if I'm playing for, like, really long periods, then my pinkie will lock. (Keith)

With hypermobility specifically, my fingers tend to lock very easily. So, my fourth finger, my ring finger, sometimes depending on what I do, like how far I'm stretching, they often get locked in place and then I can't actually play any notes after that. I, it's taken me years to get more

mobility in my pinkie finger specifically, but it still locks, and it still causes a lot of severe pain into my wrist while I'm trying to play and stuff. (Tamlyn)

Participants were also asked about their teachers' knowledge of hypermobility, and how their teachers addressed hypermobility in lessons. None of the participants' teachers addressed hypermobility specifically, but many offered solutions to the "pinkie problem", although they did not provide any insight into the root of this problem.

I used to do exercises with my teacher. She used to give me, like, elastic bands, and I used to, like, hold between my thumb and pinkie and try and stretch. (Yannick)

She didn't know about hypermobility, honestly. She just didn't, and I don't think either of my teachers have really known that much about it. (Tamlyn)

So yeah, he never really addressed it purely because I don't think it was, like, something that would be of significant importance to be addressed. (Keith)

Yeah. I didn't actually get given any exercises to do. It was more thing of, you know, she'll be like, "what's going on?" And I'll get, I used to, when I was younger, I used to get very frustrated. I used to be like, "No! It's my finger" and then I'd look, I can just imagine, I can just remember myself as like a 10-year-old being "look what it's doing! Why is it doing this?!" and then she's, and then I was kind of just, like, brushed off. It was more a thing of, like, "try not to let it happen". And my solution to that, later on when I could control my fingering and everything, was to just not to rely on a third finger like crazy always. (Amanda)

In conclusion, the participants did not openly state that their playing had been negatively affected by hypermobility, but there is evidence to suggest that there was some connection between hypermobility and the challenges they faced while playing.

Only two participants had heard of the condition prior to partaking in the study, and only one referred to it by its correct name. The rest of the participants were not only unaware of

the name of the condition, but also did not know that they had hypermobile joints and were on the hypermobility spectrum.

Two of the participants spoke about the ways in which hypermobility has affected their everyday lives. Keith said that he danced during his school career, and often found that his increased flexibility made certain tasks and exercises easier for him than for his less flexible peers. I was the only participant to mention any of the other common symptoms of HSD, including gastrointestinal issues and hormonal imbalances.

In general, the participants said that they experienced hypermobility not to have any effect on their ability to play the violin. However, in terms of the experiences and challenges the participants had faced, it became clear that difficulties were present in their playing, which may not have occurred had they not been hypermobile. The majority of the participants specifically referenced their "pinkie problem" as a challenge they have faced while playing the violin.

The implications of the findings above will be discussed in the next chapter.

4.3.3 Superordinate theme 3: Hypermobility and the experience of pain

This superordinate theme concerns the participants' perceptions of the injuries they sustained in relation to the violin. Under this theme, experience of pain and discomfort; individual response to pain; and effect of HSD related pain and injury on playing ability will be discussed.

Subordinate theme 1: Experience of pain and discomfort

Participants were asked to describe their experience of injury related to playing the violin. Four of the six participants immediately described the feeling in detail.

Interestingly, after stating that they had not experienced an injury or pain, both participants later described an experience where they felt pain while playing.

> …if I'm playing for, like, really long periods, then my pinkie will lock like that. Yeah. And yeah, so it's not, apart from that, it's not anything that will cause me, like, severe pain. But yeah, it takes a while to then, like, go back to normal, like, maybe half an hour, 20 minutes, and then yeah, my pinkie's back to normal. (Keith)

> …and after really extended sessions of playing violin, sometimes my hands would, my left hand would cramp up if I did a lot of, like, really intense double stops or chords and funny stretches. (Joel)

All the participants spoke about fatigue, pain or injury, as well as difficulties they faced while playing. The individual experiences and presentations of pain were varied. All the interviewees said that their first experience of pain occurred several years after they began playing the violin. Many participants specifically mentioned that they first experienced pain in high school, and four explicitly stated that their pain began when they were around 16 years old.

> I would say in high school because in primary school I didn't practise as much as I did in high school. (Amanda)

> So, when I was much younger, I would say no, just started out playing violin and things like that. So, I didn't really experience any sorts of pain or discomfort… [First experience of pain] I think I would say around 16 or 17. (Samantha)

> …in terms of playing the violin, if I can be honest, it's only when I got serious around 2013 when I was in Grade 10, from the rehearsing 17 hours a day with the orchestra, sitting for long periods of time, no break. (Yannick)

> So as far as I can remember, it all started when I was 16, no, end of Grade 9 [15]. (Tamlyn)

Half of the participants still play the violin regularly, despite experiencing discomfort. Keith and Joel, who initially said that they have never sustained an injury and do not regard their pain as unusual, shared that they sometimes feel fatigue while playing, as well as occasional back pain.

> It, it [back] becomes a bit tired at a point and then I just do a bit of a stretch, like, just maybe say a five-minute break and then I can continue. (Joel)

> Like, if I'm standing and playing too long then, like, my lower back will get a bit sore. (Keith)

> … But it's not really a pain. It's more like just, like, a tiredness. (Keith)

I mentioned that I get tired when playing for extended periods, and still experience pain while playing, six years after my injury first occurred.

> Sometimes it does lead to more pain than usual because it does hurt a lot while I'm playing. (Tamlyn)

The other three violinists, who do not play regularly, still experience pain years after their initial injury, despite reduced violin activity.

> It hasn't gone. I haven't played professionally for five years. It's still there. (Yannick)

> I think that if I hadn't done all those things [treatment], I would maybe be experiencing a whole lot more pain or, you know, suffering from other things today if I hadn't just simply, you know, done the stretching and that sort of thing. (Samantha)

Since Joel and Keith stated that they had not sustained an injury, only four of the six participants described their injuries. Of these four, all said that they had experienced neck and shoulder pain. The level of pain that they experienced varied from being extremely severe, requiring treatment, to being a painful, but manageable discomfort.

> But I'd say for me, the most profound one that would really make it difficult for me to play is my neck and shoulders, and my jaw was sore to close. (Amanda)

> And I experienced, especially in my matric year, a lot of pain from my shoulder into my neck and my head. (Samantha)

> Oh, my neck. Yeah, it's [pain] the upper spine, no. I know it's my middle to lower, mostly the lower and on my neck. (Yannick)

> And it's, like, this fiery pain on my shoulder blade and then this numb, dull pain down through my elbow into my, into my hand. And when I'm playing and it hurts, it gets more and more hot and it's like somebody starts stabbing into the space between the, like, the ball and socket of my shoulder. (Tamlyn)

Although all these participants discussed the pain they felt, and also had similar body parts affected by the pain, none of the participants shared the same presentation of injuries. Only two of the participants consulted medical professionals for treatment. As a result, only the participants' experience of pain can be discussed, rather than the similarities across their diagnoses.

Back pain was a common complaint amongst the musicians, although Yannick was the only participant whose main location of pain was his lower back. Other participants said that their lower back would become tired while playing for extended periods, but the severity of Yannick's pain resulted in him consulting a physiotherapist for treatment.

> So, it's my lower back. It's like the T, I don't know, it's T4? I don't know what it is, but it's my lower back. And my spine, the muscles in my back, are the same muscles that affect my, my leg. (Yannick)

Similarly, Amanda and Keith shared that they felt pain in their back shortly after beginning to play. Samantha described the pain as a "pulling" sensation, attributing it to the way in which she sat and played during orchestra rehearsals.

Three of the musicians also mentioned neck pain, often in relation to back and shoulder pain.

> But yeah, I think the most pain I've experienced would probably be from my shoulder into my neck and my head. (Samantha)

> But I'd say for me, the most profound one that would really make it difficult for me to play is my neck and shoulders, and my jaw was sore to close. (Amanda)

> …end of matric, I ended up with a trapped nerve in my neck. And I ended up with nerve problems in my neck, down my spine, and constantly numbness in my fingers, numbness in my legs. I had pain everywhere, across my back and stuff. (Tamlyn)

> …excruciating pain the whole way down, from my neck all the way into my fingers. (Tamlyn)

When discussing shoulder pain, Samantha and I were detailed in our descriptions of pain, and faced similar challenges, though at differing levels of intensity. Samantha described the pain she felt in her shoulder as an "electrical pull", which felt tingly and uncomfortable.

> From my shoulder up into my neck, it would be more of if I could say like an electrical pull, feel tingly in my neck and almost, you know, the top half of your arm would almost go numb in the pain… which sometimes, you just have to stop and put it down and go and stretch and things like that. So that's how a lot of the pain would feel very warm and uncomfortable. (Samantha)

I explained that, depending on the area in question, the pain I felt varied. I felt a hot, stabbing pain in some parts of my shoulder, and a numb, dull pain in other parts of my shoulder and arm.

> …like this fiery pain on my shoulder blade and then this numb, dull pain down through my elbow into my, into my hand. And when I'm playing and it hurts, it gets more and more hot and it's like somebody starts stabbing into the space between the, like the ball and socket of my shoulder. (Tamlyn)

I was the only musician to articulate a specific injury of the shoulder. I sustained a rotator cuff injury in both shoulders, while swimming, which later affected the strength of my neck and shoulder. After seeking treatment for this injury, my symptoms progressed and worsened, requiring me to consult a neurosurgeon. I experienced intense pain, numbness, tingling in my arm, and involuntary movements of my fingers and shoulder.

> … while I was swimming, I felt my shoulder getting uncomfortable, and then this intense pain in my shoulder… then the pain persisted a couple weeks after that… Eventually, I had to go to physio, because it was really, really bad and it just wasn't getting better. So, the physio checked my shoulder, and did all sorts of tests and whatever, and decided that I had a rotator cuff injury in my left shoulder... Eventually the physio said they didn't know what was wrong, but it sounded like a nerve problem, so they suggested I went to a neurosurgeon. (Tamlyn)

Research into violinists' experience of jaw pain revealed that the occurrence of temporomandibular disorders is common. However, Amanda was the only participant to address jaw pain. She specifically said that when she played, and then took a break, her jaw often felt like it did not "fit back together" in the correct way.

> …then my teeth would hurt so much, you know, it's almost like my jaw would not fit back together, firstly my jaw wouldn't feel like it's fitting back together properly. I don't know if it's because I just, it became awkward because I either, I was grinding my teeth or in a weird position, and then it feels uncomfortable. Or it would hurt maybe just the nerves in my teeth. I don't know. (Amanda)

Amanda mentioned temporomandibular pain regularly, often referring to how frustrated she felt about the pain, and the difficulty she faced in attempting to prevent and treat the condition.

> But I'd say for me, the most profound one that would really make it difficult for me to play is my neck and shoulders, and my jaw was sore to close. And it's very frustrating, especially when you really have to practise. (Amanda)

Amanda was the only participant to address temporomandibular pain, but there were several specific injuries and common experiences of pain amongst the participants. Three of the participants said that, at some point in their violin careers, they had experienced nerve pain, and used vocabulary such as "electrical pull", "shooting", "dull", "numb", "fiery", "constant stabbing", and "pain in my bones" to describe the feeling of this pain.

> And then from my shoulder up into my neck, it would be more of if I could say like an electrical pull, feel tingly in my neck and almost, you know, the top half of your arm would almost go numb in the pain and my wrist as well, which sometimes, you just have to stop and put it down and go and stretch and things like that. (Samantha)

> Sometimes when I, when I play, I get a random shoot of a nerve. I don't know if the nerves are pinched. (Amanda)

> And it's like this fiery pain on my shoulder blade and then this numb, dull pain down through my elbow into my, into my hand... I had pain in my shoulder all the time, no matter what I did, there was this constant pain, and it wasn't like a stabbing or hot pain or anything like that, it was this pain *in* my bones. (Tamlyn)

I was the only one of the three participants mentioned above to consult a medical professional about this nerve pain, and was diagnosed with a compression of the brachial plexus, which was later, through research and consultation with other medical professionals, changed to a case of thoracic outlet syndrome.

> …found that there's actually this very common injury that violinists tend to get, and women tend to be more prone to it, and that is thoracic outlet syndrome. Or the compression of the brachial nerve, or the nerves that go through the brachial plexus, which goes out of the head, down the neck, under the collar bone, around the front of the shoulder, through the back of the elbow and into the hand. (Tamlyn)

Since obtaining this diagnosis, I have worked with a physiotherapist and a homoeopathist to develop a treatment plan which reduced pain and helped to prevent further injury.

The "pinkie problem", as the interviewees called it, was discussed in the previous superordinate theme, but holds relevance in this theme as well. While five of the six participants spoke about the annoyance their left pinkie finger caused them, some of the participants also stated that it caused them pain and discomfort. Yannick spoke about one incidence where the locking of his fingers caused severe pain in his hand. Amanda struggled to describe the specific pain she felt, but said that it was uncomfortable.

> I used to do exercises with my teacher. She used to give me, like, elastic bands, and I used to, like, hold between my thumb and pinkie and try and stretch. Because my pinkie actually, like, locked, like, locks… all my fingers, if I bend the top part of my finger, they go, like, 90 degrees. So, like, when I'm playing, like ,when I played *Flight of the Bumblebee*, I don't know if you know it, that day broke my hand. So, my fingers do lock, but that's, they've always locked. (Yannick)

Another cause of discomfort for the participants was the mark they developed on their neck. According to Chowdhry et al. (2018), this is called a dermatitis, although the participants referred to it as a "mark" or "bruise" on their neck. This occurred when they practised, and often bled when irritated for long periods of time.

> I also used to get a mark on my neck from my violin, it would sometimes bleed. (Yannick)

> …when I'm practising, I constantly get a mark, like, constantly, so that's the default, my little mark. And if I was practising a lot, it would get quite sore and once it actually bled. (Amanda)

Most of the participants either did not see any involvement of hypermobility in their experience of pain, or believed that it was unrelated to the injuries they sustained.

> So, my back is ruined. I go to physio for it, so that's the only way it affected me really. There's, like, fatigue and endurance. But in terms of my joints, I know my legs didn't really affect my playing. (Yannick)

> Like, I haven't gotten an injury from it [hypermobility]. Like, if I'm standing and playing too long then, like, my lower back will get a bit sore. But that's really about it. It's not, yeah, it hasn't caused me major injury in any way. (Keith)

I was the only respondent who believed that there is a connection between my pain and injury, and my hypermobility.

> …and then through research, I realised that hypermobility has a large impact on a lot of the things that I've experienced. There's a lot of research to suggest that hypermobility and injuries in musicians are extremely related. (Tamlyn)

Overall, the occurrence of injury among these participants was extensive, and their perceptions and retelling of the pain vary. The most common areas of pain and discomfort included the back, neck, and shoulder, with variation in the level of intensity of injuries. It was also seen that although two of the participants did not believe that they had experienced an injury, they had felt pain in some form. Certain participants were able to describe their pain in more detail than others. Most of the participants do not see their hypermobility as playing a role in the occurrence of injury, and feel that the effects of their hypermobility are unrelated to the pain they experienced.

Subordinate theme 2: Individual response to pain

The injuries and experiences of pain related to HSD varied in presentation, intensity, and impact on the participants' lives. This theme focuses on the ways in which the participants

reacted to their experiences, at the time of injury, as well as how they express it now. The overall emotional response to pain was wide-ranging. Some participants did not speak about how they felt pain about the experience at all, while others mentioned that they felt frustrated with their injury, annoyed with the constant pain, and overall, traumatised by their experiences.

On several occasions, Amanda mentioned that her pain and the effects thereof were frustrating, and she frequently complained about it to her teacher.

> I mean, I used to complain a lot to my teacher about how I just, I would always adjust my shoulder rest and I said "I can't get a comfortable position", you know, no matter how hard I tried, I also constantly, the shoulder rest could just never be tall enough for me. (Amanda)

Where Amanda raised concerns about the pain she was feeling, I preferred not to tell others about my pain, choosing rather to deal with it on my own.

> …I struggle a lot. It's probably not very good, but I tend to just sort of push through it. I don't tell people about the pain that I experienced because I just would rather deal with it by myself. (Tamlyn)

This reservation around the expression of pain to others was present among other participants as well, with some of the violinists saying that they did not think the pain they felt was unusual. Samantha specifically felt it was a normal part of playing the violin.

> You know, it just went on as per usual as a violinist. (Samantha)

> And my wrist was mostly just, if it's playing for a long time, I mean you played for like six hours straight, you will get tired, I guess. I don't know. I don't really see it as much. I just thought it was normal. (Yannick)

This perception that their pain was “normal” was common, and many of the participants dismissed the symptoms. I chose to push through the pain, often not telling others about it when it was extremely bad.

Samantha said that she ignored her pain for about two years, because she was under the impression that it was a necessary part of the training and practising process.

> …at first for about two years, ugh, you know, this is, this is just all the training and the things that come with it. (Samantha)

Amanda did not think anything of the back pain she had, because back pain is not a “real” injury, dismissing the numbness and pain in her back.

> I was just, it was just, you know yeah, I’d say in terms of a proper injury, I mean back pain is something that you don’t really consider an injury, but sometimes your back, or you get, you know, you feel, like, a little bit numb, but you know, you’ll have just a tender feeling in your back. (Amanda)

She also dismissed her symptoms of pain, by classifying it as fatigue, rather than an injury. Amanda described how she avoided her pain when practising, purposefully pushing through the pain, to be able to practise for longer.

> But I think most of the time I can kind of ignore it when I’m practising, because when you’re in that position you almost don’t, you’ll feel the discomfort of, like, you know, you have to really work hard to get the right posture. But I feel it most when I put my violin down and then, like, my body has, my jaw has to go back to normal and my neck has to go back to normal. Well that’s actually when I feel it most often. So, it’s almost like it’s the same as, like, when you work really hard and you don’t want to take a whole hour-long break because you’re going to break your momentum. I mean some, I think I just don’t, the less breaks I take when I practise, the easier it is for me to just pick it up and continue playing. Because the minute I go back into normal posture and become aware of it, yeah. (Amanda)

I also gave a detailed description in my self-interview when discussing my experience. I stated that I remembered the experience in general, but have learnt over the last few years that there are parts of the process of which I have no recollection. That which I recall, I have very detailed memories of, but other sections of the experience are vague and unspecific in my mind.

> …a good percentage of this, I actually don't remember. I, I think the whole experience was extremely traumatic, so what I remember of it is very small glimpses, and stories, like when my mom has told me about things, then parts of it will come back to me, but I don't remember it entirely. And I don't remember it very fluidly. (Tamlyn)

I felt frustrated with the medical professionals, who gave the impression of not taking my queries about hypermobility, or the symptoms of my pain, as seriously as I felt was required. They seemed dismissive of my symptoms and did not provide a definitive diagnosis or treatment plan.

> …my mom... came across an article that spoke about a violinist who had had to stop playing because… of a compression of the brachial nerve... And the doctor seemed surprised when we realised this… and he was like, "whoa hang on a moment this makes sense". He went and Googled what it was, and found an article which sort of explained everything that I had experienced. And he hadn't even thought of it. Not a single doctor had. They all dismissed me as "ugh, this kid must be making it up. But we can see that she's not, but this doesn't make sense" ... And when we'd pointed out to all the doctors that I'd seen that I'm hypermobile, every single one of them very casually said, "oh well, I guess yeah, it probably has something to do with that. Like you probably find that the hypermobility just sort of like had an effect". But not one single doctor took it any more seriously than that. (Tamlyn)

I experienced emotional distress when consulting doctors, and regularly attempted to convince myself that I was imagining the symptoms, since that was an easier explanation than the tests, which did not offer conclusive results.

> It constantly felt like I was being called a liar, but also, I was constantly calling myself a liar, constantly trying to convince myself that I was making this all up. Because there's nothing wrong with me. Like, "what is wrong with you that you feel the need to make this up, when there's like lots of other people who are in a worse situation", but the pain was real. (Tamlyn)

Both Amanda and I spoke about our observations of the stigma around injuries in South African violinists. I had perceived a stigma around injury, in which shame is associated with injury. I felt that if I was injured, I was an inadequate violinist. Amanda concurred with this, stating that there seems to be an expectation of pain because of practice.

> So, when I've done research and seen, like, the whole problem of stigma around injury, I, I get it. There's shame that's associated with admitting that you are injured. And there's also just a, the shame, the shame from society, but it's also, like, within yourself. Because if I tell you that I'm sore, that I can't play, then that means that I'm not as good as you because I can't play, and I'm not going to be as good as you because you're going to keep working and I'm not. And that's really difficult to deal with. (Tamlyn)

> It's my expectation that that's [pain] a direct consequence to practising hard. This is what happens when you practise. You practise for a long time. It's normal. You're, you should expect it. Like, there's nothing wrong. (Amanda)

The participants' responses to their injuries and experiences of pain were wide-ranging, and the above subordinate theme displays these reactions. Many participants felt frustrated by the extent of their pain, while others were dismissive of their pain. It was perceived that there is a stigma around injury in musicians, with many believing that pain is a normal part of practice, and that injury is synonymous with weakness.

Subordinate theme 3: Effect of HSD related pain and injury on playing ability

The occurrence of injury plays a role in the ability of a musician to play their instrument successfully. The interviewees shared several ways in which their ability to play was hindered by pain and injuries. Not all the participants believed that their injuries were caused by HSD, but several associations were made between the two events.

Three of the most common challenges faced by the participants were finger dexterity, hyperextension of the fingers, and pain. Samantha, who had shoulder, neck, and back pain, said that her wrists often clicked, and her fingers cramped while playing, making the required motions uncomfortable to execute correctly.

> … my wrist would click or would feel like it locks at times and I just sit and massage it or just apply some heat to it and your fingers, my fingers, as all would cramp up and things like that. (Samantha)

Similarly, Amanda struggled with pain in her hand, although hers was mostly in her fingers. Amanda elaborated on the fact that her fourth finger was not strong enough to move in the required way, and often "locked" if she extended it too far. She said that this finger was unreliable and made playing difficult and uncomfortable. She attributed this to hypermobility, but also stated that it caused pain and affected her ability to play.

Although many of the participants experienced back pain, Keith mentioned that when he stood and played for long periods of time, back pain would eventually require him to sit down and rest, so that he could continue playing.

> …if I'm standing and playing too long then my lower back will get a bit sore. (Keith)

The pain which I experienced in my shoulder and back often forced me to cancel lessons, or to request a less strenuous lesson, to ease the pain. Yannick and I shared a similar sentiment,

saying that, at times, our pain was so severe that we could not play. I did not play for several months when I was 17, as part of an attempted treatment.

> …I'd have to cancel lessons with my teacher… because my shoulder was really struggling. (Tamlyn)

> At one stage it was so bad I couldn't play. (Yannick)

> I didn't play for a couple of months, which meant that I lost a bit of my technique. (Tamlyn)

I also discussed the difficulties I faced when playing the violin, as a result of my shoulder injury. I still struggle to rotate my shoulder and elbow around, under my violin, in order to reach the G string, especially in higher positions. This causes pain and discomfort while playing.

> …my shoulder strangely enough, just doesn't move past a certain angle. It's like you're almost supposed to, your elbow is supposed to come around a certain way so that you can, like, bring your hand around the, like, top parts of the G string and you're supposed to rotate, like, your elbow's supposed to move a lot while you playing. And my shoulder does not allow for that movement. Like, it just sort of stops once it rotates past a certain point and then it really hurts… (Tamlyn)

In addition to these physical barriers that hindered effective violin playing, many of the participants shared that the amount of time they were able to play without feeling pain was shorter than what they required, and that the pain often disrupted practice sessions. Amanda and I said that we could play for about 15 to 20 minutes before starting to experience pain. Amanda would often choose to ignore this pain, since she believed that once her body became accustomed to it, the pain was no longer noticeable. Samantha said that at the peak of her violin playing, she could manage approximately 30 minutes without feeling pain. Keith could play for 45 minutes to an hour without discomfort. Contrary to the other participants, Joel

reported that he does not feel pain when he plays, and that he can play for three to four hours without feeling discomfort.

> So, I struggle a lot when I play in concerts. Also, I think the tension between a concert and a rehearsal, or a practice session is very different. So, I'll be fine in a practice session, I'll be fine in a rehearsal for many hours. Not without pain. I have to take regular breaks, but I can play. And then concerts, it's just this excruciating pain. (Tamlyn)

> …if I don't overexert myself with weird stretches or things, I can play indefinitely without really experiencing fatigue. (Joel)

Participants experienced widespread challenges because of the injuries and pain they sustained. The impact of these challenges on their ability to play the violin differs depending on the nature and severity of their injury.

The participants shared several similar experiences of pain and injury, although none of them sustained the same injury. Many of the injuries which they sustained have affected their everyday lives and ability to play the violin for a significant period. In certain cases, the injuries and subsequent effects have caused emotional distress for the musicians. Even those who believe that they have not sustained a violin-related injury, referred to pain and fatigue related to playing. The majority of the participants made no associations between hypermobility and the injuries they experienced.

4.3.4 Superordinate theme 4: Participants' attempts to manage symptoms of HSD and pain

The final superordinate theme explores participants' attempts to manage and alleviate the pain, as well as the challenges they faced. The data indicates that there were many methods which were employed, with varying success. This superordinate theme encompasses medical

diagnosis and treatment; playing-related pain, coping strategies and adjustments; and strategies for pain management and the need for body awareness.

Subordinate theme 1: Medical diagnosis and treatment

Four participants acknowledged that they had sustained an injury affecting their everyday lives, as well as their ability to play the violin. Three of these participants sought medical attention. The remaining participants said that they did not consult a doctor because they were in denial about the severity of their pain, or because they refused to believe that they had been injured. When asked about whether he had seen a doctor for treating his pain, Joel said "No. Never been a thing." Amanda, however, stated that she would often ignore her pain, in order to continue practising.

Yannick, Samantha, and I considered our pain severe enough to require medical treatment. Samantha and I consulted a general practitioner (GP), although the intention of our consultations differed. I had consulted a GP, but did not detail what I aimed to gain from the consultation. Samantha, however, stated that she went to her GP with the intention of gaining pain management methods. She states that she did not receive an official diagnosis for her shoulder and neck pain, but was given stress-relieving and pain medication, and was advised to stretch and strengthen her back and neck.

> And I experienced, especially in my matric year, a lot of pain from my shoulder into my neck and my head. Where I would be up at night and wouldn't be able to sleep and that sort of thing. So I was taken to a doctor for that and he just gave me the next best stress reliever pain medication and told me, you know, you should lie on your back and do a little bit of physio every day. But besides, I've never been diagnosed officially by a clinical doctor and things like that. (Samantha)

Similarly, both Yannick and I had physiotherapy on a regular basis. Yannick mentioned that his physiotherapist diagnosed his pain, but that he could not remember what the diagnosis

was, since he was young and did not pay attention to the sessions. He did provide an anecdote about the tension he carried in his back:

> So, whenever they put it [needles] in, my back would spasm. I would feel, like, the tendons, and it's funny cause they said my back is like a rubber tire on a car. That's not very nice. Even though I was sitting upright, my spine is quite painful, so I was in a lot of pain. (Yannick)

During physiotherapy, Yannick received massage and dry needling treatments. According to him, the muscles of his back were extremely compressed, and required releasing, to improve his mobility.

> You're working your muscle. Because my muscles are quite compressed and they, they need to be, you know, released, that's what they told me to do and I've been doing it regularly. I can't touch my toes. That's the thing. I can't. Not just because I have long legs. It just, I physically can't bend that far. (Yannick)

In a similar fashion, I attended regular physiotherapy sessions. I was treated every week for two years and received massage, dry needling, traction, targeted ultrasound, electrical stimulation, and kinesiology taping. All these treatments aided in temporarily reducing symptomatic pain, but did not resolve the injuries.

During this time, my shoulder became more painful, and new symptoms began to manifest.

> Then, beginning of Grade 11, I think it was the beginning of Grade 11, my left shoulder started getting worse, and I started feeling numbness down my arm, down through my elbow, around the front of my shoulder. I had pain in my shoulder all the time, no matter what I did, there was this constant pain, and it wasn't like a stabbing or hot pain or anything like that, it was this pain *in* my bones. It was very, very sore. And then, the physio noticed that there were some very weird things that happened whenever he treated me… And then one of my fingers started jumping. My left ring finger started moving around by itself, and for years before that, whenever I was dancing, if I held my arms out for too long, my left finger would jump and kind of be stuck next to my

> middle finger, and then it would move around by itself, if I kept my arm out for too long. But um, I had never experienced it happening just normally. Now, if I turned my hand, palm upwards, it like, moved by itself. And for a long time, I thought I was faking it, because I was just convinced that the pain I was feeling, I was making up because I wanted attention. And I tried to convince myself of that, but it never went away. And then, slowly, the pain in my arm and my shoulder started getting worse, and my left baby finger started joining in on the jumping, so now the two of them were moving around of their own volition. So, I would walk around with my hands in my pockets, or in a fist all the time, to prevent it doing it because it was annoying. It didn't affect my playing in any way, but it did affect everything, it kind of constantly moved and it was extremely annoying. (Tamlyn)

The physiotherapist did not know the cause of my injury, and suggested I see a neurosurgeon, since the symptoms appeared to be neural, rather than muscular. The neurosurgeon knew what the diagnosis was, but needed to confirm it with tests. After a series of blood tests, MRI, and X-rays, no abnormal results could be found. I was then sent for nerve conduction tests with a different neurologist who claimed to know what had caused my symptoms. She conducted tests to prove her hypothesis. Again, the initial tests showed no abnormal activity. After more intensive tests, and no significant results, she recommended anti-depressants. The medication may have decreased my symptoms, but the neurologist did not explain how this would be achieved by the medication. She provided no diagnosis.

I was placed on a trial-and-error treatment method, in which I was instructed to stop all physical activity. One at a time, activities were added back, and it was found that violin playing exacerbated my pain and symptoms. My mother also conducted her own research in this time, and enquired about an injury she had found online, which seemed to mirror my symptoms. After briefly researching it himself, the neurosurgeon diagnosed me with a compression of the brachial plexus. We enquired about the involvement of hypermobility in

the injury development, and both the neurosurgeon and neurologist said that it might have been involved, but implied that it was an irrelevant connection.

> And then, we'd pointed out to all the doctors that I'd seen that yeah "I'm hypermobile", and every single one of them very casually said, "oh well I guess yeah probably has something to do with that. Like you probably find that the hypermobility just sort of like had an effect." But not one single doctor took it any more seriously than saying "oh, it could have been. Ugh it might have been that. It's probably nothing". (Tamlyn)

One medical professional suggested that I stop playing the violin, but provided no other treatment plan. After not playing for a few months, as part of the diagnostic process, I had realised that playing the violin was too important for me to sacrifice.

> So eventually, we left with a diagnosis that wasn't even really a diagnosis. We left with no treatment plan, nothing. Basically just "stop playing the violin, or change the way you do things, good luck". (Tamlyn)

Not having achieved success via the traditional route, I tried non-allopathic medication and treatment. A physiotherapist and acupuncturist/homoeopathist worked together to find a treatment method which reduced the general inflammation in my body, to reduce the pain and severity of symptoms. We developed a weekly treatment plan, which worked over time, and reduced my symptoms significantly.

> …realised there was probably an inflammation problem, so I went to physio once a week and Chinese acupuncture once a week and found that that was what fixed it, well not fixed it, helped. It reduced a lot of the problem… reduced most of the inflammation in my body, and my shoulder was slowly, very slowly starting to get a little bit better. But now, this was many months later. (Tamlyn)

These two medical professionals have considered my hypermobility when treating me, and have been instrumental in helping me to understand how the condition has affected my life,

my injuries, and my playing ability. They have conducted research, to understand my complaints, and to provide me with the best support possible. I still experience regular pain, but this treatment method allowed me to learn how to manage my pain. I now know when to consult my physiotherapist and my homoeopathist. Currently, I receive less frequent treatments, and in general, although present, my pain is not as severe as previously.

Since only half of the participants consulted medical professionals for diagnosis and treatment for their pain and injuries, the accounts above are limited to the experiences of these three people. My account of injury, as well as that of diagnosis and treatment, was the most extensive.

Subordinate theme 2: Playing-related pain, coping strategies and adjustments

While all the participants said that their violin teachers did not mention or address hypermobility in their lessons, many of the participants' teachers provided methods for reducing the pain they felt while playing. None of the interviewees felt that their teachers used preventative methods, reducing the chance of injury, but several teachers provided solutions to difficulties encountered by their students. These included exercises to strengthen pinkies which collapsed while playing, and ways to reduce pain by postural improvement.

Teachers placed importance on their students' posture, and encouraged them to stand correctly while playing the violin. However, none of the teachers took hypermobility into account.

> [My teacher] worked on my posture, definitely. Not specifically about bending my knees backwards because that was something I try to avoid already. Standing lower into my posture, so standing a bit more bent knees and not pulling up my shoulders. Correct back, back posture. But it wasn't specifically mentioned as hypermobility. (Joel)

Yannick's teachers encouraged him to do strength training, since he struggled to hold the violin up without his hand. Violinists use their chin and shoulder to support the violin, and aim to create a relaxed feeling in the left arm, facilitating vibrato and shifting on the fingerboard. If one cannot support the violin without manually holding the neck, unnecessary tension is created in the left arm, hindering ease of motion and fluidity when playing. Yannick's lack of general strength, in the early years of his violin lessons affected his posture, and created tension while playing. From his account, it seemed that Yannick was weaker than other children his age, who took lessons with the same teacher. His teacher focused on correcting this, and taught body awareness throughout the lessons.

> My first teacher actually told me I should do weightlifting, because I was very weak, and I couldn't hold the violin on my chest without holding it with my hand. (Yannick)

Amanda also struggled with general weakness and poor posture. In lessons, both Yannick and Amanda's teachers focused on improving posture and resolving issues regarding their unstable bow holds. Both participants' right pinkies were weak and unreliable. However, they did not elaborate on this challenge.

> It took me a long time, maybe in my high school years, where I could say I actually had an adequate posture. (Amanda)

> So, I always had issues with my bow hold, for example. So that's one thing my teacher always used to "hak" [berate] me about. So, she always made me do bow exercises, because my bow hold was, specifically also my pinkie finger, it locks, you know, with my bow hold. It makes the stability a bit difficult. (Amanda)

These two participants linked their issues with bow stability to their experience of the "pinkie problem". The participants who mentioned the locked fingers while playing were asked to elaborate on how their teachers addressed this issue and how they tried to rectify it.

Most of the participants said that they tried strengthening and dexterity exercises, although none of them managed to completely eradicate the problem.

> No, like I was saying, like, in terms of, like, my finger locking, sometimes, where I would have, like, have to stop and, like, fix my hands and stuff like that. He'd [teacher] also be like, "What happened?". I'd say, "No, my finger locked a bit". He would then ask, "Okay, are you okay now?", and I'd say, "Yes. I'm okay. We'll carry on from whatever". So yeah. (Keith)

> I've known about my pinkie problem for like eight years maybe. Yeah. And then I've not been constantly working on it because it is not as bad. I've probably worked on it for about three or four months intensely at the, when I first noticed it and then it was okay, but it, it's, it's decent. Then I came to [teacher] and it was fine for a while. And then with all of the other kind of technique changes that came in, I think I slipped back into that habit of doing that. So, then she addressed it again. That was probably another four or five months of, like, intense focusing on it. Not intensely working. Every day I pick up my violin, "Oh, I need to work on this specifically". It's the thing that I've like five months of, "Oh yeah, I need to keep this in mind", and then continue with my normal practice. And every time I notice, "Oh yeah, I need to fix my pinkie finger". And at the moment with practising less, I kind of fell into it again. So, whenever I notice it now, I go, "Okay, yeah, I'll, I'll spend about 5 or 10 minutes just strengthening my finger again". So, it's, it's not an intense, like six years of working on pinkie fingers. When I notice it, it's like 10 minutes of, "Oh yeah, I need to just try and focus on that specific aspect until it's a bit better". And maybe for the next couple of days, every day start with the pinkie warm-up. But. Not nothing intense, like a training program. (Joel)

When Yannick, Samantha, Amanda and I were injured, we consulted our teachers, who helped to adjust the set-up of our violins to find a more comfortable playing position, which suited our bodies, and prevented further pain.

> But once I was injured, she [teacher] did help quite a lot with changing the way that I played. So, addressing the way that I held my neck, organising a new chin rest that my head was at a

more natural angle. Teaching me to lift my head off of my violin and to keep the relaxedness in my hand and throughout my arm and throughout my body and teaching me to stand straight and to not sink into my side. She taught me how to sit properly so that I sat straight. So, once we realised the problem that I had, I think she addressed it very well and she helped me find ways of dealing with the problems that prevented getting worse. So, I do think that she was actually quite helpful looking back at it. (Tamlyn)

To alleviate pain, Samantha tried playing without a shoulder rest, which proved to be a successful coping mechanism for her.

Funny enough, I actually got rid of my shoulder rest. Yeah. So, when I was playing in the orchestra, I then just decided for some reason it was causing way too much pain with the violin and the shoulder rest. So, I removed it and just found myself adjusting myself where it wasn't as painful as before with the shoulder rest. So, the violin itself was a lot lighter and I could cope with that. So, in that way, yes. Then I did adjust my technique. But often, obviously without the shoulder rest, I would find myself getting very tired so my violin would drop. (Samantha)

Amanda also mentioned her shoulder rest, but found the opposite result. Her shoulder rest regularly fell off her violin, and when playing, she often felt that the shoulder rest was not tall enough for her neck, causing a struggle in finding a comfortable playing position.

I would always adjust my shoulder rest and I said I can't get a comfortable position, you know, no matter how hard I tried, I also constantly, the shoulder rest could just never be tall enough for me. It was always on this max, which means it often fell off because obviously it, it's been more like that. So sometimes we, both my, my shoulder rest would fall off. But yeah. I constantly, I think my issue was just holding it up that just that move, that pivot movements. (Amanda)

Similar to Amanda, Yannick and Joel have always played with a shoulder rest. Joel said that his shoulder rest is important in sustaining a straight neck position, preventing unnatural bending of the neck.

> …I've went from quite bendy neck to a much straighter one now. And that was being me trying to become more comfortable holding the violin. So yes, I do bend my head a bit. But I've made my shoulder rest. I can't, I can't comfortably play without a shoulder rest because that just, I bend my neck into oblivion to try and keep the violin in place. But with my shoulder rest on, I can extend it far enough that I can just lean my head to the side a bit instead of trying to bend my neck a lot. So probably at the top of my neck there's a bit of bending, but the bottom of my neck is pretty straight. (Joel)

Participants developed their own methods to alleviate pain in the moment, allowing them to continue playing in concerts and practice sessions. Many said that when pain occurred while playing, they lowered their violins, did a few small stretches, and tried to relax. However, this is not always possible during a piece, or in a performance.

> …lift my head off of my violin and to keep the relaxedness in my hand and throughout my arm and throughout my body and teaching me to stand straight and to not sink into my side. (Tamlyn)

> …you just have to stop and put it down and go and stretch and things like that. (Samantha)

> If I'm in a rehearsal or something else, I'll take the first chance I get just to lower my violin and move my shoulders, stretch them back. But if it's during, like, in the middle of a piece where we're rehearsing, I'll try and shift the way I'm holding my violin into a different position where it'' more comfortable. (Joel)

In general, none of the participants seemed to have a definite solution for playing-related pain. They made adjustments with the help of teachers, which helped reduce certain challenges, but despite these adjustments, most have not been able to play without any pain.

Subordinate theme 3: Strategies for pain management and the need for body awareness

Although not all the participants consulted medical doctors, all six found ways of adjusting to their pain and injury, and created coping mechanisms which helped to reduce pain and prevent further injury. Some participants were openly descriptive of the methods they employed, such as the use of medication, which included painkillers and stress-relieving medication. Both Samantha and I used medication to control our pain, although the dosage, frequency, and efficacy was not discussed.

> I lived on painkillers from about Grade 9 right up until first year, because nothing fixed it. (Tamlyn)

> … [my doctor] gave me the next best stress reliever pain medication… (Samantha)

Yannick, Amanda and I also revealed that our bodies sometimes "click" when we move We have learnt how manipulate our bodies so that we can self-adjust and click joints, similar to the manner in which a chiropractor would adjust a patient's body. None of us were taught how to correctly adjust our bodies, but we have discovered that certain motions and movements provide temporary relief from pain.

> I'll try to adjust my back by myself. It's not even, like, I can't even say I'm a hundred percent certain that it actually helps. It's just, I think there's a nice release about, about it. Even if it's a mental thing, you just, it feels like you're just correcting it. You're just stretching it, you're overcompensating in the other direction and it just, you feel some momentary relief. So that's the only thing I would do is often just click my back as much as I could. Every time I felt uncomfortable. (Amanda)

> My spine clicks easily. I can click it here, by myself. (Yannick)

One of the most common themes across the participants' descriptions was the need for body awareness. Amanda discussed the importance about being mindful about her body and being aware of what she was feeling. Samantha stressed the significance of understanding

one's body. She felt that her body awareness aided in preventing future, worsened injuries. Similarly, I emphasised how my injury experience had taught me to listen to my body, and to advocate for myself, since I best understand my condition and my pain.

> Where I just could keep it [good posture] in check. And I think, yeah, I think that was just a matter of practising it. It's just getting accustomed to constantly having to be mindful of that, which I think is the same with everyone. (Amanda)

> I would, I would agree that finding healthier ways like that to, you know, learn to read and understand your body as well, which is something I had to learn to do as a violinist, has definitely helped me and I think prevented a whole lot more, you know, going forward and in the long-term. (Samantha)

> …the biggest thing that I think I learned from all of that, specifically through my physiotherapist and my acupuncturist, was just that I'm the one who knows what's going on with my body and I'm the only one who can see it coming and prevent it or fix it as it happens. (Tamlyn)

The participants were all asked whether they had found effective long-term solutions for their pain and challenges. The two participants who had not had an injury did not feel the need for a solution, since they did not perceive a problem. Amanda, who did not consult a doctor, still feels pain, and has not found any solutions to her discomfort and did not develop any treatment methods. Those who consulted doctors did not feel that their problems had been resolved. These participants developed their own methods for reducing the pain, but still feel the effects of their injuries. Overall, none of the participants were able to state that they had successfully treated their injury.

Four of the six participants acknowledged the pain they felt as an injury, and searched for methods to alleviate their pain. Of these four, three sought medical treatment, in the form of physiotherapy, acupuncture, general practitioners, a neurosurgeon and a neurologist. None of

the participants felt that their injury had been healed through the medical treatment they received, although physiotherapy and acupuncture seemed to alleviate symptoms for short periods of time.

Participants adjusted their playing technique and violin set-up, through the help of their teachers, to better suit their physiology. These adjustments resulted in more comfortable, less painful playing. However, various effects of their injuries are still present.

Finally, participants described the measures they put in place to reduce and manage their symptoms. Pain medication, self-adjustment and body awareness were the main themes. Three participants expressed that they had not developed any methods for pain management at all.

4.4 Summary

Chapter 4 included the results of the analysis, and displayed the participants' experiences, drawing similarities and differences across the six cases. The first theme specifically addressed the background and context of the participants' violin experiences, to provide context for the injuries which were experienced. The second theme consisted of the participants' understanding of hypermobility and highlighted the manner in which the condition affected their lives and ability to play the violin. The third theme addressed the interviewees' experience and perception of injury in relation to hypermobility. Finally, the fourth theme detailed the attempts made by participants to reduce and alleviate the pain they felt as a result of playing the violin.

Chapter 5

Discussion

5.1 Introduction

Musician's health and wellness is an important and regularly researched field, and much research has been conducted into the experiences of violinists and the injuries they commonly experience. However, research into HSD is limited, and an understanding of the condition is still being developed. The study aimed to understand the lived experiences of violinists with Hypermobility Spectrum Disorder, who have sustained a performance-related musculoskeletal disorders. There is literature which focuses on how HSD specifically affects musicians, although much of this is outdated. To date, research into how HSD affects playing-related injury and pain is limited, and has not included the perspective of violinists. A discussion of the interview findings is presented in this chapter, and is led in relation to the four superordinate themes.

5.2 Background and context of the participants' musical lives and experiences prior to injury

The data showed several factors which were not directly related to these experiences, but rather provided context and background for the experiences, which were described in detail.

The participants all began playing the violin between the ages of five and nine. When they first began playing, many did not place importance on practising, but dedicated more time to it as they aged. With increased time spent practising, the likelihood of overuse injury would also have increased, especially if the body was being used inefficiently (Leena et al., 2016). All the participants said that from the age of 14, approximately, practice became significantly more important, and that they dedicated more time and intensity to practice because of academic requirements. Currently, one participant works as a semi-professional violinist and music

teacher, while the other participants play casually, and do not practise as regularly as does the semi-professional violinist. Despite this, all the participants still experience pain in some form when playing, despite changes to their practice routine. While prolonged practice does not necessarily lead to injury, years of repeated motion has been shown to create strain in the body, possibly leading to injury (Fry, 1987).

All the participants of this study have orchestral experience. This study did not explicitly investigate the role of orchestral involvement in the occurrence of injuries related to hypermobility, but three participants mentioned feeling intense pain during orchestra rehearsals and concerts. Orchestras often require long periods of practice. This demand on the participants' bodies could be a contributing factor in the injuries experienced. Barnes et al. (2011) found that 84.4% of musicians in the Free State Symphony Orchestra reported playing-related injuries, showing that there could be a link between the participants' experienced pain and their involvement in orchestras. A study which investigated the prevalence of chronic pain in orchestral musicians found that violinists had the highest rate of chronic pain in the shoulder and back (Gasenzer et al., 2017). This is attributed to the characteristic body position required to play the instrument (Gasenzer et al., 2017).

The aim of this study was not to investigate the role of sporting experiences as a contextual factor in violinists' injury, but a significant theme which emerged from the data was the salience of sporting and exercise habits in participants' recounting of background factors. Four of the six participants regularly took part in sports throughout school, particularly during high school. The other three did not take part in sports at all. Of the six participants in this study, the three violinists who seemed to experience the most extensive injuries were also the three who participated in sports most frequently, although there were no commonalities across the sports in which they took part. Two participants acknowledged that a sports injury had affected their violin-playing ability, although there is little research into the occurrence of injury in individuals who do sport

and also play the violin. Since none of the participants shared the same experience of sport, it cannot be assumed that sports activity contributed to HSD and injury in violin players. However, this association cannot be negated and needs further research.

In this study, all the participants stated that they each had a direct family member with hypermobility, which suggests the condition to be genetic. Of the six participants, four referred to their mother having hypermobile joints or traits, and the other two participants had a sibling with hypermobile traits. The family members of the participants had hypermobility in varying degrees. This finding is in contrast to the literature, which does not currently show definitive proof that HSD or hypermobile traits are heritable through family lineage. Hypermobile joints are often a symptom of other genetic conditions, such as EDS (Ehlers-Danlos Syndrome) and Marfans Syndrome (Castori et al., 2017; Grahame, 1999; Malfait et al., 2006). All three of these studies stated that EDS, Marfans Syndrome and Osteogenesis Imperfecta are heritable disorders of the connective tissue (HDCT). There is sufficient evidence to show that hypermobile traits are often common in these heritable conditions, although hypermobility itself is not heritable. When hypermobility becomes symptomatic, it is considered a syndrome (Grahame, 1999). The research presented by Grahame (2007) has been expanded significantly, and the condition is now seen as more than merely a symptom of other conditions. In certain cases, the genetic basis of HSD is discussed in relation to other HDCTs. Castori et al. (2014) investigated the nosology and inheritance patterns of joint hypermobility syndrome (JHS) and Ehlers-Danlos Syndrome-Hypermobility Type (EDS-HT) in 23 Italian families. These researchers found that JHS and EDS-HT share a genetic background, and that there appeared to be both intrafamilial and interfamilial heritance patterns. However, the research did not separate JHS from EDS-HT. Malfait et al. (2006) acknowledge that the familial pattern of hypermobility is strong, but that there is not enough evidence to prove whether it is heritable, and what its true genetic

underpinnings are. Research into the heritability of HSD, as removed from other HDCTs, is necessary to fully understand this phenomenon.

One unanticipated finding involved a pattern of rheumatoid arthritis in two participants' mothers. The link between arthritis and hypermobility is not commonly mentioned in literature. There are a number of similar manifestations between the two conditions, although arthritis and hypermobility represent opposite ends of the movement spectrum, with the former often hindering joint extension, and the latter showing extensive joint mobility (Kumar & Lenert, 2017). According to a study conducted by Flowers et al. (2018), there is no evidence to suggest that hypermobility leads to osteoarthritis. The fact that two of the participants' mothers have hypermobility, and later developed arthritis, could therefore be coincidental. However, this may be an important issue to be researched in future.

This superordinate theme provided interesting and unexpected findings. The themes which emerged did raise several questions about the background factors which may increase the likelihood of injury in hypermobile violinists, and more understanding of these factors may enable further research of the topic at hand.

5.3 Knowledge, experience, and impact of hypermobility

This theme encompasses the participants' general knowledge of hypermobility, as well as the effect that the condition has had on their ability to play the violin, and on their everyday life.

Most of the participants had an incomplete understanding of HSD. In general, there is limited research into musicians' perceptions and experiences of HSD, particularly in relation to PRMDs. In contrast, substantial research exists regarding the experiences of sportspeople with hypermobility and injury. I believe that this indicates the need for similar research among musicians.

The majority of participants in this study had either never heard of hypermobility, or referred to it as “double-jointedness”. This may partly be due to a limited scientific knowledge about hypermobility, evident in the fact that the term “Hypermobility Spectrum Disorder” as a condition was only coined in 2017. Researchers acknowledge that hypermobility is more complex than was previously understood. Demmler et al. (2019) found there to be a combined 0.19% prevalence of diagnosed EDS and HSD in a sample of patients. Furthermore, 56% of patients in the study received a misdiagnosis of the condition. However, despite common perception, EDS and HSD are not rare conditions, and affect multiple body systems (Demmler et al., 2019). Kumar and Lenert (2017) found that the wide variety and presentation of symptoms of HSD often result in the condition being undiagnosed by medical professionals.

Many participants were unaware of hypermobility symptoms prior to the study. This finding was unexpected, suggesting a general lack of understanding about the condition, and emphasising the need for increased knowledge and improved diagnostic tests. It appears that there is colloquial knowledge regarding the flexibility of “normal” joints, but the dissemination of accurate medical information is not as widespread as would be necessary for the prevention of injury. Five of the six participants stated that they had not consulted a medical professional about their hypermobility, as they did not know that they had the condition, or had not experienced effects serious enough to warrant consulting a medical doctor. Once again, a lack of knowledge around the effects of the condition could be the cause of this perception.

None of the participants had received a formal medical diagnosis of HSD. Three participants consulted medical professionals for treatment of performance-related disorders, but none of the health professionals referred to hypermobility as a possible contributor. One of the better-informed participants specifically asked about the possible effects of hypermobility on injury, but the query was dismissed with little consideration. Bennet et al. (2019) investigated the lived experiences of people with JHS and EDS-HT. In this study, 17 participants’ accounts were

analysed, and it was found that an overall lack of awareness of hypermobility syndromes exists among healthcare professionals. This caused participants to be misdiagnosed and suspected of mental health problems. Interestingly, both the present study and the research presented by Bennet et al. (2019) found that participants felt dismissed by medical professionals. Some participants were even accused of inventing their symptoms. Both studies show a need for improved awareness of hypermobility conditions, and illustrate a need for a greater understanding of the experiences of those living with these conditions.

Several participants felt that their playing ability was unaffected by HSD and did not believe that hypermobility can lead to injury. Participants also believed that if one has not been injured, hypermobility must not have had an impact on one's playing ability. Despite this perception, participants made specific mention of the "locking" of their fingers while playing, and named this a "pinkie problem". There is little evidence to describe or explain the phenomenon. Some studies claim that it is caused by the suboptimal function of the flexor digitorum superficialis (FDS) of the pinkie finger (Godwin et al., 2014). However, this suboptimal function does not seem to be involved in the locking of the pinkie as the participants described it. There are multiple sources which provide ways to reduce the occurrence of this locking (Reddit.com: Discussion Forum, 2018; The Strad, 2015; Violinist.com: Discussion Forum - Technique and Practising, 2019; Wilson, 2018), but few to explain why the problem arises.

The participants' teachers seemed unable to diagnose HSD in lessons and, therefore, did not understand the possible problems learners with hypermobility may face. However, they prescribed strengthening exercises and encouraged improved posture when playing. This points to a need for teacher training. Hildebrandt and Nubling (2004) investigated whether providing musicophysiological training for music teachers could benefit students, and found that the teaching habits of the test group changed and that the general level of instruction improved. Guptill and Zaza (2010) provide practical prevention strategies for teachers, which can be used

by all instrumentalists to reduce the occurrence of injury. This paper includes specific instructions regarding breaks, pacing, ergonomics and performance preparation. There is little violin-specific research addressing the teacher's role in preventing challenges and pain caused by hypermobility. However, Miller (2019) provides a variety of practical advice for teachers, simply explaining hypermobility and how it affects a violin learner. This resource, while not scientifically substantiated, provides useful strategies for aiding a student with this condition.

Overall, two of the most significant findings concerning HSD and the participants' perceptions of the condition were the severe lack of knowledge regarding the presentation and effects of this disorder, as well as the occurrence of the "pinkie problem". Many of the later findings were impacted by this lack of knowledge.

5.4 Hypermobility and the experience of pain

This theme focuses on the experience of pain, and how it has affected the interviewees' lives, their ability to play the violin, and the emotional impact of the experience. Since the overall aim of the research questions is to discover the link between hypermobility and pain, the gathered information is contextualised in terms of HSD.

While participants acknowledge pain while playing, they do not ascribe this to violin playing. Furthermore, participants associated "injury" with conditions requiring diagnosis, which may involve potential long-term effects, while "pain" was associated with short-term effects and simple self-diagnosis. Zaza et al. (1998) found that musicians perceive PRMDs as pain and other chronic symptoms which are out of their control, affecting their ability to play their instrument at a normal level. Because participants believed in this distinction between pain and injury, it is possible that they did not realise that they had been injured, as the pain may not have presented in an expected manner.

Findings showed that the participants' decision to either continue or discontinue playing the violin did not impact their pain in the long term. Despite currently playing for varying lengths of time, and at varying levels of intensity, all participants experience pain when they play, and certain participants also feel discomfort when they are not playing. Surprisingly, this contradicts the findings of Artigues-Cano and Bird (2014) who found that professional flautists practised less than flute students, and also experienced less injury. They surmised that infrequent playing could be the cause of pain and injury in flautists (Artigues-Cano & Bird, 2014). Similarly, Stanhope and Weinstein (2020) found that musicians who stop playing because of injury often experience a number of negative effects. These effects include the progression from acute to chronic pain, resulting from fear-avoidance behaviours created through not playing. These researchers investigated whether it is an effective treatment method to avoid playing when injured. They concluded that, in order to avoid further negative consequences, injured musicians should be educated in pain science, and shown how to play with pain. Both of these studies imply that the participants of the present study who continued playing the violin should not experience as severe pain when playing as they would if they played infrequently. However, this does not seem to be the case, since all of these individuals still experience pain in some form when playing the violin.

This project found that most participants experienced their first injury during adolescence. This finding could be seen to correlate with that of Bird (2017), who discussed the effects of hormone fluctuations on hypermobility. Bird found that hormonal fluctuations can have an effect on the collagen structure of ligaments and tendons, which affects the laxity of these connectors, especially in hypermobile people. Progesterone, a female hormone, loosens collagen, while oestrogen stabilises it (Bird, 2017). This means that people with hypermobility could experience worse symptoms while levels of progesterone are higher or unstable, as is common during puberty. Similarly, Graf et al. (2019) investigated the effects of sex hormones on the general

joint laxity and hypermobility in adolescents, and found a positive association between levels of sex hormone binding globulin (SHBG) and hypermobility, which indicates that fluctuations in hormone levels can impact the laxity of joints. Therefore, the hormonal fluctuations experienced by the participants during their teen years may have affected the laxity of their joints, possibly increasing the chance of injury. It has also been found that adolescents experience overuse injuries more frequently in the last 30 years than they did previously (Micheli & Klein, 1991). There are a number of overuse injuries which are considered to be "risk factors" in sports (Adirim & Cheng, 2003). Many of the injuries experienced by sports people are similar to those experienced by musicians (Quarrier, 1993), but methods for treating them differ significantly.

Some of the injuries that the participants in this study faced were back pain, neck pain, shoulder pain and jaw pain. Participants regularly experienced back pain when playing the violin. Although it was estimated in a 2013 report that 60% to 70% of adults are affected by lower back pain, the limitations on movement and ability to work are extensive (World Health Organisation, 2013). The prevalence of back pain has been trending upwards in the last 20 years. In the majority of cases, there is no clear reason for the occurrence of this pain, although injury and damage to the lower back are common causes (Duthey, 2013). In the same report, it was also shown that lower back pain has a tendency to recur many times throughout one's life, and treatments for mild to moderate pain are mainly designed to provide symptomatic relief (Duthey, 2013). Kok et al. (2018) investigated the prevalence of PRMDs in amateur musicians playing in student orchestras and found that neck and back problems are more common among string instrumentalists than woodwind players. In their sample of 186 string players, 32.3% experienced upper back pain and 23.7% experienced lower back pain, whereas 15.6% and 12.5% of 96 woodwind players experienced upper and lower back pain, respectively. This shows that back pain is a common issue, but in the light of current understanding, the participants of this study are likely to experience recurrences of this pain.

Another common injury location was the neck. Kok et al. (2018) found that 37.1% of amateur string players experience neck pain when playing. Similarly, Maric et al. (2019) addressed the presence of overuse injuries in professional classical musicians and found that string players experienced the highest rate of pain in the upper limb, shoulder and neck. This is consistent with the complaints of the participants of this study, with three of six participants referencing neck pain or injury.

Participants used specific words and phrases to describe the pain in their shoulder and neck, which included: “electrical pull”, “tingly”, “numb”, “dull”, “throbbing”, “fiery hot”, and “stabbing”. When researching whether these descriptions of nerve pain were common to other individuals, little research was found to portray the experience of the patient. In 2017, the FDA in the United States held a meeting with patients, caregivers, and families of those suffering with nerve pain. The most significant finding in this case was that the words used to describe their pain were consistent with the words which the participants of this study used, including “numbness”, “tingling”, “burning”, and “stabbing” (Center for Drug Evaluation and Research (CDER) & U.S. Food and Drug Administration (FDA), 2017).

One participant experienced most of her pain in her jaw, and said that it felt as though it did not “fit back together” after she had been playing for a period of time. Rodríguez-Lozano et al. (2010) reviewed the existing literature and found that temporomandibular disorders in violinists occur more frequently in professional violinists and violists than in the general population. It was also found that the temporomandibular joint is the most commonly affected area in violinists because of the sustained flexion of the head and shoulder required to hold the violin. This contradicts the findings of this study, since only one participant mentioned temporomandibular pain. However, it is important to bear in mind the different samples used in these studies. The current research made use of non-professional violin players, where Rodriguez-Lozano et al. (2010) made use of professional violinists. This could account for this difference in findings.

When describing their experiences, participants often referred to what they thought was "normal" for a violinist. Some discomfort may be expected when participating in an activity which requires an abnormal body movement, but many of the participants' pain went beyond this expected level of discomfort. In addition, their dismissal and ignoring of symptoms could have led to more severe injuries, owing to a lack of treatment. Andersen et al. (2013) examined the culture of pain among professional musicians, and aimed to investigate their experiences and methods for coping with pain. These researchers conducted semi-structured interviews with eight professional musicians and two elite athletes. They found that musicians do not tend to place importance on regular body maintenance to improve general performance. Musicians often accept pain as a part of their profession and ignore warning signals from their bodies in order to achieve musical "perfection". In this sense, the participants' assertion that their pain is "normal" is consistent with the injury culture identified by Andersen et al. (2013). This mentality is also consistent with the findings of Barnes et al. (2011), who, through an investigation of the injuries of musicians in the Free State Symphony Orchestra, found that 21% of musicians do not respond appropriately to their injuries. The lack of an appropriate response is due their belief that "the show must go on". This method for dealing with pain is not only damaging to the body, since injuries are left untreated and often become further exacerbated, but is also toxic to the emotional health of the instrumentalist. Similar to sportspeople, musicians often use music as a coping mechanism, and as an outlet for dealing with psychological issues (Herring et al., 2018). This means that if they are injured and their ability to play is affected, an even greater emotional impact may be felt.

In the same way, interviewees perceived a stigma associated with injury in the South African music industry, and specifically in terms of young violinists. They felt that there is a misconception among young violinists that if a person is injured, they cannot practise regularly, leading to the belief that they are not as proficient as their peers. There is an implication that if a

musician does not feel pain, they are not working hard enough. O'Neill (2019) speaks about the generally understood stigma around injury. Similarly, Coss (2015) speaks about there is a stigma and secrecy around musicians, largely caused but a fear of unemployment as a result of injury. This shows that the participants' perceived stigma around injury is not only valid, but also not specific to South Africa or violinists, as it affects many musicians worldwide. Once again, the effects of this mindset can be unhealthy, and may potentially lead to untreated pain and irreversible damage to the body. There is room for further research to determine why this stigma exists, and how it may be addressed.

The physical and emotional effects of injury on the participants were more wide-ranging than was expected. All the participants experienced pain related to playing, although some did not view the injuries they sustained as significant enough to have required treatment. The coping mechanisms employed by the musicians to handle the pain and difficulties they felt were ineffective and toxic to their physical and emotional health. Many of the participants' ability to play and practise has been significantly affected. This, combined with the pain they experienced, caused extreme frustration and annoyance for the participants. The themes which emerged raised additional questions about the occurrence of injury in hypermobile violinists, and opportunities for further research have been discovered.

5.5 Participants' attempts to manage symptoms of HSD and pain

The previous three themes outlined the background and context which led to the participants' injuries and painful experiences; provided information about the participants' experiences and understanding of hypermobility in their lives and their ability to play the violin; and showed how the interviewees' injuries occurred, and how these injuries affected them physically and emotionally. This theme completes their narratives by showing how the participants were

diagnosed, what treatment they used, and what mechanisms they have put in place to manage their pain and injury.

Many of the participants received vague or unhelpful diagnoses of their performance-related disorders and/or hypermobility. Murphy (2020) addressed the need for diagnosis in treatment of injury, and stated that reaching a correct diagnosis is a crucial part of treating patients. The author states that a misdiagnosis can lead to inappropriate administering of medication, as well as delayed treatment, which could significantly affect a patient's life. A diagnosis is important, since it directs the course of treatment (Young, 2014). In recent years, collaborating with the patient to diagnose and treat a medical problem has become more popular, as this allows for all aspects of the patient's life and activities to be considered, providing a more well-rounded understanding of the problem at hand (Murphy, 2020).

Participants experimented with various forms of treatment, and found relative success with non-allopathic treatment methods, such as physiotherapy and Chinese acupuncture. These non-allopathic treatments were successful in reducing some symptoms, but participants felt that the most important part of the process was to collaborate with medical professionals to create a treatment plan.

Overall, the experience of medical diagnosis and treatment of the participants' injuries and pain were case specific. However, searching for medical professionals who collaborate with the patient to reach a correct diagnosis and an efficient treatment plan may be the best plan of action for those seeking treatment. In my opinion, the two practitioners who took the time to listen to my case and to consider the research I had conducted, were invaluable in reducing my symptoms and helping me manage my pain.

Teachers played an important role in developing methods to handle pain, and to prevent further playing-related pain. The participants' teachers focused specifically on postural

adjustments, building of strength for playing, adjustment of instrument set-up, and improvement of playing technique. Hildebrandt and Nubling (2004) found that providing musicophysiological training to teachers could aid in injury prevention for students, and in equipping music teachers with the necessary tools to support recovery after injury. From this information, Guptill and Zaza (2010) formed a collection of prevention approaches to be used by instrumental music teachers. The following strategies were included: taking breaks, techniques for pacing, cognitive rehearsal, ergonomics, warm-up and cool down, preparation for performances, and discussion on the importance of stretching. This information could be an invaluable tool for teachers to help students prevent injury and recover from existing damage.

The participants have learnt to reduce the pain they feel while playing the violin. However, the participants used symptomatic, momentary adjustments, which included lowering their violins, doing small stretches, and trying to relax. Most would take short breaks when the pain occurred while they practised, but this was not always possible while they performed. In general, they coped the best they could, but no participant had a complete solution for the pain they felt while playing.

Some of the participants learnt that clicking and self-adjusting their bodies provided momentary relief from pain. None of the participants consulted chiropractors, who manually adjust the body, to learn how to do this correctly, and rather used their intuition to create temporary relief. In terms of the spine, chiropractors move the intervertebral joints to the point of ligament tension and thrust to release the vacuum in the joint. This increases space in the joints, reducing pressure on the intracapsular structures (Fysh, 2018). However, excessive joint mobility makes this adjustment difficult to execute on individuals with hypermobility (Fysh, 2018). Chiropractors employ several techniques to work around this and receive specific education on the effects of hypermobility to be able to make these adjustments without causing injury the patient. Therefore, in the case of a hypermobile person, self-adjustment without the

necessary knowledge of the movement could be dangerous and may cause damage and pain to the affected joints. This indicates that personal, uneducated adjustment of the participants' bodies could potentially lead to further harm.

A healthier approach to self-management of pain is body awareness. Participants extensively advocated for self-awareness of the body. Body awareness is not only useful for the prevention of injury, but could also lead to improved violin playing and expression through performance (Lozano, 2017), showing that this is not just a good preventative measure, but could help with general musicianship too. Alexander technique, an educational method that aims to improve natural poise and posture, as well to reduce tension in the body (Bull, 2015), is a commonly advocated method for teaching body awareness to prevent injury. In the case of hypermobility, Alexander technique could be an invaluable tool in teaching musicians body awareness, and control of their lax joints.

There are various ways in which the interviewees have attempted to manage their injuries and pain. Some participants consulted doctors and medical practitioners, but in general, felt that these consultations had neither healed their injuries, nor reduced their pain to a significant degree. Many participants used advice from teachers to address technical difficulties created by hypermobility and injury, as well as to reduce the pain of playing with an injury. These changes to their technique and violin set-up were beneficial, although the original issues have not been permanently resolved. Similarly, a few participants employed their own coping mechanisms, including pain medication, self-adjustment, and body awareness. The first two provide temporary relief for pain, but do not solve the underlying issue. The latter could be instrumental in creating a way for musicians to understand their bodies better, to prevent injury, and to better eradicate pain related to hypermobility and playing the violin.

5.6 Summary

The present results are significant for several reasons. This study appears to be the first of its kind to investigate the experiences of hypermobile violinists who have sustained performance-related musculoskeletal injuries. Through the investigation, it has been seen that there is a need for research into hypermobility, specifically regarding its impact on violinists' playing ability. The participants' knowledge of the condition was limited, which meant that some understanding of their injuries was missing. With more research into how the condition affects the body, more knowledge and awareness can be disseminated to medical professionals, as well as to the general public.

The participants' experience of injury was also investigated, and significant findings were discovered. Their injuries differed, but the treatment and emotional experiences shared several similarities. None of the participants can play without experiencing any pain, and this affects them both physically and emotionally.

To create a full picture of the relationship between HSD and PRMDs in violinists, future studies will need to focus on further identifying and filling gaps in the literature. The findings above indicate that some of the severity of the participants' injuries may have been preventable. Future studies could focus on creating resources for violinists, so that injury stemming from hypermobility can be prevented or lessened.

Chapter 6

Summary and conclusions

6.1 Introduction

The aim of the present research was to examine the occurrence of HSD and PRMDS in violinists. Through the use of multiple case studies, the project examined violinists' experiences of living with hypermobility and performance-related disorders. The following chapter includes a summary of the main research findings, as well as a conclusion of the research question.

6.2 Addressing the research question

What are the lived experiences of violinists with Hypermobility Spectrum Disorder who have sustained performance-related musculoskeletal disorders?

One of the more significant findings to emerge from this study is that there seems to be a lack of knowledge of HSD in South Africa in general. Preliminary research found a rarity of research into the condition in a South African context. The participants' limited understanding of HSD affected their understanding of their body, as well as of the pain they experienced.

The findings of this study showed that a variety of injuries and hypermobility symptoms were present in the sample, although knowledge of the syndrome varied. Overall, the extent of knowledge of the condition informed participants' understanding of the link between HSD and injury while playing the violin. Of the six violinists with HSD, only one was aware and knowledgeable of the condition prior to the study. One was aware that he had hypermobile joints, but was not knowledgeable of the condition.

Four participants were unaware that they had symptoms of hypermobility, and also lacked knowledge of the condition and its effects. Consequently, many of the interviewees' experiences

of HSD were limited to their knowledge of the condition. In general, participants did not associate hypermobility with performance-related violin injuries. It was clear that I, as a participant, possess more knowledge of the condition, resulting in a better understanding of HSD.

It was found that none of the participants received a medical diagnosis of hypermobility. Of those who experienced injury, none felt the need to consult a medical professional. Many did not believe that hypermobility had affected their injury, or their life, and therefore, would not need to be diagnosed. Three participants sought medical treatment for injury, but hypermobility was not mentioned as a possible contributor. I consulted medical professionals regarding the role of HSD in my injuries, but did not receive a confirmatory diagnosis. Overall, these situations show that this sample could have had a better understanding of HSD, and may have been able to identify abnormal pain related to this condition. Had the participants received an accurate diagnosis, prevention of further injury may have been possible, and treatment and support in managing the condition may have been provided.

The study revealed that violin teachers did not possess adequate knowledge of hypermobility. As a result, they were unable to account for the effects of the condition when providing support for the participants faced with HSD-related challenges. The participants, however, spoke positively about the support their teachers provided to help with pain and discomfort when playing.

Four of the six interviewees stated that they had sustained a performance-related injury, which had affected their playing ability and quality of life. Although the two remaining participants shared that they had not been injured through playing the violin, both described experiences of pain which had affected their performance ability. The extent and severity of injury varied significantly. However, there were four common loci of injury: the neck, shoulder, hands, and back. All the participants referenced an experience of back pain, although the more severe

injuries occurred in the neck and shoulder. Of the two participants who experienced severe shoulder problems, only one was diagnosed with specific muscular injury. Of the three respondents who mentioned that they had experienced nerve pain, only one consulted a specialist. One case of thoracic outlet syndrome and focal dystonia was found. Similarly, one case of temporomandibular joint pain was found.

An investigation of the existing literature showed that violinists may experience several common PRMDs. The experiences of injuries described in this study are consistent with the existing literature. Many of the participants experienced similar injuries to previous studies' samples, and their symptoms often presented as expected. A surprising finding of this study, however, is the general lack of diagnosis among the sample. Many of the respondents chose not to consult medical professionals for a variety of reasons. As a result, most cases of pain in the sample were left undiagnosed, and therefore, untreated.

When speaking about the effects of HSD on their violin playing ability, specifically, the majority of participants felt that hypermobility had not affected their lives or ability to play the violin. However, there is evidence to suggest that their hypermobility may have created unnecessary obstacles in their violin performance.

Almost all the interviewees mentioned a "pinkie problem", in which the second knuckle of their pinkie finger locked when extended on the fingerboard, causing decreased mobility, pain, frustration and inconvenience. Some participants also experienced similar problems in their right hand, negatively influencing the stability of their bow hold. The participants' attempts to solve this problem were unsuccessful, and it still occurs regularly. Research showed speculation about the cause of this issue, although it is a challenge experienced by many violinists. Since five of the six participants in this study mentioned the "pinkie problem" as a major issue when playing,

it could be assumed that hypermobility, and the increased laxity of tendons and ligaments of the hand caused by it, has rendered these participants more susceptible to this phenomenon.

Violinists are often required to play the violin for long periods of time, whether during orchestra rehearsals, individual practice sessions or lengthy solo performances. This study found that the amount of time the sample was able to play without pain was less than the generally accepted period for a violinist. In some cases, participants stated that they could only play for a period of 15 minutes without pain. In other cases, pain would progress in such a way that the participants were forced to stop playing, in order to relax and release tension before they could continue. This was a common sentiment among those who were severely injured, as well as among those who felt that they had not been injured, showing that the impact of pain on playing can be extensive and disruptive.

Two of the participants experienced performance-affecting injuries. At the peak of their injury, these participants were forced to stop playing for a prolonged period. One of these violinists does not play more than once every few months, but still experiences regular pain, despite reduced violin activity. The other plays regularly and works as a musician. They have developed a treatment plan, which has reduced their pain significantly, but both still experience regular pain, and many of their symptoms have not been eradicated.

It is clear that hypermobility and injury have significantly affected the participants' violin-playing. In many cases, their stamina and strength were influenced. The auto-ethnographic account revealed that in the period during which I did not play the violin, I lost some of my technique. Consequently, I had to work hard to regain what I had lost, despite the pain I still experience. This continued pain affected the participants emotional well-being in a variety of ways.

The results of the investigation found that the emotional effects of these participants' injuries are extensive. Most of the sample managed their pain in a damaging manner. Some participants believed that they had not been injured, but still described painful experiences. Others felt that if they pushed through the pain, they could continue practising, hoping that their bodies would eventually adjust. Many sought medical treatment, but received no definitive diagnosis. These participants still experience pain, showing that the treatment was unsuccessful. Participants suffered emotional strain because of their experiences. If the participants had managed their pain and injuries better, and if they had received accurate diagnoses of HSD and of their injuries, much of their physical and emotional pain could have been avoided.

Overall, the participants' experiences of living with HSD and PRMDs, along with their understanding of their effect on violin playing, are limited to their understanding of the condition, and the role it played in their lives. Those who were more knowledgeable about the condition felt that it played a larger role in their life than those who had little to no knowledge of the condition. Those who did not know about HSD prior to the study did not believe that there was a link between their injuries, their hypermobility, and their ability to perform effectively. The participants who knew about HSD believed that this link did exist.

This study can be seen as an important first step in understanding how violinists experience living with Hypermobility Spectrum Disorder and Performance-Related Musculoskeletal Disorders. During the research process, more questions arose regarding the nature of HSD in violinists, and the manner in which it may affect the occurrence injury. It was found that, in many ways, the limited understanding of the condition and avoidance of injury symptoms limited the possibility for obtaining rich details about the phenomena. However, this lack of knowledge is possibly the most interesting finding, since it provides an opportunity to create awareness of HSD and injury in violinists in South Africa, through further research.

6.3 Limitations of the study

A limitation of this study is that the lack of formal diagnosis of HSD in the inclusion requirements resulted in the participants not necessarily having any knowledge of the condition prior to the study. This also caused most of the participants to be unable to comment on hypermobile experiences.

Similarly, the six individuals who participated in this study were aged between 18 and 25, and were current students at a university or college. This could mean that some of the findings may be specific to this demographic group only.

The participants were not required to be professional musicians. As a result, their performance and practice experience was limited. Had professional violinists been interviewed, more in-depth details of the lived experiences of violinists with HSD and PRMDs could have been explored. This would have allowed particular focus to be placed on the association between injury and number of hours of practice and performance.

6.4 Recommendations for further research

Since there seemed to be little research into the occurrence of hypermobility among musicians, this field would be a fruitful area for further investigation. Specifically, a future study could focus on professional violinists, to assess the impact of HSD and PRMDs on the careers and performance abilities of professional musicians. Similarly, future research could include a larger sample spanning a larger age group and professional violinists or music students. To obtain more accurate descriptions of living with HSD, the study could be replicated, with a sample consisting only of professional violinists who have been formally diagnosed with HSD.

Future research could explore the impact of increased knowledge of HSD on the possible associations made between HSD and injury, both by medical professionals and individual violinists living with HSD.

Finally, the “pinkie problem” in violinists needs to be explored in more detail, to ascertain whether it is caused and exacerbated by hypermobility. Since numerous violinists have complained about this issue, a real understanding of the phenomenon may be vital.

6.5 Conclusion

When researching HSD, there is much conflicting information about the condition, since its aetiology is still being refined and understood. There is significant evidence showing that musicians are at risk of injury if they are hypermobile, but research into PRMD occurrence in hypermobile violinists is limited.

Prior to the study, I expected to find violinists with similar experiences to my own, who would be able to provide rich descriptions of their lived experiences of HSD and performance-affecting injuries. I found it surprising that the participants had little in-depth knowledge of HSD. Therefore, it was challenging to draw meaningful conclusions about HSD and injury in violin players. I also found that, although injury and pain are common, the participants tended to avoid or dismiss their pain for various reasons.

The findings of this study highlight a lack of knowledge around HSD in the violinist community. There is a need for research into the experiences of violinists with HSD who have experienced PRMDs. There is also a general lack of understanding of HSD in South Africa, among musicians and healthcare providers, pointing to the need for research in this context.

This research study represents the first step towards investigating HSD and injury in violin players, and I intend to continue further research to gain a better understanding of my own experience of Hypermobility Spectrum Disorder.

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Appendices

Appendix A: Letter of Information

Dear Participant

I am currently enrolled for a MMus (Musicology) at the University of Pretoria for which I am conducting a research project. I would greatly appreciate your involvement since your personal experience of hypermobility, playing related musculoskeletal injury, and violin playing could provide valuable insight into my research, which centres on these three concepts.

Title of the study

Hypermobility Spectrum Disorder and Performance-Related Musculoskeletal Disorder in Violinists

Aim of the study

The proposed study aims to explore your experiences of injury as a violinist who has hypermobility syndrome. Through the gathering of this data, I aim to explore the relationship between these three phenomena and ascertain how they affect each other.

Research procedures

I would like to invite you to take part in a semi-structured interview. Should you agree, the semi-structured interview will be arranged at a convenient place and time. The interview will be audio-recorded for ease and accuracy of data collection and should take between thirty minutes to one hour. Should you so wish, the transcribed interview will be sent to you individually for verification.

Confidentiality

All information you provide will remain confidential. Personal details will not be used, and each participant will be assigned a pseudonym. Only the researcher and research supervisor will have access to the participants' identities. The University of Pretoria will hold the raw data confidentially for a period of fifteen years after the study is completed.

Potential risks

Since this study addresses the wellbeing and medical problems of its participants, the interview process could potentially be triggering or upsetting. Should you feel uncomfortable in any way during the interview, you may end it immediately. Should you require further support from a professional therapist or counsellor, you will be referred to a prearranged professional who will be able to provide the necessary support. You are in no way obligated to complete the interview once it has begun, or once you have received treatment for any triggering or upsetting experiences, because of the interview.

Participants' rights

You are invited to ask any questions about the study before you provide consent. Your involvement in this study is voluntary, and you may withdraw from the study at any given time without any negative consequences. You will be given complete access to your data, at any point

in the study, should you request it. You are also welcome to view the full project upon completion.

Contact details of researcher

Tamlyn Harker

tamlynharker@gmail.com

Contact details of supervisor

Prof. C. Panebianco

clorinda.panebianco@up.ac.za

Appendix B: Letter of Informed Consent

If you agree to participate in this research, please sign the following letter of consent.

I, _____ (name of participant) hereby acknowledge that I am aware of the abovementioned formalities associated with the participation in this study. I agree with the process that will be carried out to collect data relevant to this specific topic.

_____	_____	_____
Participant	Signature	Date
_____	_____	_____
Researcher	Signature	Date
_____	_____	_____
Supervisor	Signature	Date

Appendix C: Excerpt of an analysed interview

Interview 2: Samantha

Interview	Coding	Notes	Potential Themes
Participant So, yeah, so mostly I would experience the pain on the backside. The pain in my shoulder wouldn't be here on the tip particularly, but more at the back with the muscle is just before the spine and yeah. So when I, mostly when I've got to pain, it would shoot down my arm and into my wrist and I would get that numb feeling again, which then became quite severe at times when I would be playing for hours and practising hours and that sort of thing.	Mostly on backside of shoulder Not on tip of shoulder Pain in muscles of shoulder, near spine [scapula and trapezius] Pain shoot down arm into wrist Numb feeling Quite severe when playing for long period	Pain around back of shoulder Shooting pain into arm and hand Exacerbated by playing	Experience of pain
Researcher And how long did that pain go on for? Was it a week or two or was it quite a few months?	How long did pain last for		
Participant It was the, a couple of months. So [orchestra] actually, they've got all the rehearsals and performances from January right up until, I think end of May, June. And then we would, you know, that would be, it's for the year basically. And I wasn't really involved in any other big orchestras or ensembles at that time. So, then I had time to focus on just my, my school practical work and exams and that sort of thing. But just so it would be more severe when I was put under pressure in playing a lot of the time, long hours and that sort of thing. But yeah, so it lasted a couple of months and then once I didn't practise as much, then my pain would only come just after I would finish practising, you know, on my, my daily habits when I would, when I'd practise and that sorts of things.	Couple of months Specifically, in periods when played for orchestra Played first half of year More severe when under pressure When less pressure and intensity, pain only appeared after practice	Pain centred around practice No prolonged pain Worst when playing a lot of orchestra	Experience of pain
Researcher And when you were like, when it was like the worst part of the injury, how long would you say you were playing for daily? Was it like a couple of hours?	At peak of injury, period playing without pain		
Participant So with [orchestra], we would arrive there early in the morning as early as I think 6:30, I think we would begin our sessions at about 7:30 in the morning. We would practise right through in all our sections. You know, at the second violins and the first violins and you go practise for about two, three hours at a time. And then you have a small interval, and you go off and you're practising again for two, three hours at a time. Then an hour break and then everyone would come together for	Orchestra rehearsals very intense Playing and sitting for hours Roughly 8 hours a day over a weekend	Orchestra rehearsals very taxing on body	Formative experiences Experience of pain

the entire afternoon. And sometimes, yeah, you'd be sitting for hours playing, practising or simply even just waiting, you know.			

Appendix D: Example of Coding Spreadsheet

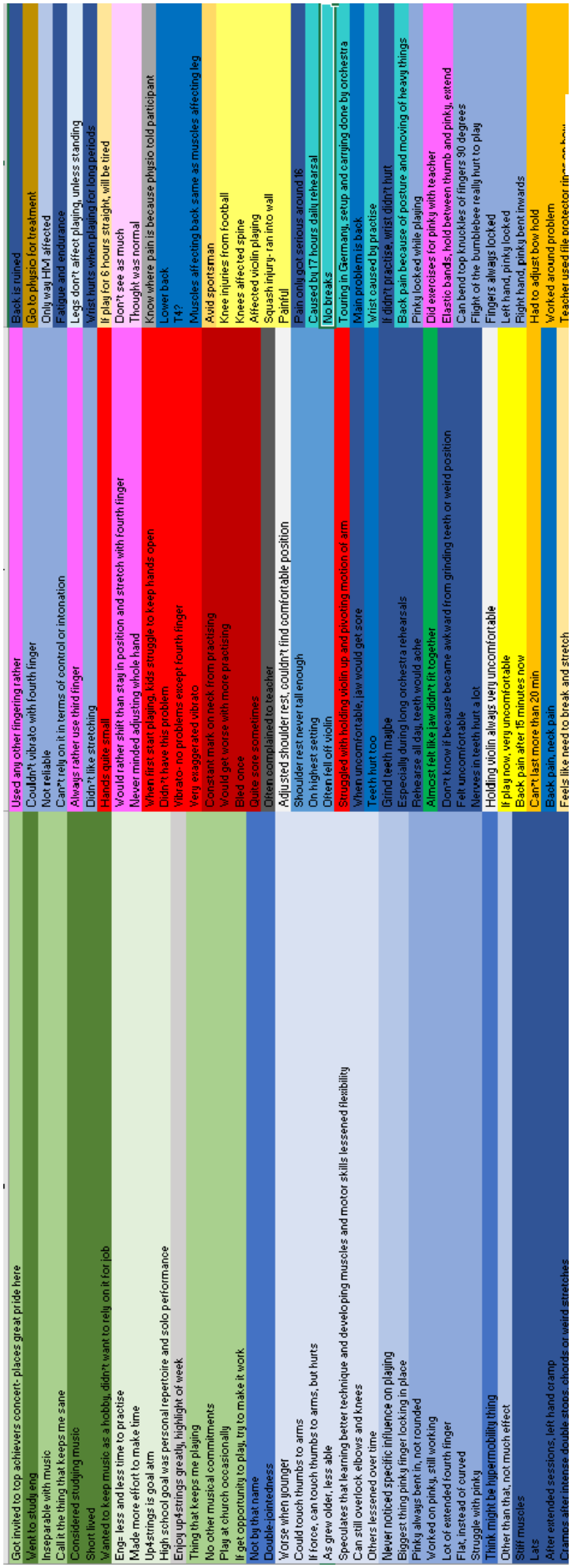

Figure 2: Overview of Colour Codes

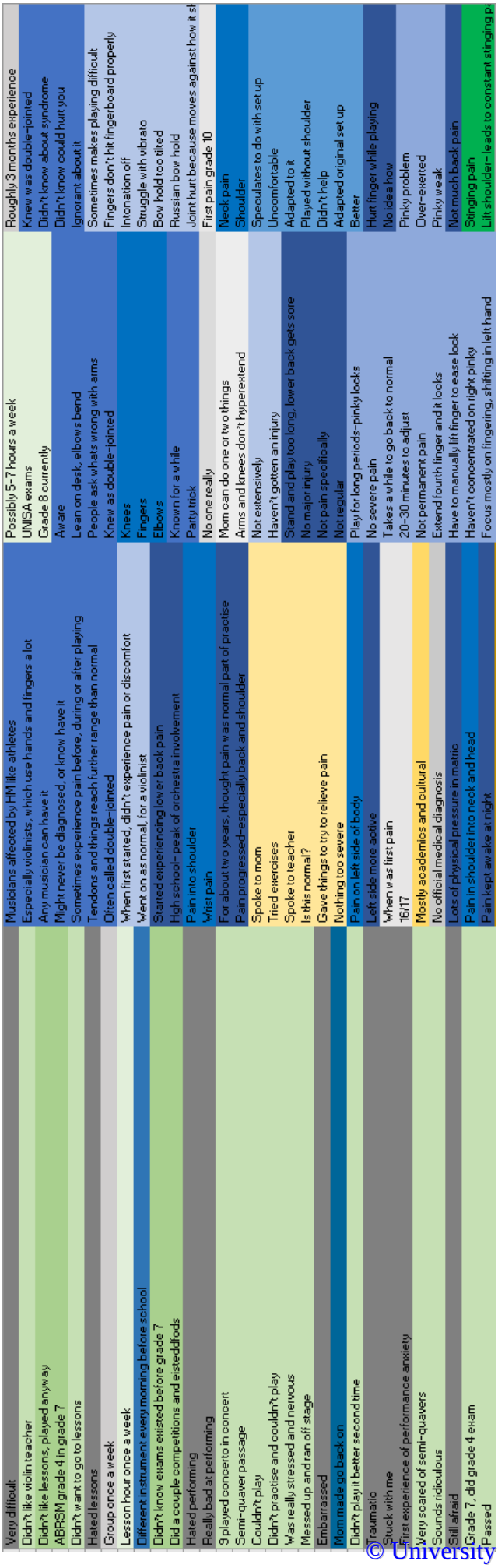

Figure 3: Example of Codes in Chronological Order within Interviews

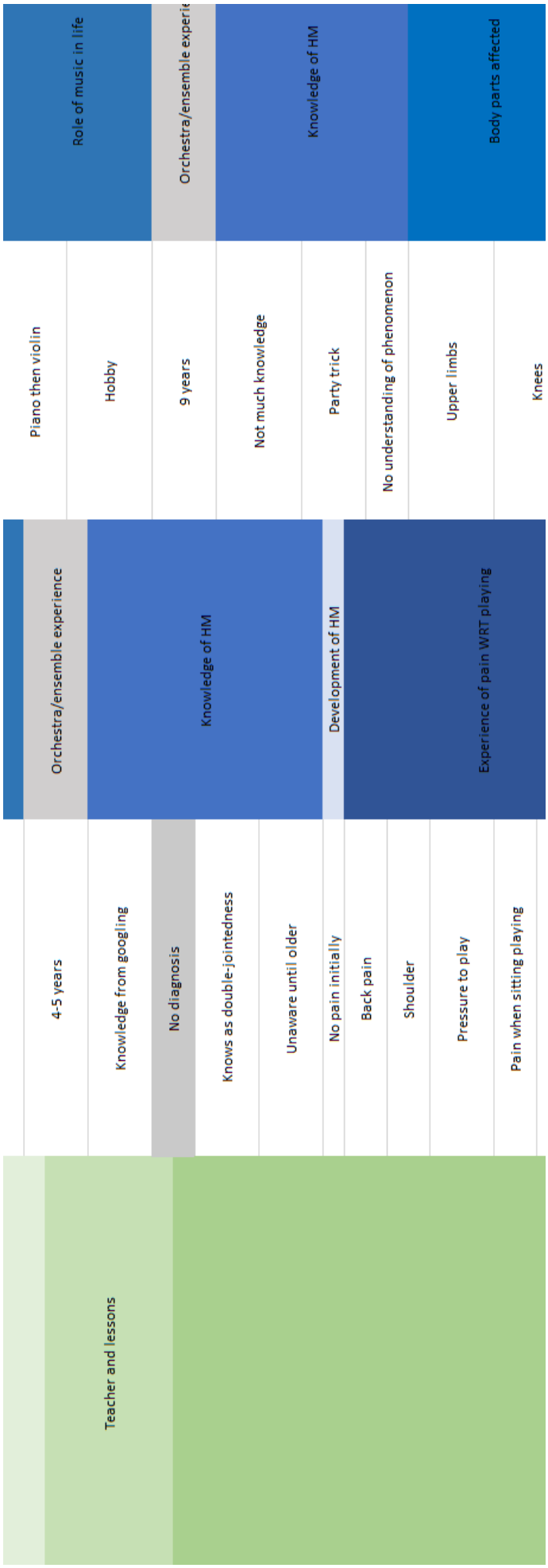

Figure 4: Codes organised into emergent themes

Appendix E: Google Form

The Google Form used for participant recruitment can be found at this link:

https://forms.gle/MPcWSQKDHNcqX2Yv9