



**Student Name:** Carina Heymans

**Student Number:** 15005420

**Address:** 329 Lois Avenue, Newlands, Pretoria

**Cell Phone:** 072 961 2119

**E-mail Address:** u15005420@tuks.co.za

**Supervisor:** Prof. Clorinda Panebianco

# **The impact of practice on quality of sleep in performance major music students**

by

Carina Heymans

15005420

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Supervisor: Prof. C.R. Panebianco

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## Declarations

### Declaration of Originality

This dissertation is original work that has not been previously submitted or used at any other academic institution. Where secondary material is included, this has been carefully acknowledged and referenced in accordance with university requirements.

### Ethics Statement

Ethical standards required in terms of the University of Pretoria's Code of Ethics for Research and Policy Guidelines for Responsible Research have been observed, and the applicable ethics approval has been obtained for the research described in this work.



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

31/05/2021

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Date

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## Abstract

Existing literature reveals that musicians and music students are susceptible to poor sleep quality due to several aspects related to the conservatoire culture and the musical temperament. Furthermore, music students' investment in music often comes at the expense of healthy lifestyles, meaning that sleep is not prioritised. At present, it is unclear whether music students are receiving and developing the necessary sleep knowledge as part of their performance training. Therefore, this study set out to examine the potential impact of practice on sleep quality in a sample of seven South African performance major music students. A mixed methods approach was used comprising of three, distinct research phases: Firstly, questionnaires measuring perceptions of practice, sleep, and psychological states were completed. Secondly, participants kept numeric logs of their practice and sleep for four weeks. Lastly, music students' lived experiences of practice and sleep were discussed during semistructured online interviews. The main findings reveal an interplay of factors of practice that collectively influence sleep. Although the quantity and organisation of practice show some influences, the qualitative components of practice, such as the nature, perceptions, and experiences of practice have the most conclusive impacts on sleep. This study highlights the value of developing an understanding of how practice strategies and experiences of practice may impact sleep, since this, in turn, directly affects music students' daily practice, performance, and overall wellbeing.

*Keywords:* COVID-19 lockdown; music students; performance; practice; rumination; sleep; stress

## Contents

<b>Chapter 1 Introduction</b>	<b>1</b>
1.1 Introduction and Background to the Study	1
1.2 Aims of the Study	2
1.3 Research Questions	2
1.4 Research Methodology	3
1.5 Key Concepts	3
1.6 Chapter Outline	4
<b>Chapter 2 Literature Review</b>	<b>5</b>
2.1 Introduction	5
2.2 Practice	5
Perspectives on Practice	5
Quantity and Quality of Practice	6
Individual Differences and Variation in Practice	10
Experiences of Practice	12
2.3 Sleep	13
Sleep Quality in Music Students	14
Environmental and Personal Determinants of Sleep in Music Students	15
The Importance of Sleep in Musical Learning, Practice, and Performance	18
2.4 Summary	20
<b>Chapter 3 Methodology</b>	<b>21</b>
3.1 Introduction	21
3.2 Research Paradigm	21
3.3 Research Approach	21
3.4 Research Design	22
Embedded Mixed Methods Design	22
Quantitative Strand: Descriptive Design	23
Qualitative Strand: Multiple Case Study Design	23
3.5 Sampling	24
Sampling Strategy	24
Description of the Sample	24

3.6 Data Collection	25
Phase 1: Questionnaires	25
Phase 2: Practice-Sleep Logs	26
Phase 3: Semistructured Online Interviews	27
3.7 Data Analysis	28
Phase 1: Quantitative Analysis	28
Phase 2: Quantitative Analysis	28
Phase 3: Qualitative Analysis	28
3.8 Validity and Reliability	30
Phase 1: Questionnaires	30
Phase 2: Practice-Sleep Logs	30
Phase 3: Semistructured Interviews	30
3.9 Ethical Considerations	31
3.10 Summary	31
<b>Chapter 4 Results</b>	<b>32</b>
4.1 Introduction	32
4.2 Phase 1: Questionnaires	32
Perceptions of Practice, Sleep, and Stress	32
4.3 Phase 2: Practice-Sleep Logs	34
Practice and Sleep	35
Individual Differences and Variation in Practice and Sleep	36
Associations Between Practice and Sleep	39
4.4 Phase 3: Semistructured Interviews	41
Main Themes and Subthemes	41
Theme 1: Music Students' Practice	42
Theme 2: Music Students' Sleep	50
Theme 3: Associations Between Practice and Sleep	53
Theme 4: Music Students' Experiences of Lockdown	60
4.5 Summary	70

<b>Chapter 5 Discussion</b>	<b>71</b>
5.1 Introduction	71
5.2 Practice	71
Quantity and Quality of Practice	71
Individual Differences and Variation in Practice	72
Perceptions and Experiences of Practice	74
5.3 Sleep	75
Quantity and Quality of Sleep	76
Individual Differences and Variation in Sleep	77
5.4 Associations Between Practice and Sleep	79
Bidirectional Nature of Practice and Sleep	79
Impact of Sleep on Practice	79
Impact of Practice on Sleep	81
5.5 Music Students' Experiences of Lockdown	83
Emotions During Lockdown	84
Practice During Lockdown	85
Sleep During Lockdown	86
Practice and Sleep During Lockdown	87
5.6 Summary	88
<b>Chapter 6 Conclusion</b>	<b>89</b>
6.1 Introduction	89
6.2 Addressing the Research Questions	89
Subquestion: How Does the Total Amount of Practice Impact Sleep?	89
Subquestion: How Does the Timing of Practice Impact Sleep?	90
Subquestion: How do Students' Perceptions of Practice Impact Sleep?	90
Main Research Question: How Does Practice Impact Quality of Sleep in Performance Major Music Students?	91
6.3 Limitations of the Study	92
6.4 Recommendations for Future Research	92
6.5 Conclusions	93
<b>References</b>	<b>94</b>



<b>Appendix A: Letter of Information and Informed Consent Form</b>	<b>115</b>
<b>Appendix B: Questionnaire</b>	<b>118</b>
<b>Appendix C: Practice-Sleep Logbook</b>	<b>125</b>
<b>Appendix D: Semistructured Interview Schedule</b>	<b>129</b>

### **List of Tables**

Table 1 Participant Profile and Demographic	25
Table 2 Descriptive Statistics: Questionnaire Scores	33
Table 3 Descriptive Statistics: Practice-Sleep Logs	35
Table 4 Interview Themes and Subthemes	41

### **List of Figures**

Figure 1 Links between practice time, formal practice, and musical achievement	9
Figure 2 Research Design	23
Figure 3 Data Analysis in Qualitative Research	29
Figure 4 Trends in Total Amount of Practice Over 28 Days	37
Figure 5 Trends in Total Amount of Sleep Over 28 Days	38
Figure 6 Scatter Plots and Linear Trendlines of Associations Between Practice and Sleep	40

## Chapter 1

### Introduction

#### 1.1 Introduction and Background to the Study

Music has been found to affect levels of mood and arousal and, by extension, the quantity and quality of sleep (De Niet et al., 2009; Hallam, 2013; Harmat et al., 2008; Wang et al., 2014). The potential of music to induce and enhance sleep has been observed in diverse settings, in people of all ages, and in both healthy subjects and those suffering from sleep pathologies (Hallam, 2013). However, this relationship depends on factors such as preceding levels of musical experience. Interestingly, the extensive body of research does not speak to musicians' experiences of sleep, nor to the interaction between sleep and music-making. Surprisingly little is known about musicians' sleep in general. Even more so, the nature of sleep in university music students remains mostly unexplored.

A small handful of studies have been conducted on this subject. Findings reveal that music students struggle to get sufficient sleep and suffer from periods of restricted sleep (Araújo et al., 2017; Marín, 2018). The demands of the conservatoire culture and performance training, in conjunction with certain psychological traits characteristic of music students, significantly increase susceptibility to poor sleep (Araújo et al., 2017; Beaty et al., 2013; Gjermunds et al., 2020; Healey & Runco, 2006; Marín, 2018; Saksvik-Lehouillier et al., 2017; Sternbach, 2008; Vaag et al., 2015; Vaag et al., 2016; Williamon et al., 2009). Most noteworthy, music students have also been known to exhibit low health responsibility, often consciously sacrificing healthy lifestyles and sleep routines in the pursuit of music (Araújo et al., 2017; Ginsborg et al., 2009; Kreutz et al., 2008; Marín, 2018; Nedelcut et al., 2018; Panebianco-Warrens et al., 2014; Perkins et al., 2017; Rickert et al., 2015; Spahn et al., 2017). At the same time, however, sleep is considered a core component of music students' health and wellbeing, as well as a necessity for ensuring that they are at the top of their abilities to learn, practise, and perform (Araújo et al., 2017; Marín, 2018; Simmons, 2011; Tucker et al., 2016; Van Vugt et al., 2013). Currently, it is unclear whether music students are receiving and developing the necessary health habits and sleep knowledge as part of their performance training (Araújo et al. 2017; Perkins et al., 2017; Wynn Parry, 2004). Therefore, a study of this underinvestigated aspect of music students' daily lives seems relevant. The impact of practice behaviours on sleep is a

particularly important consideration as music students' investment in music may come at the expense of their sleep.

My interest in this topic stemmed in part from my own experiences as a music student. During my undergraduate studies, I often found myself struggling to sleep following periods of intensive practice. I would lie awake, unable to stop thinking through the music I had spent the day practising, resulting in little and unsatisfying sleep. These sleep difficulties seemed to intensify with stress leading up to lessons, examinations, or performances. Following conversations with some of my peers and instructors, I learnt that other musicians share in these experiences.

The study was therefore guided by both an academic interest and a personal curiosity about the interplay between practice, stress, and sleep — specifically pertaining to the effects of practice on sleep.

## **1.2 Aims of the Study**

The central aim of this study was to investigate the impact of practice on sleep quality in performance major music students. The research delved into a background of factors of musical training that may influence students' sleep, including practice routines, perceptions and experiences of practice, and the specific pressures associated with performance and performance training. Although it was not an initial aim of the study, the unprecedented COVID-19 pandemic also presented an unexpected opportunity to reflect on students' experiences of practice and sleep under lockdown.

## **1.3 Research Questions**

In line with the aims described above, the study was guided by the following research question:

- How does practice impact quality of sleep in performance major music students?

To address this research question, the following subquestions were identified:

- How does the total amount of practice impact sleep?
- How does the timing of practice impact sleep?
- How do students' perceptions of practice have a bearing on sleep?

## 1.4 Research Methodology

In line with the pragmatic research paradigm, this study was informed by a mixed methods approach combining both quantitative and qualitative methods of inquiry. Seven performance major music students participated in the research. Data were gathered in three phases:

- Phase 1 followed a quantitative approach. Participants completed a multisection questionnaire, which had been formulated to measure their perceptions of practice, sleep, and their psychological states.
- Phase 2 also employed a quantitative approach. Participants kept daily numeric logs of their practice and sleep routines over a period of four weeks. During this time, they wore sleep monitoring watches, which enabled them to keep accurate sleep logs.
- Phase 3 followed a qualitative approach. Semistructured online interviews were conducted in which the participants discussed their lived experiences of practice, sleep, and the demands of studying music.

The data offered by the three phases were analysed separately and chronologically. The quantitative and qualitative results were brought together only during the final stages of the study, at which point a synthesis and overall interpretation of the research findings began to emerge. A more comprehensive account of this methodological procedure is presented in Chapter 3.

## 1.5 Key Concepts

Some of the concepts that were relevant to this specific study are briefly delineated as follows:

### Practice

*Formal practice* may be defined as a structured activity aimed at increasing one's current level of performance and exceeding one's previous limits (Ericsson et al., 1993; Ericsson & Lehmann, 1999). This type of practice differs from work or play, as it requires intensive concentration and effort, as well as specific goal-setting and consequent monitoring of performance (Lehmann et al., 2007). The term *practice* refers exclusively to this context of formal music practice throughout this report, unless otherwise specified.

## **Sleep Quality**

Despite the term's widespread use in sleep research, *sleep quality* has not been rigorously defined. According to Buysse et al. (1989) and Krystal and Edinger (2008), it is a complex concept defined by quantitative metrics (e.g., physiologic sleep duration, onset latency, and sleep stage distribution) as well as qualitative indicators (e.g., subjective feelings of restfulness and depth of sleep). Similarly, this study was guided by a multifaceted conception of sleep quality encompassing both objective and subjective dimensions of sleep.

## **Stress**

The American Psychological Association defines *stress* as “the physiological or psychological response to internal or external stressors” (APA, 2020, Dictionary of Psychology). It is thus the body's reaction to changes, challenges, threats, and demands. Stress alters a vast array of processes in nearly every system of the body — be it physical, emotional, or psychological — and thereby influences how people feel and behave. Over the long term, chronic stress has deleterious effects on both mental and physical health. According to Sternbach (2008), music students are vulnerable to stressors unique to the conservatoire culture. In this study, stress was also considered specifically within the context of pressures associated with performing and meeting the demands of a music degree. Relevant indicators of stress in this study included negative affect, perfectionism, music performance anxiety, and rumination.

## **1.6 Chapter Outline**

This dissertation is composed of six chapters. This first chapter served as an introduction to the study as a whole. The background, aims, research questions, and methodologies guiding the research were addressed. Chapter 2 includes a review of existing literature regarding practice and sleep in music students. Chapter 3 provides a detailed account of the methodology employed for the study. This includes information about the research approach and design, the methods of sampling, data collection and analysis, and the strategies used to ensure reliable and ethical research. Consequently, Chapter 4 presents the raw quantitative and qualitative results obtained from the three discrete data sets and Chapter 5 provides a discussion of the integrated findings in relation to pertinent literature on practice and sleep. Finally, Chapter 6 highlights the conclusions drawn from the research, identifies limitations of the study, and recommends opportunities for further research.

## Chapter 2

### Literature Review

#### 2.1 Introduction

This chapter provides an overview of existing literature relevant to this study. Music practice is discussed in terms of the various scholarly perspectives on practice, the interplay between the quantity and quality of practice, individual differences and variation in practice, and lastly, musicians' experiences of practice. This is followed by an overview of research concerning sleep in musicians and music students, specifically pertaining to its interactions with musical learning, practice, and performance.

#### 2.2 Practice

Developing skills in any domain of expertise requires practice. Likewise, practice is central to the cultivation of all physical and psychological aspects of musical expertise (Hallam et al., 2012; Nielsen, 2008; Williamon, 2004). According to Lehmann et al. (2007), it is the most prevalent activity that musicians engage in and an unarguable necessary duty.

#### Perspectives on Practice

Practice is a multifaceted behaviour that has drawn much interest from musicians and researchers since the 1940s (e.g. Rubin-Rabson, 1940). However, one of the fundamental challenges concerning this field has been pinpointing what constitutes as practice. Although some types of practice are recognised easily (e.g. technical and trouble-spot practice), other aspects are not as easy to identify (e.g. doing breathing exercises, practising gestures in front of a mirror, listening to recordings, and memorising or analysing a score away from an instrument). For this reason, researchers began to distinguish between *formal practice* and *informal practice* (Ericsson et al., 1993; Sloboda et al., 1996). Whereas formal practice is a structured endeavour different from work, play, or mere exposure to music, informal practice comprises overall time spent playing and includes less structured activities such as improvising, jamming, messing about, and playing by ear. In music, the concept of formal practice is closely related to the *deliberate practice* theory, as defined in the research of Ericsson et al. (1993, see also: Ericsson, 2016) on the acquisition of expertise in various

domains. It has since been widely investigated in the context of formal music practice. This theory is discussed in more detail in the section, Quantity and Quality of Practice (p. 7).

While this perspective of formal versus informal practice is most widely recognised, other classifications of practice have also been proposed. For instance, there is also the differentiation between *playing practice* and *non-playing practice* (Williamon, 2004). Alternatively, Chaffin et al. (2003) describe practice as a long term activity encompassing everything from the beginning stages of getting an overall representation of a piece (e.g. by reading or listening to the music) to technical practice, performance preparation, memorisation, and finally, the maintenance of technical and memory aspects over time. Likewise, Araújo (2015) holds that all processes from the acquisition and development of motor skills through the final stages of performance training qualify as practice. Accordingly, another perspective on practice emerged where practice is seen as involving three dimensions, including: *basic dimensions*, *interpretive dimensions*, and *performance dimensions* (Araújo, 2015; Chaffin et al. 2003). While the basic dimension encapsulates that which is needed to simply play the notes (e.g. fingering, technical difficulties), the interpretive dimension refers to that which provides musical shape to the notes (e.g. phrasing, dynamics, tempo), and the performance dimension refers to the cues the musician must learn to attend to while performing (e.g. basic, interpretive, and expressive cues).

Altogether, Lehmann et al. (2007) show that these various elements of practice can be compiled into two overarching perspectives: the *macro perspective*, which refers to a holistic notion of practice as an everyday activity, and the *micro perspective*, which involves a scientific look at practice, focusing on its skill-building aspect. Like the other researchers, Lehmann et al. (2007) posit that a comprehensive description of practice requires consideration and evaluation of all activities skilled musicians engage in to hone their craft.

### **Quantity and Quality of Practice**

Research on musical expertise has been especially concerned with the interplay between the quantity and quality of practice. First, a set of studies examining the accumulated lifetime practice amounts of musicians from varying levels of performance have consistently shown that practice times correlate with different levels of accomplishment; more specifically, that experts practise significantly more than amateurs throughout their lifetimes (Ericsson et al.,

1993; Jørgensen, 2002; Sloboda et al., 1996). Yet, substantial differences among individuals in these studies suggest that the quality of practice undertaken is also influential in the development of expertise.

As a result, other studies have delved into the elements of quality practice. Hallam (1998, as cited in Williamon, 2004) considers quality practice as that which achieves a desired outcome in as short a time as possible without compromising long-term progress. Researchers believe that this can be achieved through deliberate practice strategies (Bonneville-Roussy et al., 2011; Ericsson et al., 1993; Ericsson, 2006, 2016; Hallam et al., 2012; Platz et al., 2014; Williamon & Valentine, 2000). *Deliberate practice* refers to a structured activity aimed at exceeding one's previous limits and increasing one's current level of performance. It entails setting specific goals for improvement and monitoring performance through evaluation (Ericsson et al., 1993; Ericsson & Lehmann, 1999; Lehmann & Davidson, 2002). When practising, musicians must keep their goal in mind, listen attentively, evaluate, and adapt their next attempt accordingly (Lehmann et al., 2007). Doing so requires determination, concentration, and effort. Therefore, motivation is essential to sustain this kind of practice (Ericsson & Lehmann, 1999; Lehmann & Davidson, 2002; Sloboda et al., 1996).

Researchers further hold that quality practice is achieved through *self-regulation* (Araújo, 2015; Leon-Guerrero, 2008; McPherson & Renwick, 2011; McPherson & Zimmerman, 2011). From this paradigm, effective practice occurs through the interaction of cognitive, affective, motivational, and social processes and includes behaviours such as setting goals, planning, time management, self-evaluation, metacognitive thinking, internal attributions, external causal attributions, help-seeking, active search for resources, and environment control (Lehmann et al., 2007; McPherson & Zimmerman, 2011). In brief overview: Goal orientations, especially mastery goals, form the foundation of self-regulated practice (Nielsen, 2008; Smith, 2005). Problem-solving is further guided by a strategic and systematic use of musical structure (e.g. identifying and attending to challenging musical sections, Miksza, 2007) as well as a continuous cycle of self-evaluation (or “play–evaluate–play differently–evaluate”, Lehmann et al., 2007, p. 66). To do so efficiently, environmental control and time management have also been emphasised as essential aspects of self-regulated practice. Simple structuring such as finding a quiet place to practise may minimise distractions and optimise a musician's concentration (McPherson & Renwick, 2011). Planning the time and order of practice may



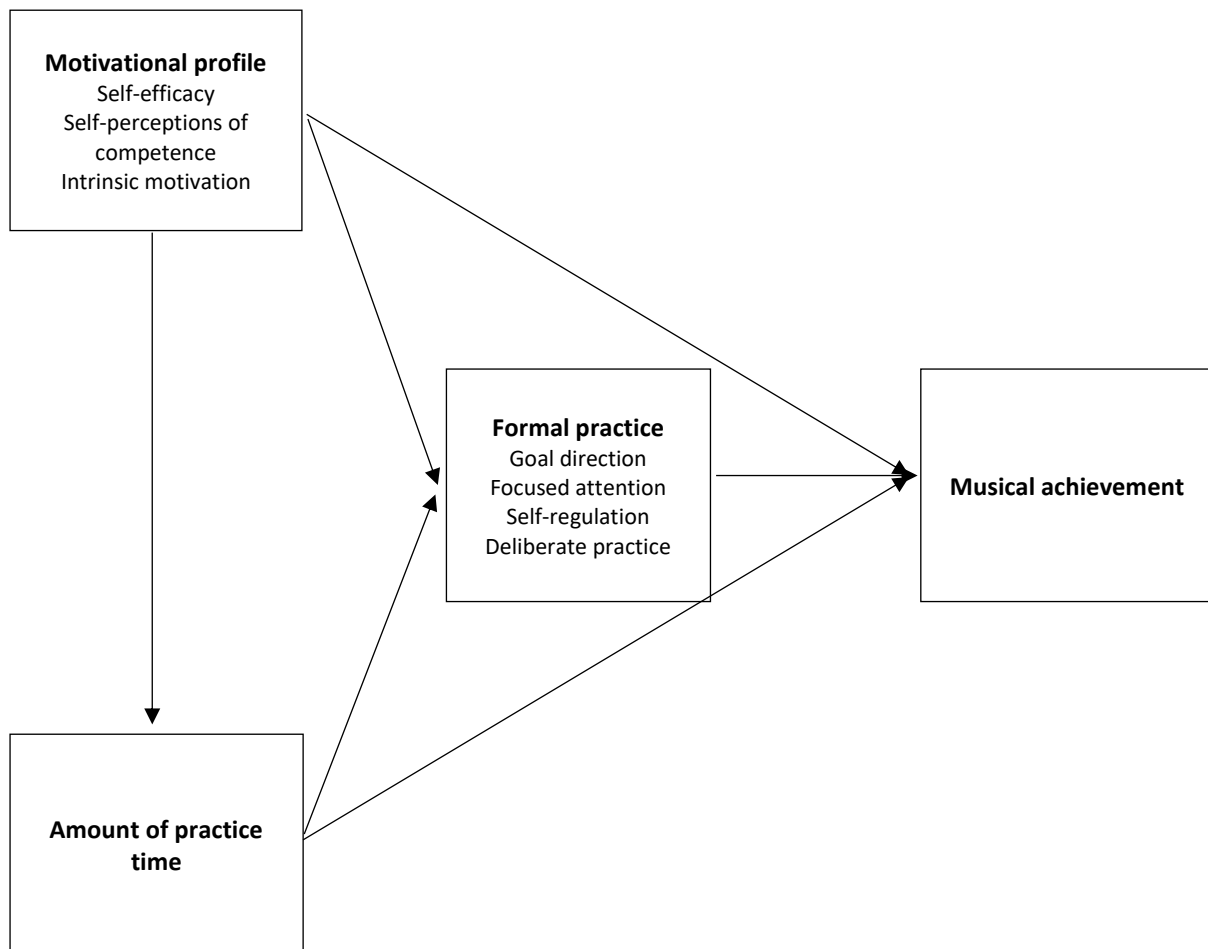
hold further benefits. Some lines of evidence suggest that there are optimum periods for practice, specifically indicating the benefits of morning practice (Ericsson et al., 1993; Ericsson, 2006; Williamon, 2004; Sloboda et al., 1996) and distributed practice (Ericsson et al., 1993; Rubin-Rabson, 1940; Simmons, 2011). Researchers further recommend managing practice sessions in a sequential order, including a warmup routine, technical exercises, and repertory work (Hallam et al., 2012; McPherson & McCormick, 2006). Alongside self-evaluation, planning, and organisation, self-control strategies such as self-instruction and constructive inner speech are vital to optimise musicians' efforts (McPherson & Renwick, 2011). In a model by Araújo (2015), the array of self-regulating behaviours has been grouped into three overarching categories, including self-regulation through: *personal resources*, *external resources*, and *practice organisation*. Araújo (2015) further demonstrates that musicians rely more on personal resources than support from external resources with experience and that practice organisation also becomes habitual over time. According to this view, the desired outcome of self-regulation in music practice is self-sufficiency.

While the deliberate practice and self-regulation theories have been assessed independently for their role in musical learning, it may be argued that both are components of overall formal practice and should therefore be assessed cooperatively to obtain the most accurate description of quality practice (Bonneville-Roussy & Bouffard, 2014). In fact, some lines of evidence suggest that self-regulated musicians also tend to practise more deliberately (McCormick & McPherson, 2003; McPherson & McCormick, 2006), but that the success of either strategy may be dependent on factors such as motivation, self-efficacy, and grit (Duckworth, 2016; Lehmann et al., 2007; Mazur & Laguna, 2019; McPherson & Renwick, 2011; Nielsen, 2004; Sloboda et al., 1996). Therefore, Bonneville-Roussy and Bouffard (2014, p. 690) suggest a framework in which formal music practice is construed as a focused, goal-directed period of practice involving both deliberate practice and self-regulation strategies. Furthermore, formal practice is viewed alongside motivation and practice time as interrelated factors contributing to the quality of practice (see Figure 1, p. 9).

**Figure 1**

*Links between practice time, formal practice, and musical achievement*

*(Bonneville-Roussy & Bouffard, 2014, p. 690)*



According to this view, formal practice is enhanced by greater practice amounts and a higher motivational profile. In turn, practice amounts only predict musical achievement when associated with formal practice (Bonneville-Roussy & Bouffard, 2014). A consensus remains in the literature that the conceptualisation of the quantity of practice should distinguish between formal and informal time spent practising, and consequently, that accumulated formal practice times could be regarded as an indicator of the efficacy of practice (Bonneville-Roussy et al., 2011; Ericsson et al., 1993; Hallam et al., 2012; McPherson & McCormick, 2006; Miksza, 2011; Sloboda et al., 1996; Williamon & Valentine, 2000). Although both the quantity and quality of practice are influential independently, the combined amount of optimised practice is central in musical learning.

## Individual Differences and Variation in Practice

Practice routines and strategies vary considerably from musician to musician (Ericsson et al., 1993; Hallam, 2001; Hallam et al., 2012; Hallam et al., 2016; Jørgensen, 2002; Jørgensen, 2004; Lehmann et al., 2007; Sloboda et al., 1996). Interestingly, in a twin study of 10 500 Swedish musicians, Mosing et al. (2014) have found that there may be a genetic component to musicians' inclinations toward practice and their use of practice strategies. A number of personal determinants such as age, gender, culture, socioeconomic background, education, motivation, personality traits, and self-efficacy have also been suggested to impact individually on musicians' preferences and attitudes to learning, thereby influencing their practice behaviours (Hallam et al., 2016; Lammers & Kruger, 2006; Lehmann et al., 2007; Nielsen, 2004).

Other studies suggest that practice behaviours may vary with instruments played (Burwell & Shipton, 2011; Hallam et al., 2012; Hallam et al., 2016; Jørgensen, 2002; Lammers & Kruger, 2006). For instance, a handful of studies have demonstrated that keyboard players practise the most on average, followed by string players, whereas brass and woodwind players practise considerably less, and vocalists the least (Hallam et al., 2016; Jørgensen, 2002; Lammers & Kruger, 2006). According to Hallam et al. (2012), instruments played may also contribute to individual differences in practice strategies and the organisation of practice activities. Researchers attribute these differences to several factors, including: musicians' physiological limitations, certain instruments' physical and technical demands, the nature and extent of the repertoire, physical access to the instruments or rehearsal space, and teaching traditions (Burwell & Shipton, 2011; Hallam et al., 2016; Lehmann et al., 2007; Williamon, 2004). Musical genre has also been identified as a potential factor in musicians' diverse practice behaviours (Creech et al., 2008; Gruber et al., 2004; Lehmann et al., 2007). However, the evidence base is not particularly strong and has yielded mixed results. For instance, differences in practice amounts between musicians of different genres have not been thoroughly assessed (Hallam et al., 2016). The limited academic interest in this subject has been directed more toward differences in practice strategies, showing that classical musicians prioritise solitary practice and tend to practise more deliberately, whereas jazz and popular musicians use more informal practice methods and are likely to incorporate both communal and solitary activities, observation of other musicians, and resources such as play-along

recordings into their routines (Creech et al., 2008; Gruber et al., 2004; Lehmann et al., 2007). However, these findings concerning genre- and instrument-based differences are not conclusive as practice behaviours can transcend particular group characteristics (Hallam et al., 2016; Welch et al., 2008). Regardless, it may be argued that, along with the other personal determinants highlighted earlier, instrument and genre can give rise to musical identities and impact attitudes toward learning (Welch et al., 2008). There is still much to learn about differences and similarities in practice behaviours between different types of musicians.

Practice routines and behaviours may also vary over time (Burwell & Shipton, 2011; Hallam et al., 2012; Sloboda et al., 1996; Williamon & Valentine, 2000). These changes may apply to the long-term over musicians' lifetimes, but also to the short-term in the form of varying practice routines from day to day. Some research shows that even the most advanced musicians do not practise every day (Ericsson et al., 1993; Hallam et al., 2012; Sloboda et al., 1996). However, at the same time, consistent practice routines are also associated with higher achievement (Ericsson et al., 1993).

Nonetheless, music literature highlights a number of reasons for day-to-day variations in practice routines. Lehmann et al. (2007) show that person-related factors, such as managing one's life, family, and career may impact a musician's ability to maintain a practice routine. Additionally, one's current psychophysiological states (e.g. fatigue, hunger, mood) may also have an influence on practice behaviours from day to day. Factors pertaining to the practice environment, such as access to the necessary resources and a quiet space may also influence practice routines (Burwell & Shipton, 2011; Hallam et al., 2012; Lehmann et al., 2007). The solitary nature associated with formal practice is indicative of the mental effort and concentration it requires, as well as the adverse effects of distractions (Araújo, 2015; Lehmann et al., 2007). According to Lehmann et al. (2007), as these personal and environmental conditions become less ideal, practice becomes less effective.

It is thus evident that the quantity and quality of practice may be influenced by many factors, resulting in individual differences as well as variation in practice over time.

## Experiences of Practice

Musicians have been known to be very emotional in their descriptions about their practice, seemingly loving and hating it at the same time (Chaffin et al., 2003; Lehmann et al., 2007). Some musicians enjoy practice more than others (Hallam, 1995). Practice has been described in many ways, ranging from “fun”, “mental labour” and a “commitment to yourself to improve...” (Lehmann et al., 2007, pp. 64–65) to “boring” (Hallam et al., 2012, p. 665–667). It has even been compared to dishwashing (Chaffin et al., 2003).

That being so, Ericsson et al. (1993) conducted a survey study in which university music students were asked to rate the enjoyment and effort of several everyday activities, such as shopping, work, and household chores compared to various music-related activities, such as performing, formal practising, jamming, going to lessons, and doing music theory. After performing, practising and going to lessons were rated highest in effort among all activities, and also less enjoyable than other activities. In a similar study, Lehmann and Davidson (2002) asked musicians to rate the effort and enjoyment of specific dimensions of practice. Resultantly, learning new repertoire and practising trouble-spots emerged as the most effortful activities, with trouble-spot practice also being the least enjoyable. According to these early perspectives on the deliberate practice theory, formal practice is thus effortful and not inherently enjoyable (Ericsson & Lehmann, 1999; Lehmann & Davidson, 2002).

However, some perspectives raise questions as to whether formal practice could include a greater level of enjoyment. Drawing on the work of Sloboda and Davidson (1996), Hallam et al. (2012) suggest that high achieving musicians tend to spend more time on both formal and informal practice due to higher levels of enjoyment. More recently, Hallam et al. (2016) have also found that young musicians mostly enjoy formal practice, but do not feel like practising every day. Several lines of evidence suggest that musicians’ experiences of practice may be an important determinant of the quantity and quality of practice undertaken (Chaffin et al. 2003; Hallam, 1995; Hallam, 2001; Hallam et al., 2012; Lehmann et al., 2007; Mazur & Laguna, 2019; Renwick & McPherson, 2002; Sloboda & Davidson, 1996; StGeorge et al., 2013). More specifically, when musicians enjoy practising, they also practise more and implement better practice strategies. According to Burwell and Shipton (2013, p. 329), practice “feeds and reflects motivation and other affective aspects of learning”. In a recent review of the broad base of existing literature, Mazur and Laguna (2019, p. 850) relate music practice with three

different types of affect, including: pre-existing mood (“context-free affect”), as well as feelings that accompany practice (“practice-related affect”) and performance (“performance-related affect”). Their review confirms, through several pathways, that musicians’ feelings and emotions influence the quantity and quality of practice.

These findings do not negate the fact that practice can be more effortful than enjoyable at times. It seems natural that a process of repeatedly trying and failing before succeeding at aligning one's attempts with a desired goal can be frustrating (McPherson & Renwick, 2011). Because of the interactions between effort and enjoyment, other factors such as motivation, self-regulation, and self-efficacy play a vital role in directing and maintaining practice (Bonneville-Roussy & Bouffard, 2014; Ericsson & Lehmann, 1999; Lehmann & Davidson, 2002; Mazur & Laguna, 2019; McPherson & Renwick, 2011; Nielsen, 2004; Sloboda et al., 1996). Furthermore, it also implies that practice can only be sustained for a limited amount of time before rest and recuperation are needed or before leading to burnout (Ericsson et al., 1993; Ericsson & Lehmann, 1999; Sternbach, 2008; Williamon, 2004). Therefore, Lehmann et al. (2007) emphasise that it is most important that the body and mind must be fresh and motivated for effective practice. Although there is a vast body of research from the micro perspective on how students can optimise their practice through increasing the quantity and quality of their practice, there is still room for research from the macro perspective on how students might gainfully manage their minds and bodies in pursuit of more effective and enjoyable practice. One promising self-management strategy, as per interest of this study, is increasing the quality of sleep.

### **2.3 Sleep**

Although the benefits of music for sleep have been well documented (De Niet et al., 2009; Hallam, 2013; Harmat et al., 2008; Wang et al., 2014), the nature of sleep in musicians and its interactions with music-making has received little attention. Even more so, surprisingly little is known about music students’ sleep in the context of conservatoire culture and musical training.

## Sleep Quality in Music Students

Student populations in general have been recognised as a notoriously sleep-deprived group due to their late bedtimes and erratic sleep patterns (Ban & Lee, 2001; Brown et al., 2002; Buboltz et al., 2001; Forquer et al., 2008; Gaultney, 2010; Milojevich & Ludowski, 2016; Reid & Baker, 2008; Tsai & Li, 2004). Yet, little research has been conducted on sleep in music students specifically.

A notable exception is a study of health-related perceptions and behaviours among 483 conservatoire students in which Araújo et al. (2017) found that music students' sleep quality is poor compared to the general population. A follow-up investigation has revealed that, despite being aware of the importance of sleep, music students struggle getting sufficient sleep and suffer from periods of restricted sleep (Marín, 2018). Currently, it is unclear whether music students are learning the necessary health habits and sleep knowledge as part of their preparation to meet the demands of the music industry (Araújo et al. 2017; Perkins et al., 2017; Wynn Parry, 2004). The lack of adequate health education in performance training is perhaps relevant in explaining the following series of findings:

Numerous studies have shown that experiences of sleep difficulties and poor sleep quality are common among professional musicians (Fishbein et al., 1988; Hinkamp et al., 2017; Kegelaers et al., 2020; Matei et al., 2018; Nedelcut et al., 2018; Pereira et al., 2010; Van Selms et al., 2020). One oft-cited Norwegian study is that of Vaag et al. (2016), who found a higher prevalence of troubled sleep in musicians compared to other occupations and the overall population. The researchers also observed considerable individual differences within the musician demographic and were able to ascribe these to a number of factors, including: music-related workload, form of musical employment (e.g. freelance vs. employed), musical instrument, and genre. For instance, insomnia symptoms were significantly more common among musicians playing keyboard and bowed string instruments compared to vocalists, woodwinds, brass players, and percussionists. Previous studies have shown that these two groups experience stress more acutely (Fishbein et al., 1988; Nedelcut et al., 2018; Panebianco-Warrens et al., 2014; Vaag et al., 2015), but also practise more than other instrumentalists (Jørgensen, 2002; Lammers & Kruger, 2006; Hallam et al., 2016). This piques interest into the interplay of underlying psychological characteristics, practice, and sleep in different musicians.

Overall, the studies reviewed here outline a need for more knowledge on the relationship between work and sleep in the context of musicians' occupational health. Moreover, it seems relevant to assess sleep quality and practices already at university level, as the performance training environment may be the ideal setting for early intervention. A better understanding of sleep in music students may thus be useful for equipping students for a future career in performance and breaking the pattern of poor sleep associated with professional musicians to date.

### **Environmental and Personal Determinants of Sleep in Music Students**

Findings in tertiary learning environments in general indicate that sleep problems are mainly attributed to a lack of proper sleep routines, poor engagement with health responsibility, and stress (Gaultney, 2010; Lund et al., 2010). While acknowledging that music students have many aspects in common with their peers in other subjects, they also face specific challenges associated with the performing arts (Araújo et al., 2017; Sternbach, 2008). Conservatoires have been characterised as a demanding environment, marked by high workload, long hours, constant scrutiny, intense competition, and pressure to excel (Araújo et al., 2017; Marín, 2018; Sternbach, 2008). Music literature identifies several factors related to the daily life of music students that may make them susceptible to experiencing poor sleep.

Music students' busy schedules, workload, and late working hours may cause difficulty to achieve a good night's sleep (Araújo et al., 2017). Music majors balance academic coursework with supplementary music activities such as hours of solitary practice, rehearsals, performing, and involvement in ensembles and/or orchestra, many of which take place at night. Consequently, findings of Vaag et al. (2016), Saksvik-Lehouillier et al. (2017), and Marín (2018) indicate that these large amounts of night time work, as well as varying routines, may produce a rhythm issue and interfere with the natural sleep-wake cycle in music students. Because music students may seek, or be offered, 24-hour access to practice rooms, the influence of practice behaviours is a relevant consideration in their sleep (Araújo et al., 2017; Marín, 2018).

Music students' busy schedules also leave little time for relaxation or a personal life (Sternbach, 2008), which may also affect sleep. In Marín's (2018, p. 31) study, music students consistently reported "having no time to wind down and get ready to sleep" as a main obstacle to getting enough sleep. The students also held an intrinsic belief that work overload



and the expectations to perform under immense pressure are normal, causing them to sometimes regard “sleep not being an option” (p. 27). Despite being aware of the importance of sleep, it is not a priority for them, and students would compromise on sleep when other uses of time seem more important. Several other lines of evidence confirm that music students’ investment in music often comes at the expense of engaging in healthy lifestyles (Araújo et al., 2017;; Ginsborg et al.; Kreutz et al., 2008; Panebianco-Warrens et al., 2014; Marín, 2018; Perkins et al., 2017; Rickert et al., 2015; Spahn et al., 2004). Accordingly, overall low health responsibility, including a lack of healthy sleep habits, is also identified as a strong and direct determinant of the quantity and quality of music students’ sleep.

Music students’ attitudes towards health are particularly troubling in light of the evidence that they endure similar performance-related health adversities and stress as professional musicians already during their student years (Ajidahun & Phillips, 2013; Ballenberger et al., 2018; Biasutti & Concina, 2014; Cohen & Panebianco, 2020; Ginsborg et al., 2009; Osborne et al., 2014; Panebianco, 2017; Papageorgi et al., 2011; Spahn et al., 2017; Williamon & Thompson, 2006). Music students are thus at risk for pain, musculoskeletal symptoms, and overuse injuries, as well as high levels of stress and performance anxiety — factors that have also been associated with sleep problems in musicians (Saksvik-Lehouillier et al., 2017; Vaag et al., 2015; Vaag et al., 2016). According to Sternbach (2008) and Nedelcut et al. (2018), many aspects of musical learning and performance may be even more taxing for students since they have not yet consolidated their abilities to cope with the demands of making music. Araújo et al. (2017) and Marín (2018) further show that music students engage poorly in stress management and coping strategies, which, in turn affects their sleep adversely. In Marín’s (2018) sample, stress was identified as the main cause of music students’ sleepless nights and poor sleep quality nights. In line with other observations (Alvaro et al., 2013; Freeman et al., 2020; Kalmbach et al., 2018), this was linked to hyperarousal and ruminating at bedtime causing difficulty falling and remaining asleep. For the music students’ specifically, night time rumination had to do with the workload from college and pressures to perform, as well as self-expectations and self-doubts about musical ability, and uncertainty about their futures as musicians. This internal conflict suggests that the immediate demands of the conservatoire environment are not solely responsible for students’ problems with sleep.

Several underlying traits of the musical temperament have been found to overlap with sleep problems (Marín, 2018; Saksvik-Lehouillier et al., 2017; Vaag et al., 2015). These characteristics include higher levels of sensitivity (Lehmann et al., 2007), creativity (Beaty et al., 2013; Gjermunds et al., 2020; Healey & Runco, 2006; Lehmann et al., 2007), neuroticism (Saksvik-Lehouillier et al., 2017; Vaag et al., 2015; Vaag et al., 2016), and perfectionism (Stoeber & Eismann, 2007; Williamon et al., 2009), as well as an increased predisposition to affective and anxiety disorders (Kenny et al., 2012; Saksvik-Lehouillier et al., 2017; Vaag et al., 2015; Vaag et al., 2016), and a tendency to ruminate (Jones et al., 2014; Roy et al., 2016; Verhaeghen et al., 2005).

Most concerningly, some research shows that these traits and tendencies may develop alongside musical training. For instance, Araújo et al. (2017) demonstrate that music students are highly driven to succeed and may develop perfectionistic tendencies alongside their musical training in the pursuit of excellence (see also: Stoeber & Eismann, 2007; Zwaan & Ter Bogt, 2009). At the same time, they are exposed to a lot of criticism during lessons, rehearsals, and performances, which, in turn, can be internalised in the form of excessive self-criticism and insecurity (Sternbach, 2008; Zwaan & Ter Bogt, 2009). Reiterating Marín's (2018) findings, such self-expectations and self-doubts of musical ability can again give rise to sleep-interfering rumination. Other interesting views are that the higher levels of rumination observed in musicians may develop alongside creativity (Roy et al., 2016) or relate to musical training in the sense that the repetitive thought style in rumination may mirror the repetitive, circular nature of deliberate music practice (Jones et al., 2014). However, more research is needed into the direction of these associations. It is still unclear to which extent these characteristics in music students occur as a matter of nature or nurture from the conservatoire culture. What remains clear is that, regardless, these variables have strong links with sleep problems (Alvaro et al., 2013; Van de Laar et al., 2010). Therefore, it seems relevant to investigate these personal and environmental aspects of music students' lives, as they may have profound effects on their health, wellbeing, and sleep. There is especially room for research on the impacts of music students' performance training on their sleep, as this has yet to be investigated.

## The Importance of Sleep in Musical Learning, Practice, and Performance

Sleep has many functions that are valuable to everyday life. It has been identified as an essential component and critical determinant of overall health and wellbeing, daytime functioning and performance, as well as memory and learning (Buysse, 2014; Carskadon & Dement, 2011; Ferrara & De Gennaro, 2001; Grandner, 2017; Okun, 2011; Perry et al., 2013). These interactions may be especially significant in the lives of university students. A multitude of international studies have found links between sleep and health as well as sleep and academic performance in tertiary education settings (Ban & Lee, 2001; Edens, 2006; Gaultney, 2010; Gilbert & Weaver, 2010; Milojevich & Lukowski, 2016; Reid & Baker, 2008; Steptoe et al., 2006; Stewart-Brown et al., 2000). However, these associations have rarely been investigated in the context of music students specifically. Regardless, they may have significant implications on the daily lives of music students.

As highlighted in the previous section, the performing arts milieu can be a stressful environment. Araújo et al. (2017, p. 1558) point out that maintaining a healthy lifestyle — which includes proper sleep routines — is crucial to ensure that music students are in top physical and mental condition, or “fit to perform” in spite of the demands of making music. Extending on the work of Araújo et al. (2017), Marín (2018) observed that sleep can have significant implications on music students’ health and wellbeing, as well as their daily practices and performance.

Theories regarding *optimal periods* for practice, which advocate for practising in a time that one feels most alert and awake (Williamson, 2004), and *distributed practice*, which emphasises the importance of rest periods between practice (Simmons, 2011) could allude to a role of sleep in optimising the effectiveness and/or experience of practice. This could offer a probable explanation as to why advanced musicians report a preference for practice first thing in the mornings after waking up (Ericsson et al., 1993; Ericsson, 2006; Williamson, 2004; Sloboda et al. 1996) or in multiple sessions with a nap in between (Ericsson et al., 1993). There is an opportunity for investigation into the organisation and timing of practice around sleep as a potential strategy to optimise the effectiveness and experience of practice.

From the existing literature, several reasons have been identified supporting the importance of sleep in musical learning, practice, and performance. For instance, rest between practice

has been identified as essential to relieve physical and emotional fatigue (Simmons, 2011) and to prevent burnout or injury (Ericsson et al., 1993; Williamon, 2004). Therefore, the restorative functions of sleep to relieve fatigue are particularly valuable for practice. Sleep and energy levels have been positively associated with concentration (Ban & Lee, 2001; Marín, 2018), mood (Ferrara & De Gennaro, 2001; Okun, 2011), motivation (Edens, 2006), self-regulatory capacity (Hagger, 2010; Williamon et al., 2009), and self-efficacy (Edens, 2006; Schlarb et al., 2012). As has been discussed previously in this chapter, these factors have all been linked to the quantity, quality, and experience of practice.

Furthermore, it has consistently been shown that sleep improves cognitive and motor functioning (Ferrara & De Gennaro, 2001; Grandner, 2017; Hagger, 2010; Perry et al., 2013). This may carry special emphasis for music students as making music requires maximum sensorimotor precision (Lehmann et al., 2007; Van Vugt et al., 2013). Research shows that sleep is vital for learning, especially with regard to motor skills. Findings from several studies have shown that sleep contributes a significant enhancement of motor skill memory (Cash, 2009; Duke & Davis, 2006; Walker et al., 2002). This is a function of *memory consolidation*, the set of processes by which new memory traces are developed, stabilised, and enhanced in the mind (Walker & Stickgold, 2006). Although these processes occur during wake, they are activated further and optimised during sleep (Carskadon & Dement, 2011; Diekelmann & Born, 2010; Maquet, 2001; Walker & Stickgold, 2006). Evidence for sleep-based consolidation of complex motor skills has been observed specifically in music learning: Allen (2007), Simmons and Duke (2006), Duke et al. (2009), and Simmons (2011) show enhancements in the precision of complex motor skills in musicians via sleep-based memory consolidation. One interesting study is that of Tucker et al. (2016), who have shown that, although the musical mind is better optimised for motor skill learning over both wake and sleep compared to nonmusicians, sleep promotes a more effective use of this equipment. Similarly, Van Vugt et al. (2013) have found that sleep is essential for musicians to attain the sensorimotor precision required in music making and that early sleepers benefit most from their sleep in their music learning. Therefore, the importance of proper sleep routines cannot be factored out from music students' ability to learn and practice effectively, and to succeed during practical lessons, examinations, and performances. Altogether, these findings highlight sleep as a core

component of music students' wellbeing as well as a necessity for optimising their musical learning, practice, and performance.

## **2.4 Summary**

In this chapter, practice and sleep have been approached from various angles, with existing research covering a range of topics within each field. Yet, little is known about how the two interrelate in music students' daily lives. Although music students may be at risk to poor sleep due to several aspects related to life in the conservatoire environment, sleep is vital in ensuring that they are fit to meet the demands of making music. Despite the literature available in each field, there is still a need for research exploring the associations between performance training and sleep, specifically from the direction of the impact of practice on sleep. The following chapter demonstrates how this study was designed with this research gap in mind.

## **Chapter 3**

### **Methodology**

#### **3.1 Introduction**

This chapter concerns the methodological foundations of the study. The research paradigm, approach, and design are delineated. Following this, the particulars of the execution of the study are detailed, including the methods of sampling, data collection, and analysis that were used. Lastly, considerations ensuring the reliability, validity, and ethics of the research are discussed.

#### **3.2 Research Paradigm**

The foundations of this study stemmed from a philosophical view known as pragmatism. In line with this paradigm, the research problem was prioritised above the method or underlying philosophical assumptions, single and multiple realities were adopted, objective and subjective perspectives were embraced, and inductive and deductive reasoning were employed (Creswell & Plano Clark, 2011; Morgan, 2014; Teddlie & Tashakkori, 2009). The assumptions of pragmatism were thus well suited for merging multiple perspectives into a larger understanding of music students' practice and sleep by connecting the notions of experience and inquiry.

#### **3.3 Research Approach**

Guided by the perspectives outlined above, a mixed methods approach combining quantitative and qualitative modes of inquiry was employed in this study. Mixing methods often provides a more nuanced, comprehensive understanding of a research problem (Creswell & Plano Clark, 2011; Ivankova et al., 2016). Where quantitative strategies offer numeric support and structure to research, qualitative inquiry offers flexibility and sensitivity (Ivankova et al., 2016; Willig, 2008). Similarly, the quantitative component of this study served to provide objective context of music students' practice, sleep, and psychological states, whereas the qualitative component was aimed at understanding practice and sleep through the lens of music students' lived experiences. The rationale behind the multifaceted paradigm and methodological pluralism in this study was thus to facilitate greater validity, completeness, and diversity of views.

### **3.4 Research Design**

This study followed an embedded mixed methods design. In this section, the overarching research design and its component qualitative and quantitative strands are described in greater detail.

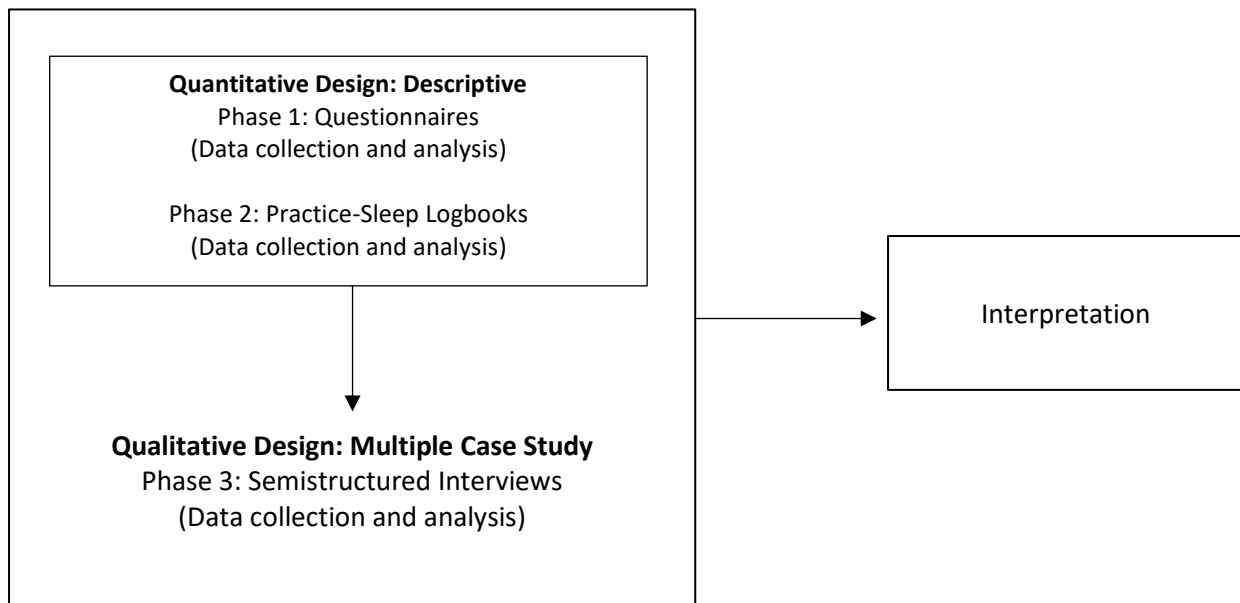
#### **Embedded Mixed Methods Design**

The embedded mixed methods design is characterised by the collection and analysis of both qualitative and quantitative data within a conventional qualitative or quantitative design (Creswell & Plano Clark, 2011). A qualitative strand may thus be added within an overall quantitative design, or a quantitative strand within an overall qualitative design. The supplemental strand may be implemented before, during, or after the primary data collection and analysis procedures traditionally associated with the overall design. The one strand thus plays a secondary role in addressing the research questions, while the other is prioritised.

In this study, a quantitative strand was embedded within an overall qualitative design framework. A three-phase structure was used, with the collection and analysis of two quantitative data sets before the primary qualitative methods of inquiry. The aim of the supplementary strands was to provide objective context to music students' lived experiences of practice and sleep. During the final steps of the study, the various strands were combined to facilitate the mixing of methods and to formulate an overall interpretation of the findings. A summary of the overall research design and procedure is demonstrated in Figure 2 (p. 23).

**Figure 2**

*Research Design*



**Quantitative Strand: Descriptive Design**

Descriptive research involves examining a situation as it exists in its current state (Leedy & Ormrod, 2001). It may be used to identify attributes of a particular phenomenon or to explore correlation between two or more phenomena based on an observational basis (i.e., without the manipulation or control of variables). This study sought to describe the associations between practice and sleep, rather than inferring a causal relationship between the two phenomena. Therefore, a descriptive nature was suited for the quantitative components of this research.

**Qualitative Strand: Multiple Case Study Design**

Case studies are often used in research to investigate prevailing characteristics in specific groups or situations over time through a variety of sources and research instruments. Including multiple cases and sources of information enables researchers to obtain a holistic view of a specific phenomenon, resulting in a richer description (Noor, 2008). Likewise, the multiple case study design supported the descriptive nature of this research by allowing a deeper qualitative understanding of how music students experience the impacts of practice on sleep. The following sections engage in a more detailed discussion of the execution of this research design.



### **3.5 Sampling**

This section presents the strategy of participant selection and a demographic description of the resultant sample.

#### **Sampling Strategy**

The use of criterion-based, purposive sampling techniques are useful for ensuring that all key components relevant to a subject matter are addressed (Ritchie et al., 2003). In this study, the inclusion criteria limited the sample to participants who were: (a) enrolled as performance major students at the University of Pretoria; (b) comfortable expressing themselves in English; and (c) preferably able to access a Fitbit sleep-staging watch for the duration of the study.

After the University of Pretoria provided written permission for the inclusion of its students in this research, an open invitation was issued to all postgraduates enrolled at the Department of Music. Interested students who met the inclusion criteria were provided with letters containing information pertinent to their potential involvement in the study. Thereafter, individual meetings were held in the Music Library during which details regarding the study were discussed, participants' questions were addressed, and informed consent forms were signed (see Appendix A).

#### **Description of the Sample**

The initial sample consisted of eight postgraduate music students majoring in Performing Arts. Shortly into the study, one participant withdrew due to complications pertaining to the COVID-19 pandemic. The demographic composition of the remaining sample was representative with respect to gender, with four students identifying as male and three as female. Of the seven participants, four were enrolled in the Master of Music (MMus) course, and three were enrolled in the Bachelor of Music honours (BMus hon) course. Three singers and four instrumentalists were included in the sample, and three participants played a second instrument. The sample was not inclusive with respect to musical disciplines, with only one jazz student involved in the study. Although both classical and jazz students had been pursued equally in the recruitment phase, the former group demonstrated a greater willingness to participate. All participants were young adults aged 21–24 years. The demographic profiles and associated pseudonyms of the participants can be found in Table 1 (p. 25).

**Table 1***Participant Profile and Demographic*

Pseudonym	Gender	Age	Academic year	First instrument	Second instrument
Cathy	Female	22	BMus hons	Flute	-
Eric	Male	23	BMus hons	Piano	Jazz piano
Greg	Male	21	BMus hons	Jazz voice	Saxophone
John	Male	23	MMus	Voice	-
Kyle	Male	23	MMus	Guitar	Cello
Lily	Female	24	MMus	Voice	-
Lia	Female	23	MMus	Violin	-

**3.6 Data Collection**

The mixed methods design presented multiple data collection opportunities. Data were collected using several research instruments over three distinct phases:

**Phase 1: Questionnaires**

The first phase of data collection entailed completion of a multisection questionnaire recording participants' subjective accounts of practice and sleep, as well as indicators of stress (see Appendix B). The questionnaire consisted of five sections, four of which made use of standardised research instruments:

Section A consisted of items gathering a demographic background of each participant, including their age, gender, year of study, and the instrument(s) they play. Participants were also asked to provide estimates of their average total amount of daily practice (hr/day) and their quality of sleep (%).

Section B used the short Positive and Negative Affect Schedule (PANAS-SF; Watson et al., 1988) to quantify participants' affective states. Participants responded to 20 items by indicating how intensely they had experienced certain positive affectivities (e.g., "excited", "strong", "enthusiastic") and negative affectivities (e.g., "upset", "guilty", "ashamed") throughout the course of one week, using a Likert scale ranging from 1 (very slightly or not at all) to 5 (extremely).

Section C consisted of the revised Multidimensional Inventory of Perfectionism in Sport (MIPS-R; Stoeber & Eismann, 2007) measuring three facets of perfectionism in musicians: striving to perfection (e.g., “I strive to be as perfect as possible”), negative reactions to perfectionism (e.g., “I get absolutely furious if I make mistakes”), and perceived pressure to be perfect (e.g., “My parents set high standards for me”). Participants rated 18 statements on a Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree).

Section D comprised of the revised Performance Anxiety Inventory (PAI-R; Rae & McCambridge, 2004). Participants responded to 11 items about how they feel in the face of performances or practical exams (e.g., “I feel anxious about an exam even when I am well-prepared”) on a Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree).

Section E consisted of the shortened Ruminative Response Scale (RRS-SF; Treynor et al., 2003), which considers rumination on two subscales: reflection (e.g., “I go someplace alone to think about my feelings”) and brooding (e.g., “I think about a recent situation, wishing it had gone better”). Participants indicated how they usually respond to negative events and/or depressed mood by rating 10 statements on a Likert scale ranging from 1 (almost never) to 4 (almost always).

The questionnaires were administered in individual 15-minute sessions in the Music Library. Afterwards, each participant was briefed on the proceedings of the next phase.

### **Phase 2: Practice-Sleep Logs**

The second phase made use of practice-sleep logbooks, in which numeric data of practice and sleep were recorded in tandem over 28 days (see Appendix C). Participants kept daily practice logs in terms of the time of day and total amount of time spent practising (hr/day). They also made entries about their sleep, including the total sleep duration, time spent in various sleep stages (Light, Deep, REM and Wake) and overall sleep score (%) for each night. To assist in keeping sleep logs, participants wore Fitbit sleep monitoring watches, which provided them with objective measurements of their sleeping patterns. Using these instruments also allowed participants to access their sleep history, preventing the loss of data if they had forgotten to complete the logbook at some point.

Students who did not own Fitbits were provided with rented devices and information relating to their use. They wore the watches informally for two weeks to become familiar with the devices before data collection commenced. The participants continued keeping logs of their practice and sleep for 28 days, and were reminded to do so via messages broadcast at the beginning of each week.

During this time, the COVID-19 pandemic reached South Africa and a strict nationwide lockdown was instituted. These unforeseen circumstances hampered the progress of this study. Initially, follow-up face-to-face interviews would have been conducted after the logbooks had been retrieved and analysed. This was no longer a viable course of action. Instead, the Phase 3 interviews were conducted virtually and the logbooks were retrieved only after the South African government had relaxed lockdown regulations.

### **Phase 3: Semistructured Online Interviews**

For the final phase of data collection, semistructured online interviews were conducted in order to obtain an in-depth account of music students' perspectives on practice, sleep, and the demands of studying a performance degree. The conversations were guided by a semistructured interview schedule comprised of open-ended questions formulated in light of the research problem (see Appendix D). According to participants' responses, additional questions were introduced and the predetermined questions were modified, rearranged, or excluded.<sup>1</sup>

The conversations centred around participants' recent experiences of keeping practice and sleep logs as well as their reflections on practice, sleep, and performance training in general. In situations where participants expressed strong identification with the themes of performance anxiety, perfectionism, or rumination, the perceived impact of these factors on their practice and sleep was explored in more depth. The interviews also presented an opportunity to reflect on the effects of the pandemic and the lockdown on students' practice and sleep. Audio recordings of all conversations were taken.

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<sup>1</sup> Appendix D presents the original set of questions.

### 3.7 Data Analysis

Due to the diverse approaches, a comprehensive analysis of music students' practice and sleep was possible. This section describes the quantitative and qualitative analysis strategies applied to the three data sets.

#### Phase 1: Quantitative Analysis

Quantitative data collected from the questionnaires were analysed using simple statistics. Raw data were captured on Microsoft Excel and refined according to the scoring systems of each individual measurement instrument (PANAS-SF, MIPS-R, PAI-R, RRS-SF). Consequently, means (*M*) and standard deviations (*SD*) were calculated. Given the small sample, the statistical analysis was exploratory and the results served merely to inform the qualitative data.

#### Phase 2: Quantitative Analysis

The practice-sleep logs were analysed by means of a deductive quantitative analysis, since the data were analysed in response to specific research questions (Maree, 2016). The raw data were transferred to Microsoft Excel and summarised using simple statistics (i.e., *M*, *SD*). The practice and sleep logs were also represented on line graphs demonstrating individual trends and fluctuations in practice and sleep over time. In a tentative exploration of the relationship between practice and sleep, the two data sets were then juxtaposed and represented on scatter plots.

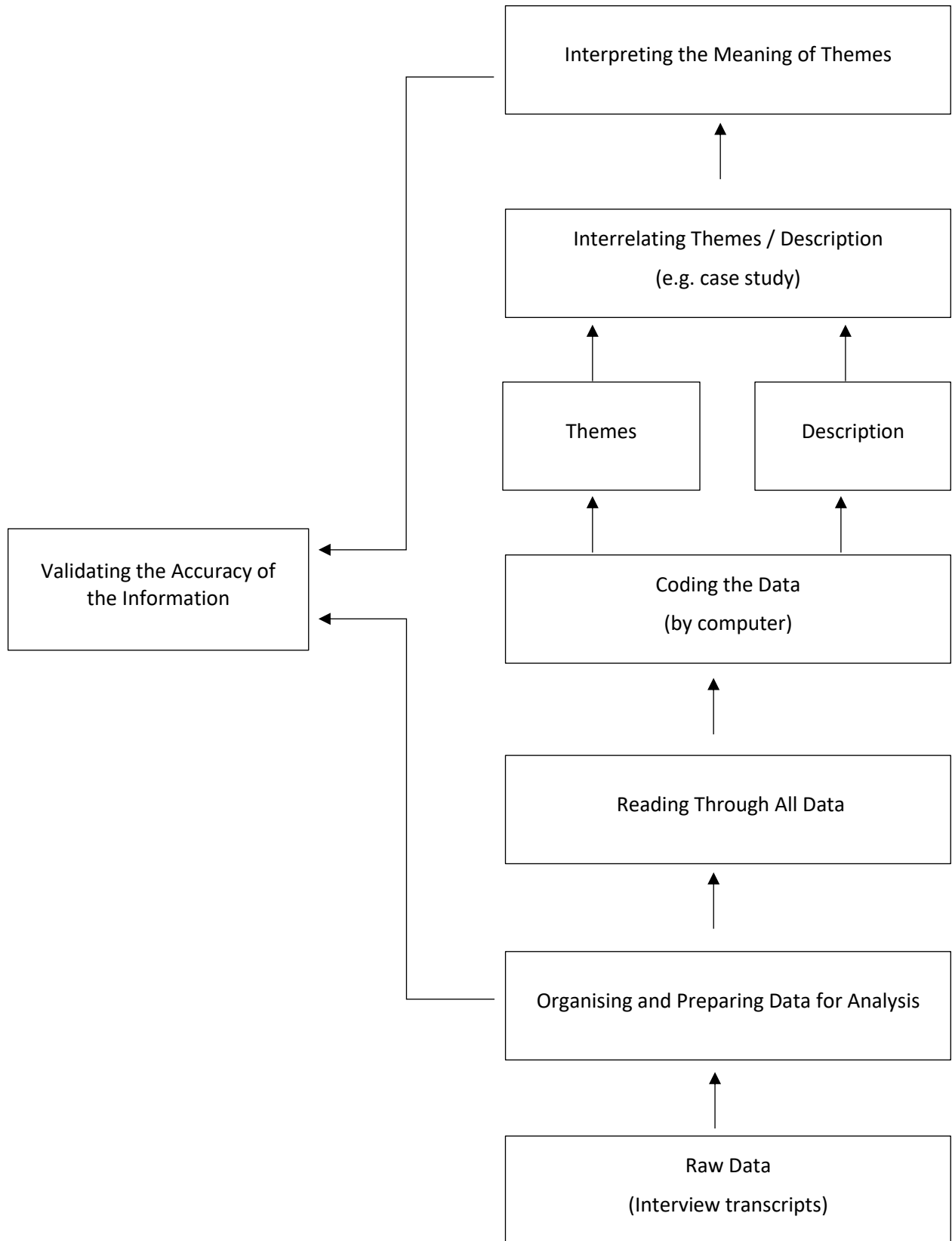
#### Phase 3: Qualitative Analysis

Analysis of the qualitative data in this study necessitated both inductive and deductive reasoning, since the data were examined for emerging patterns or themes, while also being evaluated against the guiding research questions (Maree, 2016). The thematic analysis of the semistructured interviews was guided by an existing model of analysis proposed by Creswell (2014, p. 197), as depicted in Figure 3, p. 29. The audio recordings taken from the seven interviews were transcribed and prepared for analysis. The resultant transcripts were read and reread to synthesise a broad interpretation of the data. The considerable amount of raw data were then reduced via a coding process, and ultimately organised into themes and subthemes capturing the essence of students' experiences of practice and sleep.

**Figure 3**

*Data Analysis in Qualitative Research*

*(Creswell, 2014, p. 197)*



### **3.8 Validity and Reliability**

The cross-verification of multiple sources of information is a useful strategy to facilitate data validation in mixed methods research (Creswell & Plano Clark, 2011; Maree, 2016). This study employed quantitative and qualitative approaches cooperatively to ensure that multiple, diverse perspectives were explored, which could then be synthesised into a richer, truer account of music students' practice and sleep.

#### **Phase 1: Questionnaires**

The sample in this study was too small to conduct any meaningful analysis of internal consistency (Cronbach's  $\alpha$ ). The use and interpretation of the questionnaires thus rested on the reliability of the standardised instruments in previous studies and samples of musicians (PANAS-SF: Thompson, 2007; MIPS-R: Madigan, 2016; Stoeber & Eismann, 2007; PAI-R: Rae & McCambridge, 2004; Botha, 2015; RRS-SF: Erdur-Baker & Bugay, 2010). Furthermore, the quantitative data capturing and analysis were reviewed by two independent consultants for accuracy.

#### **Phase 2: Practice-Sleep Logs**

Historically, self-report surveys and diaries have been popular in sleep studies, owing to their low cost and ease of use. However, these methods are limited, as they rely on potentially biased, inexact estimates (Hirshkowitz et al., 2015). In this study, the inclusion of sleep monitoring watches was valuable in offering a measure of objectivity and consistency to the sleep logs. Only selected sleep-staging models were used, including Fitbit's Versa 1, Versa 2, and Charge 3. Recent meta-analyses show these particular devices to be useful in determining the duration, distribution, and quality of sleep, thus rendering them a helpful tool for addressing the limitations of diary methods (Haghighat et al., 2019).

#### **Phase 3: Semistructured Interviews**

In line with recommendations by Roberts (2010) and Creswell (2014), the validity of the qualitative research was ensured via strict conformity to the guiding methodological processes, the use of established qualitative methods, and the peer-review of analysis and interpretation of the interviews. Participants also received the opportunity to verify the transcripts and findings for accuracy and resonance to their personal experiences. The

inclusion of verbatim quotes further supported the findings and introduced a degree of transparency to the research.

### **3.9 Ethical Considerations**

The research conformed to the ethical standards of the University of Pretoria and was conducted with approval from the Research Ethics Committee. Several ethical concerns were considered in the planning and implementation of the study.

Participants were thoroughly briefed on the purpose, nature, and implications of the research and provided informed consent accordingly (see Appendix A). Involvement in the study was entirely willingly: Students received no financial incentives, were not coerced during the recruitment phase, and were free to withdraw from the study at any time without facing negative consequences. Furthermore, the wellbeing, dignity, and privacy of participants were prioritised throughout the research: Students were not subjected to any harm in completion of this study, and their personal information and contributions to the findings were treated with strict confidentiality and anonymity. Lastly, all the data delivered by this study will remain the property of the University of Pretoria and will be stored in a secure password protected electronic format at the School of The Arts for a minimum of 15 years.

### **3.10 Summary**

This chapter presented the methodological foundations of the study. It showed how a multifaceted pragmatic paradigm was translated into an agile mixed methods research design, culminating in an approach that was well suited to studying music students' practice and sleep. The particulars of how the data were collected and analysed were described according to the three-phase structure of the study. Special attention was paid to the processes which ensured that the data were reliable, viable, and produced with strict adherence to ethical principles.



## Chapter 4

### Results

#### 4.1 Introduction

The study aimed to explore the impact of music practice on sleep based on a sample of seven performance major music students. This chapter includes the results of the mixed method analysis according to the respective quantitative and qualitative outcomes of the three phases.

#### 4.2 Phase 1: Questionnaires

The first phase made use of a multisection questionnaire acquiring a background of the participants' perceived practice, sleep, and psychological states. In this section, quantitative results of the questionnaires are shown based on a descriptive and comparative analysis of the participants' subjective accounts of practice and sleep, as well as their scores on the four standardised instruments (PANAS-SF, MIPS-R, PAI-R, and RRS-SF).

#### Perceptions of Practice, Sleep, and Stress

The results revealed varying individual perceptions of practice, sleep, and stress. Table 2 (p. 33) shows each participant's scores alongside a description of the overall sample.

**Table 2***Descriptive Statistics: Questionnaire Scores*

Measure	<i>i</i>	Scale	Participants							Sample	
			Cathy	Eric	Greg	John	Kyle	Lily	Lia	<i>M</i>	<i>SD</i>
Practice											
Total amount (hr/day) <sup>a</sup>	1	–	3	4*	3	2	3.5	1	1.5	2.6	1.02
Sleep											
Sleep score (%) <sup>b</sup>	1	–	70	80	75	47	50	60	70	64.57	11.64
Affect											
Positive affect	10	1–5	3.6	3.6	3.4	3	3.1	2.2	3.5	3.2	0.46
Negative affect	10	1–5	3.2	2	1.1	3.2	3.9	3.1	3.3	2.83	0.88
Perfectionism											
Striving for perfection	5	1–6	5	3	2.8	5	5	5.4	2.8	4.1	1.1
Negative reactions	5	1–6	4.2	3	1.8	3.8	4.4	5.6	4	3.8	1.1
Perceived pressure	8	1–6	1.6	2	1.6	2.5	3.3	3.9	2.4	2.5	0.8
Performance anxiety											
Performance Anxiety	11	1–6	3.45	2.91	2.82	2.09	4.82	4.36	4.55	3.57	0.95
Rumination											
Reflection	5	1–4	2.8	2	1.8	1.8	3.2	1.8	2.2	2.23	0.52
Brooding	5	1–4	1.8	2.2	2.6	2	2.2	3	2	2.26	0.38

Note. *i* = number of items; *M* = Arithmetic mean; *SD* = Standard deviation.

Except for *Practice* and *Sleep* (which were single items), all measures are mean scores across items.

<sup>a</sup> *Total amount* = Average total amount of time spent practising per day (decimal hours).

<sup>b</sup> *Sleep score* = Average subjective sleep quality as a score ranging from 1–100.

\* Of the three students who played second instruments, Eric was the only one who indicated practising his second instrument regularly.

The students reported an average total amount of 2.6 hours of practice per day and indicated a mean subjective sleep score of 64.57% for their sleep quality in the preceding weeks. On the psychological indicators, the overall mean scores for the group were: 3.2 for positive affect and 2.8 for negative affect (PANAS, 1–5); 4.1 for striving to perfection, 3.8 for negative reactions to imperfection, and 2.5 for perceived pressure to be perfect (MIPS-R, 1–6); 3.57 for performance anxiety (PAI-R, 1–6); and lastly, 2.23 for reflection and 2.26 for brooding rumination (RRS, 1–4).

The results also indicate individual differences in perceptions and attitudes among the students. The following individual observations were derived from a comparison of the minimum and maximum values: Eric (pianist) indicated the highest perceived amount of time spent practising (4 hr), as well as the highest subjective sleep score (80%). Furthermore, he also scored highest on positive affect (3.6), as did Cathy (flute). Lily (voice) indicated practising the least (1 hr). She also scored lowest on positive affect (2.2) and reflection (1.8), but highest on brooding (3), and all dimensions of perfectionism (S = 5.4; NR = 5.6; PP = 3.9). Oppositely, Greg (jazz voice) scored the lowest across all perfectionism categories (S = 2.8; NR = 1.8; PP = 1.6). He also scored the lowest negative affect (1.1) and reflective rumination (1.8). John (voice) scored similar on reflection, and obtained the lowest performance anxiety score (2.09). Interestingly, he also indicated the lowest subjective sleep quality (47%). Kyle (classical guitar) scored the highest on reflective rumination (3.2), negative affect (3.9), and performance anxiety (4.82).

In sum, the questionnaire results revealed varying individual perceptions of practice, sleep, and stress among the participants, and contributed to an understanding of the group at large.

### **4.3 Phase 2: Practice-Sleep Logs**

This section provides objective context of the participants' practice and sleep routines through the results of the quantitative analysis of the 28-day practice and sleep logs. The results include descriptions of the participants' average practice and sleep, individual differences and variation in practice, and associations between practice and sleep.

## Practice and Sleep

Descriptive statistics informed an understanding of the students' typical practice and sleep over the four weeks. Table 3 presents a mean summary of each participant's logbook in comparison to the overall sample.

**Table 3**

*Descriptive Statistics: Practice-Sleep Logs*

Measure	Participants							Sample	
	Cathy	Eric	Greg	John	Kyle	Lily <sup>2</sup>	Lia	<i>M</i>	<i>SD</i>
<b>Practice</b>									
Total amount (hr/day) <sup>a</sup>	1.45	1.56	1.68	0.83	1.83	0	0.88	1.18	0.58
Number of sessions <sup>b</sup>	1.92	2.65	1.3	1.43	1.54	-	1.68	1.75	0.21
Length of sessions <sup>c</sup>	0.9	0.97	1.57	0.78	1.36	-	0.78	0.9	0.45
Timing of sessions <sup>d</sup>									
Day (%)	97.83	95.55	100	96.66	64.86	0	100	92.27	47.1
Night (%)	2.17	4.45	0	3.34	35.14	0	0	7.73	11.82
<b>Sleep</b>									
Sleep duration (hr/night) <sup>e</sup>	7.33	6.13	7.07	6.5	5.93	8,30	7.73	7	0.78
Sleep stages <sup>f</sup>									
Awake (%)	12	12	15	14	15	13	11	13.14	1.46
REM (%)	17	24	15	20	23	17	24	20	3.46
Light (%)	54	47	54	51	51	57	47	51.57	3.46
Deep (%)	17	17	16	15	11*	13	18	15.29	2.31
Sleep score (%) <sup>g</sup>	82	80	74	73	71	79	83	77.43	4.37

*Note.* All scores are mean scores for the 28 days. *M* = Arithmetic mean; *SD* = Standard deviation.

<sup>a</sup> *Total amount* = Average total amount of time spent practising per day (decimal hours).

<sup>b</sup> *Number of sessions* = Average number of practice sessions per day on days practised.

<sup>c</sup> *Length of sessions* = Average length of practice sessions on days practised (decimal hours).

<sup>d</sup> *Timing of sessions* = Average percentage of practice sessions during the day (06:00–18:00) and night (18:00–06:00) in proportion to overall number of practice sessions.

<sup>e</sup> *Sleep duration* = Average amount of time spent sleeping per night (decimal hours).

<sup>f</sup> *Sleep stages* = Average percentage of time spent in each sleep stage in proportion to overall sleep.

<sup>g</sup> *Sleep score* = Average objective sleep quality as a score ranging from 1–100.

<sup>2</sup> Lily was unable to practise during the logbook-keeping period due to illness.

The participants practised for an average of 1 hour and 10 minutes in one to two sessions per day. The average length of practice sessions was 55 minutes. The vast majority of practice sessions were during the day. Altogether, night time sessions accounted for only 7.73% of practice.

The students slept for an average of 7 hours per night, with a collective sleep score average of 77.43%. Regarding the distribution of sleep stages, the most time was spent in light sleep (51.57%), followed by REM (20%) and deep sleep (15.29%), and some time awake (13.14%).

### **Individual Differences and Variation in Practice and Sleep**

The analysis revealed differences in practice and sleep routines among individuals and over time. Accordingly, Figures 4 (p. 37) and 5 (p. 38) show the participants' unique 28-day trends in the total amounts of practice (hr/day) and sleep (hr/night), respectively.

Students who practised the most on average were Kyle (1 hr 50 min) and Greg (1 hr 41 min), whereas Lily practised the least, indicating no practice whatsoever over the four weeks. Eric averagely distributed his practice over the greatest number of sessions per day, while Greg practised in the least and the longest sessions per day. Kyle also practised in relatively longer sessions, while Cathy, John, and Lia favoured shorter practice sessions. Kyle was also the student who practised the most often at the night (35.14%). Overall, it was common for the students to have days without practice from time to time.

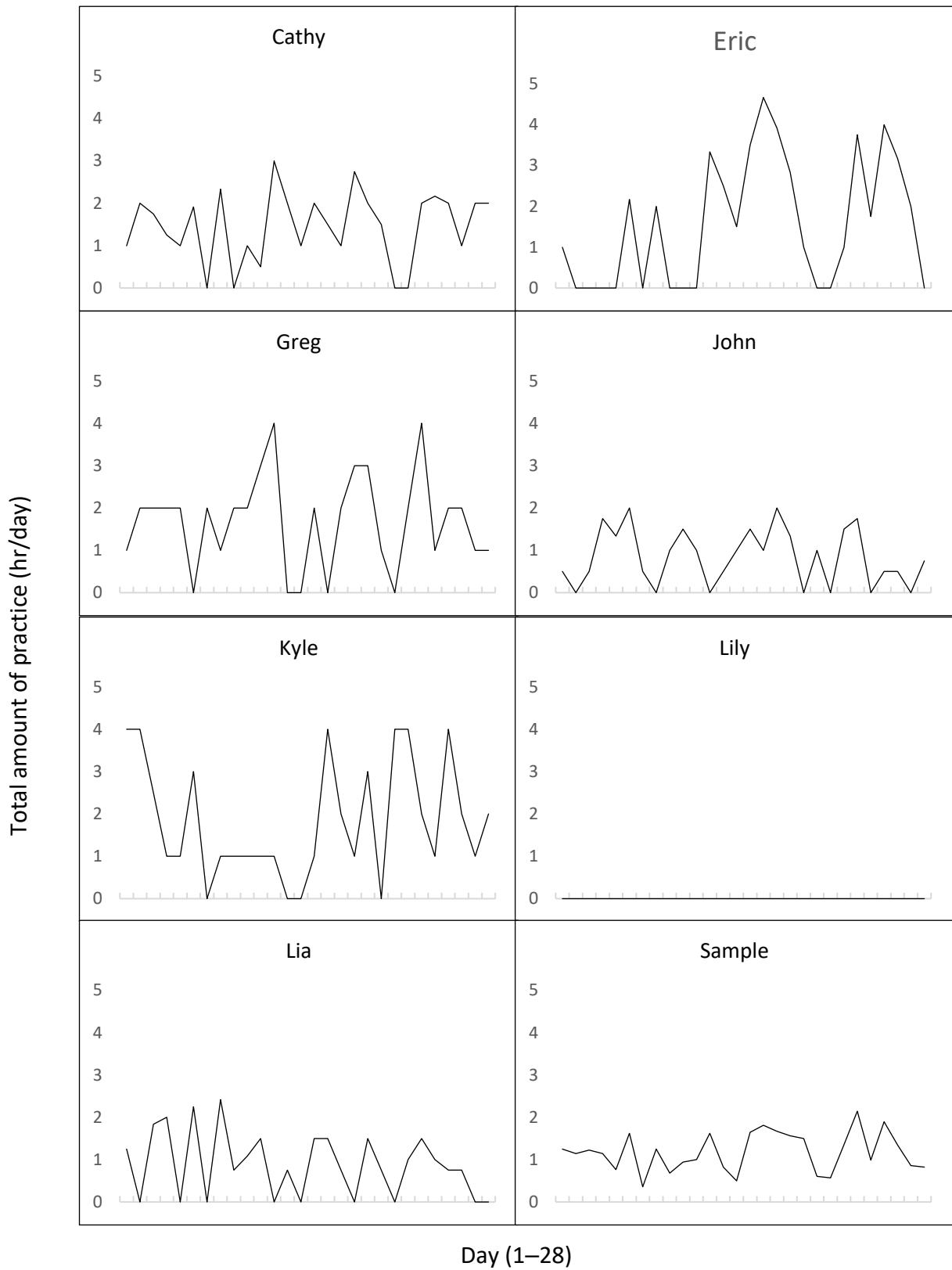
Like practice, the participants' individual sleep routines varied. In general, the female students maintained slightly more consistent sleep durations than the male students. While Lily slept the most on average (8 hr 18 min), Lia obtained the highest sleep score (83%) and displayed the most consistent sleep duration across nights. Oppositely, Kyle, who displayed the most erratic sleep pattern of all the participants, also slept the least (5 hr 56 min) and obtained the lowest sleep score (71%). In addition, his average deep sleep (11%) fell short of the typical range for the age group (12–23%)<sup>3</sup>, even though he had a high portion of REM sleep. On the contrary, Lia and Eric spent the least time awake and had the highest portions of REM and deep sleep.

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<sup>3</sup> Benchmarks provided by Fitbit (2021, April).

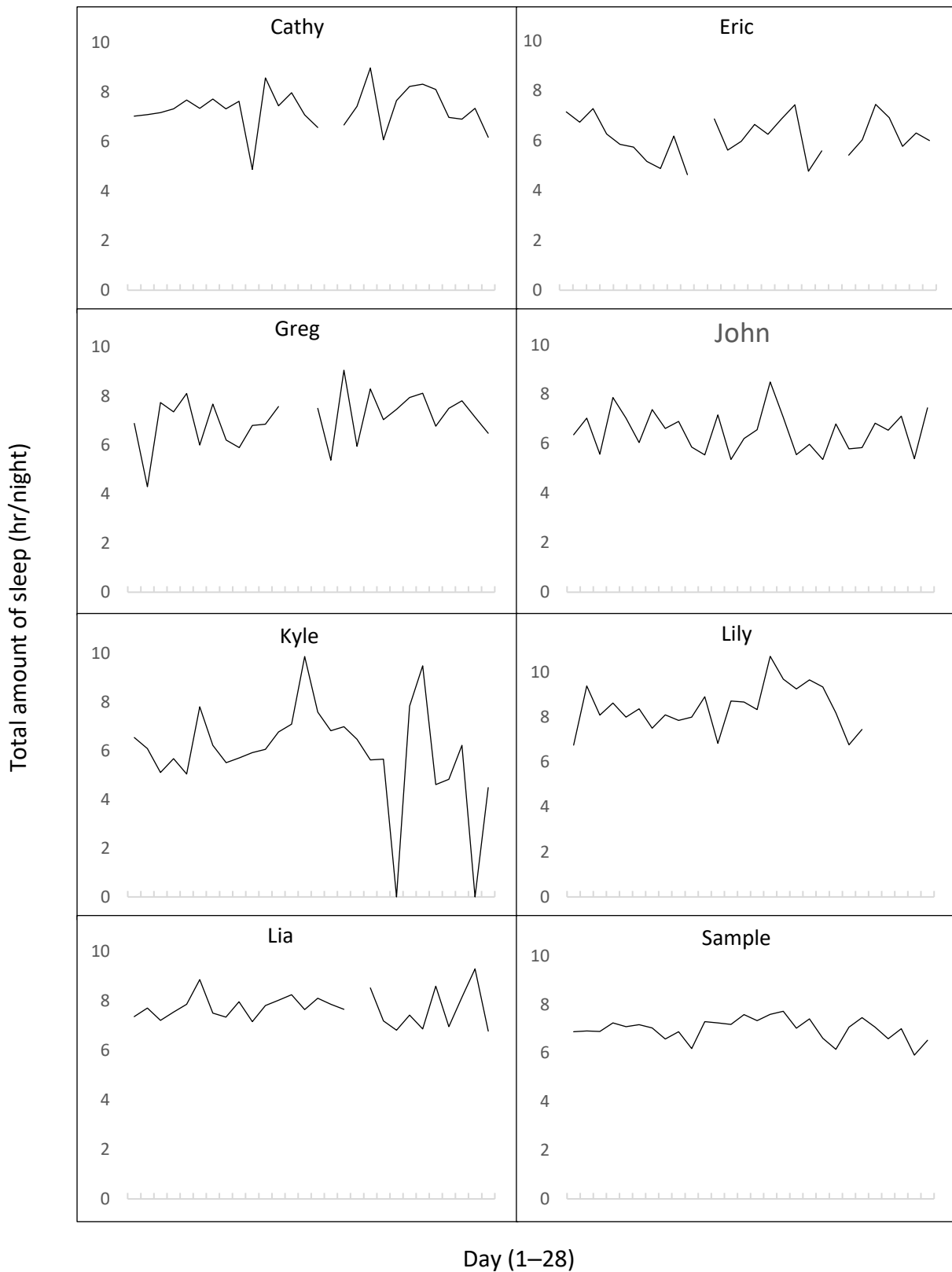
**Figure 4**

*Trends in Total Amount of Practice Over 28 Days*



**Figure 5**

*Trends in Total Amount of Sleep Over 28 Days*



### **Associations Between Practice and Sleep**

Following the investigation of separate fluctuations in practice and sleep over time, the two data sets were juxtaposed as a tentative exploration of the impact of practice on sleep. Accordingly, Figure 6 (p. 40) depicts scatterplots of the total amount of sleep (hr/night) in relation to the total amount of practice (hr/day) over the 28 days for the participants and the overall sample.

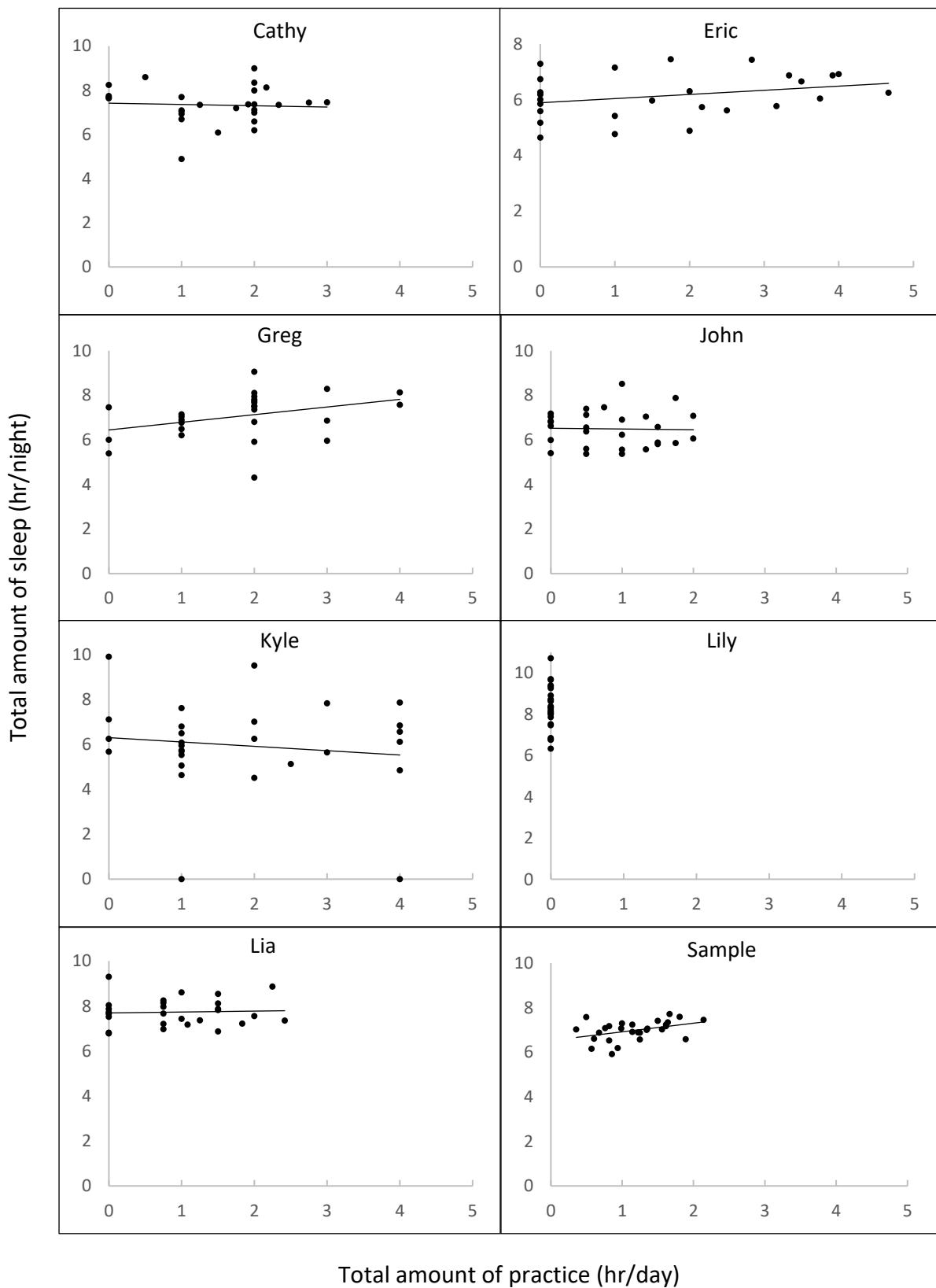
The various scatter plots are markedly different from one another, indicating unique associations between practice and sleep among the participants. However, the general trend is that hours of sleep either stayed the same or increased slightly with increased practice. Some individual cases drew interest, including those of Eric, Greg, and Kyle, who recorded higher daily amounts of practice than the others. The direction of the trendlines for Eric and Greg suggest a positive association between practice and sleep. Kyle's demonstrated the opposite, with an increase in practice suggesting a decrease in sleep.

The data provides a broad indication of sleep and practice and suggests that individual differences and other variables could also be influential on these associations.



**Figure 6**

*Scatter Plots and Linear Trendlines of Associations Between Practice and Sleep*



In sum, the results of the quantitative logbook analyses informed an understanding of music students' average practice and sleep. The analysis also revealed individualised routines and variation in practice and sleep over time. The juxtaposition of practice and sleep did not provide evidence supporting linear associations between practice and sleep amounts. Therefore, the qualitative methods of inquiry might provide further insights into the potential impacts of practice on sleep.

#### 4.4 Phase 3: Semistructured Interviews

This section contains a detailed account of the students' lived experiences of practice and sleep, as obtained from the semistructured interviews. The conversations centred around participants' reflections on keeping practice and sleep logs, as well as their perspectives of practice, sleep, and the demands of studying music in general. The opportunity was also utilised to reflect on the COVID-19 pandemic and its effects on practice and sleep.

##### Main Themes and Subthemes

The thematic qualitative analysis revealed four themes and various subthemes, as outlined in Table 4. In this section, each theme is discussed with its related subthemes and is supported by extracts from the interview transcripts.

**Table 4**

*Interview Themes and Subthemes*

Themes	Subthemes
1. Music Students' Practice	1.1 Quantity and Quality of Practice 1.2 Individual Differences and Variation in Practice 1.3 Perceptions and Experiences of Practice
2. Music Students' Sleep	2.1 Quantity and Quality of Sleep 2.2 Individual Differences and Variation in Sleep
3. Associations Between Practice and Sleep	3.1 Bidirectional Nature of Practice and Sleep 3.2 Impact of Sleep on Practice 3.3 Impact of Practice on Sleep
4. Music Students' Experiences of Lockdown	4.1 Emotions During Lockdown 4.2 Practice During Lockdown 4.3 Sleep During Lockdown 4.4 Practice and Sleep During Lockdown

## Theme 1: Music Students' Practice

The first main theme provides a brief background to the participants' practice drawing on their recent experiences of keeping practice logs and their reflections on their practice routines in general. Three subthemes were identified as: the quantity and quality of practice, individual differences and variation in practice, and perceptions and experiences of practice.

### Subtheme 1.1: Quantity and Quality of Practice

Keeping practice logs allowed the participants to reflect on their usual practice behaviours and facilitated self-discovery.<sup>4</sup> Some students became more aware of their true practice amounts, realising that perceived time spent practising and actual time spent practising do not always align.

I became more aware of how much I actually practise and, um, yeah, it was interesting. (Lia)

That was certainly eye-opening; realising sometimes you do more than you think you do, and then sometimes you do way less than you think you do. Um, so I found the experience, uh, to help a lot with... sort of, uh, governing yourself in terms of, um, you know, not, not falling into that thing of, like, "yeah, well I did– I practised, like, probably, like, 3 hours yesterday. I'm probably fine." And then you, once you actually think about it and go back or if you wrote it down, then you realise, "Oh it wasn't 3 hours, it was more like an hour and 50 minutes." (Eric)

Regardless of the time spent practising, the participants realised that they value quality over quantity practice. Six of the seven participants described usually having an overall deliberate approach to practice.

I try to have a goal in mind rather, you know– something I want to achieve rather than an amount of time ... In general, I like to think I'm a little bit more organised in my practising– in my approach. (Cathy)

I would plan my practice, so like, have specific goals for practice ... (John)

These students also discovered similar strategies in the timing of their practice. The students mentioned favouring morning practice, but also revealed distributing practice time over

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<sup>4</sup> Although Lily did not practise during the time of this study, she reflected on her usual practice approaches and behaviours.

multiple sessions throughout the day. Interestingly, three accounts suggested that the productivity, tone, and focus of practice would vary at different times of the day, in line with the students' preference for morning practice. Altogether, there was little mention of regular evening practice among the participants.

I also noticed that I do have a preference for what time in the day I practise, which is actually quite useful 'cause I've never, never considered that before ... I tend to practise in a lot of small sections ... Normally I practise very early in the morning ... I usually practise early, throughout the morning, and then sometimes in the evening as well. Um, I found that I'm actually, definitely more productive in the morning. (Cathy)

What was really interesting to see was how most of my practice sessions are never a full hour, it's usually, like, broken up between 20-minute sessions or 30-minute sessions or I do an hour session and then do 30 minutes later and all different things ... [Usually] I'd practise in the morning... anytime between 8 [a.m.] and 12 [p.m.]. (John)

I like to practise, like, more seriously in the mornings because I'm more— I feel like I can just zone easier in the mornings. It's like you— your head's not cluttered as much (Eric)

I try to space the practising out, like, morning, evening, night.... you can sort of feel that your practice times are more productive at certain times of the day ... I would always try to have a practice session in the morning, first thing ... but if I didn't get that down, then my preferred practice time would always be, sort of, late afternoon into the evening. (Kyle)

The one jazz student was also distinctive in his practice style, which was generally free and unstructured, without preferences for the organisation or timing of practice.

I am not very structured in my way of practising. (Greg)<sup>5</sup>

In sum, keeping practice logs was a valuable learning experience, specifically in terms of bringing about a more accurate evaluation of practice habits. Overall, participants had a homogenous approach to practice, characterised by a formal nature and a priority for morning practice and distributed sessions.

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<sup>5</sup> Greg's quotes have been translated from Afrikaans.

### **Subtheme 1.2: Individual Differences and Variation in Practice**

Despite their similar practice strategies, there were individual nuances in the students' practice routines. Although most participants commonly prefer practising in the mornings, the exact timing of their normal practice sessions varies. While Cathy and Kyle would usually begin practising "very early in the morning" and "in the morning, first thing", Lia would "start with doing something at, like, 9 a.m." and Lily "not too early, usually around 9 or 10 o'clock", whereas John would practise "anytime between 8 [a.m.] and 12 [p.m.]". Greg was entirely unique in that he reported having no preferences regarding the timing of his practice.

The participants' statements also revealed that practice routines vary over time. For example, when reflecting on his practice logs, John noticed fluctuations in his practice from day to day. Kyle theorised that most musicians probably deviate from their planned practice occasionally.

I was surprised to see how on some, like, in some time or some days, practice could— could be very low and, like, drop significantly to, like, the point of no practice for maybe 2 days, and then, sometimes, I could practise for extended periods of time for longer periods of time. (John)

Naturally, I don't think anybody really keeps to their practice schedule. (Kyle)

The analysis revealed multiple factors contributing to variation in practice routines. For instance, five participants revealed that balancing practice with other priorities, such as academic- and part time work causes some fluctuations in their practice from day to day.

I kind of try and use the time that I have in between things ... Let's say there's half an hour between something and teaching, then I try and use that half an hour. There are days that I don't practise at all because you just kind of go, go, go between teaching and— and so on, and so on, um, and other days I am able to practise, like, 2–3 hours. (Lia)

In this period now, I was working on my proposal a lot, so there were some days when I didn't practise and wrote on my proposal. (John)

Some participants mentioned that their practice routines are subject to access to a private practice environment and the necessary facilities. For example, Eric and Lily, who do not have pianos at home, as well as Cathy, who struggles finding a solitary space, mentioned that their practice is somewhat limited to the times that they can access the practice rooms on campus.

I don't have any means of practice actually at my house [because I don't have a piano or a solitary space], and so, in general, it's very hard for me to get time to practise because I live far from campus, so I don't always get to go to the practice rooms. (Lily)

Normally I practise very early in the morning because there's no one on campus ... The practice rooms are horrible, but there are no— very, very little distraction there [compared to at home] ... We also had drama with our neighbours, because they think we're too noisy, um, so that limited my practice sessions a little bit as well ... My sister also practises at home, so, sometimes that also gets a bit— it's a lot of noise. (Cathy)

Physical limitations were also identified as a factor contributing to variation in practice, especially between the classical vocalists. This was also reflected in how the effects of sickness prevented Lily from practising over the period of keeping practice logs.

You can't continue practising forever, because now you'll tire out the voice. (John)

I would then [usually] work [practise for] an hour to an hour and a half, depending on, um, what I was working on and how tired my voice got ... [Recently, while keeping practice logs] I didn't practise, so, um, not th— that I didn't try, but um, yeah, I was sick ... I actually only really was able to start practising about a week ago and that's where my voice felt ready. (Lily)

The analysis also showed that psychophysiological states, such as mood and energy, contribute to how consistently students maintain their practice routines.

There were some days when I was just lazy and didn't practise at all. (John)

It [practice] really depends on, like, my mood and just where I'm at. (Kyle)

I have to kind of be in the right mood to practise. (Lia)

How I feel influences how I practise, and, like, yeah ... I feel— sometimes, as if I just want to sit at the piano all day and practise and play and go on, and other days it's just like, I can't even try to begin. (Greg)

Lastly, it was evident that students' practice routines would change surrounding performances. More specifically, the students reported an increased drive to practise with preparation for performances. The mechanisms underlying these changes are explored more extensively in Theme 1.3: Perceptions and Experiences of Practice (p. 46).

I think also subconsciously you practise better closer to a performance because you're more motivated. (Lia)

I don't know if it's anxiety or motivation, I guess, uh, maybe the anxiety motivates you or something? I don't- I don't know, but yeah, definitely, closer to a performance or an exam I do practise even more, um, which I feel is probably natural for most people ... (Eric)

This subtheme highlighted individual differences, as well as variation in practice routines over time. The latter was attributed to several factors, including competing activities, access to a practice environment, physiological and psychophysiological limitations, and motivation surrounding performances. The influence of variables on practice routines became especially apparent in this study, due to circumstances of the COVID-19 lockdown. More detail regarding these changes is provided in Theme 4.2: Practice During Lockdown (p. 62).

### **Subtheme 1.3: Perceptions and Experiences of Practice**

As seen in the previous subtheme, pre-existing psychophysiological states, such as mood or energy, may influence students' practising. The findings also revealed insights into participants' perceptions and experiences of practice itself, as discussed in this subtheme.

The participants' responses consistently showed that their experiences of practice are determined by the perceived success of their efforts. The students commonly described the positive effects on their mood following successful practice sessions, as opposed to the deterring effects of practice sessions that do not go well.

It would probably be either a good sense of success when progress comes along ... you could say I'm happy about that or inspired— definitely inspired or motivated, um, but then more commonly, I think which is obvious is frustration ... I get easily upset with practising, like, emotionally upset, like, I want to cry because I'm just cross when things don't go right, and I do have limits at times. (Kyle)

If you have a, like, not a successful practice session or you don't accomplish what you want to, then I think it can deter your mood, um, slightly I'd say ... If I was really trying hard to do something specific and failing at it, then I might feel a bit sad afterwards, and like, a bit down in the dumps. (Eric)

If I feel I had a good practice session, and that I've actually accomplished something, um, it generally gets me energised and I feel better during the day, um, it just gives me a good feeling.

And if I don't get that right and I feel like I struggle or, it's just not working, I leave the practice area very demotivated and feeling down. (Lily)

Sometimes when it [practice] goes badly, I get extremely anxious ... If it didn't go very well, then I'm frustrated and I also get quite withdrawn. (Cathy)

The data also revealed that self-expectations play a large role in how the students perceive and experience their practising. The participants had high expectations for their practice, which could result in self-disappointment and self-criticism at times.

I'm very hard on myself. So, if I think that I haven't achieved what I should have achieved, it's sometimes a problem for me. (Cathy)

I also get disappointed in myself because I feel I didn't— I didn't do the right things. So, if I sang something before a practice session and, at the end, if I don't feel that it's improved, then I'm disappointed, 'cause then I feel like I haven't looked— done the correct things to improve in that session, 'cause, most of my goals that I do set are what I think are realistic. (John)

That [unsuccessful practice] leads to disappointment, um, kind of in yourself, um, which it shouldn't, because it's practice, you know, but we do that, we're constantly self-critiquing. It's like, "Why can't I do this? I should be able to do this," and all that. (Eric)

This was especially evident among the six classical participants, who all related with perfectionism, specifically in terms of their musical identities. Perfectionistic strivings were associated with the students' perceptions and experiences of practice. Failing to meet the standards expected from themselves would result in fixation on mistakes which, in turn, leads to over-practising and rumination after practice is concluded. Lily uniquely explained that imperfect practice would cause her to feel demotivated and give up practising altogether. But, like the others, she would also continue ruminating about her practice afterwards.

It's got a negative effect of always thinking that I'm not good enough and that I can get better ... I'll start to over-practise and start to manipulate my technique to try— to try and change something that's already good the way it is ... So, basically, the negative perfectionism comes in when I start to manipulate my technique, which can lead to injury of the vocal folds. (John)

I always think I can do more ... I think that sometimes it— it gives me sort of tunnel vision, and I forget to see something as a whole and [instead I] focus, like, zone in completely on 4 bars,



which, actually, were fine, I'm just overthinking it. So, ja, and I think that sometimes it— it drives me at 8 o'clock in the evening, back to the practice rooms for, I don't know what reason when I'm exhausted and I'm not going to do anything productive anyway. (Cathy)

There are instances where I definitely over-analyse and stuff like that, yeah. It— it can influence my practising negatively, but also positively. Um, because striving for perfectionism means that you're constantly evaluating yourself, which you have to do, um, but also if you— if you go to it to too a great extent, then it can net— negatively affect your practice because then you tend to fixate on one thing and then never move past it, you know? (Eric)

I want a practice session to be perfect rather than it to just be a training ground and actually to just build on something, I already expect it to be perfect in that moment. And when it's not, I stop and just give up ... In terms of practice, like, if I didn't please myself or I didn't do something that I thought was good, then, it will cause a negative reaction and constant thought, um, thing afterwards. (Lily)

The data also revealed that the participants perceive a matter of pressure to practise. For instance, the consistency at which students maintain their practice from day to day also contributes to the perceived success thereof. The six classical students described that they would feel “guilty” when missing practice sessions or practising less over a period of time, knowing that this limits their progress. Some also mentioned that they would feel anxious, angry, or disappointed with themselves, especially when not having valid reasons to justify not practising.

I do tend to feel very guilty ... I haven't practised today, for example, and I— I'm not too proud of that fact, ja. So, I'm not very good at skipping days. (Cathy)

In the moment, I feel like "ugh, it's okay", but definitely the next day I get disappointed at myself and like "ugh, you wasted so much time" ... “you could have been practising” ... “and you've chosen not to practise” then, so, I become very disappointed and angry at myself if I miss a practice session and I don't have a legitimate reason for it ... When I don't practise and feel this sense of disappointment the next day, then I can get anxious 'cause I feel like I'm not progressing enough, and then I get anxious thinking, "Ugh, will I pass my masters? Will I do great in my masters? Will I improve from what I did last year in my performances?" ... So, it creates anxiety in that way, so like, fear of the unknown and fear of not progressing. (John)

If I don't practise, then I think it affects my mood in the sense that I feel guilty because I didn't practise that day, so that could be one thing, definitely. Um, sometimes I try and work around the guilt and be like, "No, but you have to do other things as well. And it's not the end of the world." Um, but ja, you still feel a matter of— of guilt. (Lia)

When I know I need to practise, then it's just, like, a stressful thing ... If I don't get music done during the day, or— or for a little bit, if there's other stuff in the way, then you feel, like, a little disappointed in yourself in a way. So, there is this sort of negative thing surrounding, "Oh my gosh, I need to practise." (Kyle)

These responses would also intensify leading up to performances. Thereby, it was evident that perceptions of practice were closely related to stress surrounding performance and performance training. The clearest indicator thereof was the students' descriptions of performance anxiety. All the participants reported experiencing performance anxiety, although at varying degrees. Cathy, Kyle, Lily, Eric, and Lia's descriptions of MPA were the most vivid. The group described the stress as building up gradually in the days (or sometimes weeks) leading up to performances. During these periods, the perceived pressure to prepare would affect the students' practice behaviours, as well as their perceptions and experiences of practice.

I get very anxious about performances ... I haven't had a performance in the last 2 years that I haven't been in tears right before ... I would say that it probably starts about a week before, on most occasions, um, in situations where I feel a little bit unprepared, it might start a bit before that, sort of two weeks before, and then it will just grow as the performance approaches ... Upcoming performances tend to make my practising a bit, sort of, frenetic ... I tend to start to practise more, and more, and more, and more, often just going around in circles and not always practising very efficiently, sort of just repeating and drilling things. Um, I've come to the realisation recently that it's a problem ... I'll practice for like 4 or 5 hours a day, even when I'm in pain or very tired. So that's not very— always very healthy. (Cathy)

I believe I experienced it [MPA] at its worst. I just, ja, I have— seriously, I don't— I don't know why I'm studying music performance, but yes, I have very, very bad performance anxiety ... So, if we think of our, my master's performance [months away], like, I'm already nervous just thinking about it ... [During practice] I think that impending end of just, "Okay," you know, "the performance is 4 weeks away now, there's no time to like mess around" ... the result that comes

from that is like binge-practising. So, you'll see, like, a week before [a performance], I'll practise every day for, like, 6 hours. (Kyle)

It [MPA] builds up, so, from a mild anxiousness about it coming closer and having to prepare and being ready, and then it peaks the day or two before the actual performance, and on the day as well ... [Sometimes when I'm practising] my imagination will take me to me actually performing the piece and everything will just kind of go [gasp-like gesture]. (Lily)

If it's right before performance, for instance, and you're practising and then all of a sudden something's not the way it should be, um, then that can definitely make me more anxious. Um, and then it can also lead to, you know, like, over-analysing and that stuff, which makes you even more anxious. So, uh, yeah, I think it depends largely on how the practising itself goes, obviously if it goes really well, then you— you— you are less anxious because you feel more in control. (Eric)

If the practice sessions don't go well [during performance preparation stages], I become anxious because I'm scared of then doing the performance, um, not, you know, not well enough. (Lia)

To summarise, this subtheme showed that music students' experiences of practice are determined by the perceived success of practice, and the perceived pressure to practise. Factors such as perfectionistic traits and performance anxiety were also highlighted for having an influence on how students perceive and experience their practice.

## **Theme 2: Music Students' Sleep**

The second theme provides a brief background to the participants' sleep drawing on their experiences of keeping sleep logs and their reflections on sleep in general. Two subthemes emerged from the data as: quantity and quality of sleep, and individual differences and variation in sleep.

### **Subtheme 2.1: Quantity and Quality of Sleep**

As with the practice logs, keeping sleep logs facilitated self-discovery. When reflecting on the data recorded by the sleep monitoring watches, some students noticed that they slept more than they realised, while others noticed that they slept less.

I feel that I sleep more than I thought I do. (Greg)

I was surprised, I would say, because I didn't think I slept such— so little. Like, I knew I didn't sleep that much, but it was, like, that much less, like, the average. (John)

I actually noticed that I'm a better sleeper than I thought I was. That's good. But then I also, um, yeah, I think maybe with the whole lockdown situation I'm sleeping more than I normally would.

(Cathy)

However, this could also be attributed to changes in sleep due to the COVID-19 pandemic and imposed lockdown. The students' statements revealed that they generally maintain regular bedtimes during the normal academic term. However, during the time of this study, all but one described having later and/or irregular bedtimes.

Whereas I used to go to bed about 10 or 11 at night, now I go to bed, like, 1 in the morning.

(Cathy)

I would [usually] sleep at what, what one could call a "normal time", so maybe around 10 [p.m.] or 9 [p.m.] compared to now, like, 11 [p.m.] or 12 [a.m.] or 1 [a.m.] or 2 [a.m.] or sometimes 3 [a.m.]. (John)

[It] started becoming more apparent that I live more like a 30-hour day instead of, like, a 24-hour day ... The first night I would go to bed at, like, 3 or 4 in the morning, which would be my typical bedtime, and then I'd sleep for maybe 4 hours— that's my normal— that was my normal sleeping pattern then. Um— and then, that afternoon, I would always have, like, a nap for an hour. So, my average sleep was always 4–6 hours a day, not necessarily consistent sleep, though. (Kyle)

Some participants also briefly commented on the quality of their sleep. Lily felt that she usually slept enough in this time. Cathy and Kyle were also satisfied with their sleep, specifically mentioning improvements in their sleep quality compared to before.

I usually actually sleep enough, or too much [now]. (Lily)

During the semester, like, I'll go to bed and get up so early to rush to campus and get everything done, and sometimes I'm generally really, really tired the whole day ... [But now,] I'm better, better rested than I normally am. (Cathy)

I feel like I've been sleeping better, just because I've been sleeping more. (Kyle)

In sum, by keeping sleep logs, participants became more aware of their sleep. It was evident that subjective perceptions of sleep may differ from objectively recorded sleep. It was also

clear that the students' sleep routines differed significantly compared to usual due to influences of the COVID-19 pandemic.

### **Subtheme 2.1: Individual Differences and Variation in Sleep**

Some individual differences in sleep routines and perceived sleep quality were evident. Kyle drew particular interest as he was the only student who acknowledged having a history of erratic sleep even before the lockdown. He slept little compared to the others and, as a result, often took afternoon naps. He admitted that he often does not prioritise sleep, an issue which he attributed to competing activities, academic work, “student life” and a general lack of routine.

I like to live, and I like doing things and sometimes if I don't get everything I wanted to do in the day done, I will stay awake and, even if it means I get those last two hours of computer games in at, you know, 2–4 in the morning, then that— I can just [be] very stubborn and that's what I do. Um, because if it meant I had to work until 2 in the morning, I won't go to sleep because I told myself I was gonna do something else and, ja, so it's always been very all over the place— random naps in the middle of the day if I'm not teaching or if I'm at home or things like that. Ja... I think it's also a combination of a lack of routine with the student life. (Kyle)

The data also revealed individual differences in terms of gender. While the three female students maintained regular bedtimes during this time (albeit later than usual) the four male students experienced erratic bedtimes across nights. For instance, John described that he would go to bed at “11 [p.m.] or 12 [a.m.] or 1 [a.m.] or 2 [a.m.] or sometimes 3 [a.m.]” These comparisons are shown in more detail in Theme 4.3 Sleep During Lockdown (p. 66).

The analysis also revealed variation in sleep over time. This was attributed mainly to the effects of overall daytime routines on sleep at night. During this research period, the participants became especially aware of the influences of routine and daytime activities on sleep at night.

I experienced just how influential everything you do every day is on your sleep pattern ... especially now with current circumstances ... the lack of routine and everything certainly has a huge influence on your sleep pattern. (Eric)

Variation in sleep was also attributed to occasional difficulties falling asleep as a result of emotional states, stress, and active thoughts at bedtime. This was true for the specific

conditions of this period, as well as in general during the normal academic term. Some of the mechanisms underlying these experiences were explored more comprehensively in this study, as are detailed in the remaining themes in this chapter.

My head works the way that when I— when I, like, really get into something, it tends to occupy my mind for a bit, you know, even when I'm, like— even if I just finished doing it now, it's not like I can immediately, like, switch over and be, like, you know, calm and whatever, and get in a state of mind where I can just fall asleep. I tend to, like— still, it's still, like, whirling around in there and then eventually, it sort of filters out. (Eric)

What often happens to me is: I am almost, excited, more than anything else, and then it keeps me from sleeping and my mind just keeps on thinking the whole night and then I can't sleep. (Greg)

You get that point in your sleep where you're sort of lying and your eyes are closed, but you're still having your own vivid thoughts ... this is now an hour into supposed to be sleeping, you know, I'd be like "Okay dude, you need to, like, calm down." (Kyle)

This subtheme referred to differences in sleep routines and sleep quality between students as well as variation in sleep over time. The latter was linked to the effect of daytime routines as well as affective states on sleep. At the time of this study, circumstances of the COVID-19 lockdown also contributed to changes in sleep, as is considered in more detail in Theme 4.3 Sleep During Lockdown (p. 66).

### **Theme 3: Associations Between Practice and Sleep**

This theme concerns participants' perceptions of the associations between practice and sleep, specifically pertaining to three subthemes, as: the bidirectional nature of practice and sleep, the impact of sleep on practice, and the impact of practice on sleep.

#### **Subtheme 3.1: Bidirectional Nature of Practice and Sleep**

The analysis conclusively revealed that the participants experience a two-way relationship between practice and sleep. An awareness of the effects of practice on sleep, and sleep on practice, was evident among six of the seven participants. Greg, the jazz student, believed there to be no relationship between practice and sleep. Oppositely, Kyle and Eric theorised about the directional connections between practice and sleep, emphasising the importance of sleep on all activities, as well as the effect of daytime events on sleep in turn.

I think ja, definitely [practice and sleep are connected], the way one would think that sleep is connected to everything, um, ja, definitely. (Kyle)

I experienced just how influential everything you do every day is on your sleep pattern ... I do think there's a relationship [between practice and sleep], um, but I think it varies, uh, sometimes. (Eric)

Although a relationship between practice and sleep is evident, it varies between individuals and situations. The following two subthemes delve deeper into the students' perceptions of the impact of sleep on practice, and practice on sleep.

### **Subtheme 3.2: Impact of Sleep on Practice**

Sleep was shown to influence several aspects of practice through its effects on perceived energy, mood, and daytime functioning. In a broad sense, sleep affects the quantity, quality, and experience of practice. Whereas satisfactory sleep was associated with increased practice, perceived successful practice, and positive experiences of practice, poor sleep was associated less practice, lower motivation, focus, and productivity.

If I slept better, then I'll be more motivated to practise more, and my practice will generally be, it won't be taxing— taxing to practise. It will be, natural, if I can say that. Natural to practise, won't be much— it won't be too much of a hassle, that's if I slept, better. And if I had bad sleep or slept poorly, then practicing, I would either not practise or have, um, smaller practice sessions or just not be motivated to practise. (John)

If I feel more energised during the day, I generally have more motivation, so, I would practise more, and more effectively as well. Whereas if I'm tired, my focus is lacking, so, I have no— I don't feel like practising, so I don't do a good job of it. (Lily)

One participant also held a belief that optimal times for practice could relate to one's sleep timing.

I live by that [that practice and sleep are related], which is why I try to space the practising out, like morning, evening, night ... you can sort of feel that your practice times are more productive at certain times of the day, um, and I think that is obviously in relation to when you're sleeping (Kyle)

Interestingly, John added that a night's sleep also influences his goal setting and selection of repertoire to focus on during practice sessions.

It also motivates different– or affects the different goals that I set in practising and what the– what I want to practise and, my focus in the practice– if I'm just practising for the sake of practising, or practising to actually fix something ... for example, practising runs and getting runs flowing and smoothly and all the various things necessary for singing technique. So, if I had a bad night of sleep, I will stay away from my pieces, like Händel and C.P.E. Bach with all the runs, and maybe just focus on something like Massenet that has the long lines or, Grové, which has different interpretations, so, I don't want to say I'd practise the easier things, I would practise the things with the less singing-technical challenges. (John)

This subtheme briefly highlighted the importance of sleep in music students' practice. Sleep was shown to impact practice routines in terms of the quantity, quality, and experience of practice.

### **Subtheme 3.3: Impact of Practice on Sleep**

Several pathways were identified through which practice can potentially influence sleep. Firstly, some participants alluded to the idea that practice can be tiring. As a result, they believed that the amount of time spent practising and the length of practice sessions in a day could contribute to their sleep. Although the participants could not pinpoint the exact extent of the implications on sleep, they associated the amount of practice with tiredness and sleep.

I would guess that sometimes, a lot of practice, I tend to fall asleep [more easily] because I'm really tired. (Cathy)

If you practise, like, in one– in 1 day, you practise, like, really a lot, um, compared to your usual routine, then I feel like that would definitely influence your sleep, because obviously I'd be more physically exhausted as well. But I guess through mental exhaustion you become sort of, you know– but also spending a lot of time sitting hunched over at the keyboard also has an influence, um, on it [sleep]. (Eric)

So obviously, when I practise for longer sessions, I'll be more tired, so fall asleep much easier– or not easier– fall asleep much quicker, or sleep for much longer, compared to if I have shorter practice sessions. So, I don't want to say that practising tires me out, it doesn't tire out, but it just adds to the sleep, if that makes sense. (John)



Providing some clarity, Eric proposed that the relationship between practice and sleep is not linear. Instead, he suggested the amount of time spent practising only becomes influential when considered alongside the nature and content of practice.

Sometimes I would practise maybe 5 hours or something in a day and I wouldn't get a lot of sleep um, but then the next day, I mean it would result to maybe the same amount of practice almost, but then I'd sleep really well. But I mean, I guess you could argue that it's because I didn't sleep the previous night, so, you know, um, yeah, but I think it's a— I don't think, I would say, there's like a finite line where you can say, you know, "I practised 6 hours today, so I'm going to get a good night's sleep" or "I practised 6 hours today, I'm not going to sleep that great". Um, like I said earlier, like, it also depends on what you were working on, you know? ... Sometimes if you had been spending a lot of time on one particular thing, I find, um ... it can influence it [sleep] quite a lot ... But then on the other hand, sometimes you might spend a whole day playing a lot and, uh, you know, none of it really sinks to that level where it has— like, keeps you awake or whatever, you know. (Eric)

More conclusively, the timing of practice was shown to influence sleep. Five of the participants associated night time practice with difficulty falling asleep, describing that it generally causes a sleep-interfering state of mental activity. While Cathy and John related to the experience, the reports of Lia, Eric, and Kyle were the most detailed. Notably, Lia mentioned that she deliberately avoids evening practice, as she knows that this usually interferes with her ability to fall asleep.

I specifically don't try and practise late at night, or later in the evening, first of all, because I don't enjoy it, and second of all, I know that my mind is not going to be able to switch off, because if you have, like, rehearsals or something late evening, um, then I've experienced that it takes a while for your mind just to completely set [switch] off before you can actually go to sleep. (Lia)

I often find if I practise late at night, then I struggle more to switch off ... I play a lot in the evening anyway, but if I seriously practise in the evening, um, I do find it harder to— to switch off and like, you know, just be able to go to sleep, definitely. Because now everything that normally happens after you practise, you know, the thinking of what you should do and all that stuff is still going on, so, yeah, I think it definitely makes a difference ... I think the reason why is because, uh, I don't know, this— this might vary for each individual ... but my head works the way that when I— when I, like, really get into something, it tends to occupy my mind for a bit,

you know, even when I'm, like— even if I just finished doing it now, it's not like I can immediately, like, switch over and be, like, you know, calm and whatever, and get in a state of mind where I can just fall asleep. I tend to, like— still, it's still, like, whirling around in there and then eventually, it sort of filters out, you know? (Eric)

I definitely think that if I practise late, then I would struggle to sleep, because practising, or any real form of music-making, even for me listening, it's very stimulating, but not just on, like, a— a mental level or, like, you know, because you're interacting with your brain, but because I really do enjoy and I'm very inspired, you know, and I really appreciate or get into music a lot naturally. Um, it will affect my ability to, like, go to sleep, so, if I plan bedtime is [at] this time and I'm practising right up until that point, you know, then it's— becomes one of those evenings where I will sit up for, like, 1 hour or 2, because— especially if you play certain kinds of music as well, um, a lot of things like Bach and polyphonic music, you know, that— the counter melodies and things like that, they really stimulate the brain a lot and it keeps you awake, and um, you could say, I get a bit of an ear worm and then I'm sitting there, thinking, thinking, thinking the whole time about the music. (Kyle)

Again, these effects overlapped with the nature and content of practice. As seen in the previous statements, Eric described that night time practice mostly affects his sleep when it is formal in nature. Kyle, however, shared that all forms of musical engagement affect his ability to fall asleep, but that the effects would be most evident after practising polyphonic music.

The analysis also revealed that perceptions of practice (as seen in Theme 1.3) influence sleep. The students revealed that perceptions and experiences of practice impact their emotional states at bedtime, which in turn affect their sleep. Firstly, the perceived success of practice impacts sleep when self-expectations are not met. Moreover, six participants identified that expectations rooted in perfectionism would cause them to ruminate about their practice at bedtime, resulting in difficulty falling asleep. Interestingly, Lily added that she would sing through her pieces in her head, likening this activity to a state of mental rehearsal.

I know if I didn't have good practise it does influence my mood 'cause I feel like I didn't get anything done and it makes me feel a bit down in the dumps. So, I think that could also maybe impact just how I feel when I go to bed, which could then also lead to inf— influencing how I sleep ... There are some times where I go to bed, um, where I can't fall asleep for quite some

time because I'm lying in bed, just thinking about what happened during practice, going through things in my head that I felt I didn't do, um, properly or didn't get to in practice. So sometimes I'll just lie and sing through pieces in my head in bed instead of just sleeping and being peaceful about it ... As soon as there's no other distractions for my mind, it usually starts there and it would go on for about, I don't know usually how long, but, it takes a while for me to actually calm down enough to sleep, because it will just replay and replay and I'll think about it from different angles, but— just constantly go over it in my head before I sleep ... It usually causes me to take very long to fall asleep, and then, even though I might not wake up a lot during the night, I will wake up feeling, um, tired and in a bad mood the next morning. (Lily)

From the time that I've practised to the time that I fall asleep, I'll just keep thinking, "Ugh, what happened in that practice— practice session? That wasn't good enough." So, I think it [perfectionism in my practice] will affect the time— the length it will take me to fall asleep. (John)

Sometimes the knowledge that I didn't practise enough keeps me awake, but that can be a bit, a bit, ja, I'm very hard on myself. So, if I think that I haven't achieved what I should have achieved, it's sometimes a problem for me. (Cathy)

Sometimes it [practice] can influence it [sleep] quite a lot, I think, um, like, especially if something's bothering you in your practice routine or if you're working on something, like, specifically difficult for you, um, and it's kind of troubling you in that way. I think it can definitely have an influence on your sleep because you kind of keep cycling, you know, in your thoughts and everything and then it's that— that definitely has an influence. Um, but then on the other hand, sometimes you might spend a whole day playing a lot and, uh, you know, none of it really sinks to that level where it has— like, keeps you awake or whatever, you know. Um, but yeah, I definitely think it [practice] does have some influence on your sleep, especially when it comes to performances and stuff like that. (Eric)

As revealed by Eric's statement, these effects would intensify leading up to performances, indicating that perceived pressure surrounding performance and performance preparation also impacts on sleep. All seven participants identified with upcoming performances having adverse effects on their sleep, albeit with ranging intensity. Although the effects of performance anxiety would have some effects in the days leading up to a performance, it would be most evident on the night before performing. The participants commonly described lying awake and feeling anxious while thinking about their repertoire. In some situations, this

activity likened to a state of mental rehearsal mixed with rumination. Thereby, students would experience delayed sleep onset, and sleep little as a result.

It takes me longer to fall asleep [before performances], 'cause I'll be thinking of that performance and just thinking about the music and thinking of possible things that can go wrong. (John)

I'd say the night before a, like, a big performance or uh, something like that, it definitely has an influence on my sleep. Because at that stage you're kind of analysing a lot, you know, you—you're going— like, your mind tends to— I don't know, mine does this where it leaps ahead, you know, and, like, keeps, like, thinking through the music— it's like, "okay, yeah this section", and "what's happening there", and "what's happening here", um, and that can sometimes become overwhelming to the extent that, you know, it does impact your sleep. I, for instance, like, a night before a performance, like, I couldn't get this one movement out of my head that I had to play, you know, you keep hearing, you just keep hearing this movement the whole time and you keep going like, "yeah-yeah-yeah, that's the harmony, yeah-yeah-yeah, that's the phrasing, yeah-yeah", you know? (Eric)

I won't sleep at all, like, not— not even an hour the day before [a performance]... I think I start to focus, or like, you know, hone in on the situation, um, maybe too early or very early and it's again a part of that confidence and assurance, and so, sleeping, I think my mind just feels like sleeping takes me out of that ... the only thing I constantly think about is sitting on the stage, going through all of my little processes, like how I walk on the stage, almost visualising and re-enacting the entire thing before, you know ... it's like the ultimate preparation in a way, because it's— ja, it's just my way of, like, dealing [with performance anxiety]. (Kyle)

In sum, this subtheme highlighted several factors of practice that are influential on sleep, including the amount, timing, and nature of practice, as well as students' perceptions of practice and performance training. This theme thus explored the bidirectional relationship between practice and sleep. Aspects of the practice routine were shown to be influenced by sleep, but also to have an impact on sleep in turn. Furthermore, it was evident that students' experiences and perceptions of the conditions of practice and sleep are influenced by their psychological states, and vice versa. This was shown to have a direct impact on the perceived associations between practice and sleep.

## Theme 4: Music Students' Experiences of Lockdown

While participants kept logs of their practice and sleep, the COVID-19 pandemic was declared and a national lockdown was imposed. This theme includes an evaluation of the music students' experiences of Level 5 lockdown in terms of four subthemes: emotions during lockdown, practice during lockdown, sleep during lockdown, and practice and sleep during lockdown.

### Subtheme 4.1: Emotions During Lockdown

The students described an array of emotions during lockdown. Cathy aptly compared her daily experiences to an emotional "rollercoaster", saying that some days she felt like the situation was under control, whereas other days seemed "terrible."

There was mention of some positive sides to the lockdown, such as having more free time and being at home with their families.

I've tried to keep, sort of, busy and try to do things that I don't get around to normally. Um, it's been, I suppose it's been good for me. (Cathy)

Positive in the sense that I have the time to do things that I love. (Lia)

At first, I really enjoyed it 'cause it was nice to spend some time at home, but then eventually it became, "Ugh, it's still lockdown." (John)

However, they mostly experienced the time in a negative manner, feeling as though their lives had suddenly come to a halt.

All of a sudden our lives are standing still, so I feel– I've definitely experienced, uh, I've experienced more negative feelings around it than anything else. (Eric)

I'm bit annoyed about the entire lockdown situation 'cause I feel like that's sort of– it's not how I would– this is not how I would normally function. (Cathy)

I hated it. Pretty bad, you know. Like, um, ja, it's had an impact on my mental, like, wellbeing ... it's literally, like, the inverse of my lifestyle, so no, it hasn't been pleasant at all. (Kyle)

Furthermore, uncertainty surrounding the pandemic caused anxiety at times. Participants feared falling ill and were unsure of how the academic year would progress and about how life would be after lockdown.

I think the uncertainty has made me a bit anxious. (Cathy)

In the beginning it was, a lot of anxiety and fear about what's going to happen, and you don't know what's going to happen, and, I mean, then there are days that you feel more at ease, like at the beginning of the lockdown, my girlfriend and I, for example, both had a lot of anxiety and then, I don't know, we thought we had symptoms, which we didn't actually even have, because you start to— your head starts to think crazy things. (Greg)

I feel in general I've experienced, like, some anxiety because we don't know what's going to happen, um, and also because just being unsure in general about everything, you know, surrounding our degrees and, um, “What are we going to do after this?” and you know, “How— how are things going to settle again?” (Eric)

Due to restrictions on social gatherings, the participants' rehearsals and upcoming performances were cancelled. This had deterring effects on their motivation and work ethic, but also had social implications. The students reported feeling lonely at times and longing for the events that normally filled their lives.

To have all of the performances that I had been practising so hard for just sort of, ripped away, kind of, destroyed my motivation a bit ... also, now we might not even play June exam, so, I don't know what to do, and my teacher didn't start doing Skype lessons until, like, last week, so, it was very much me on my own, a bit sad, and lonely. (Cathy)

[I also experienced lockdown] definitely in a negative way in the sense that, like, gigs are cancelled, concerts are cancelled, um, just going out and, you know, doing your normal life things, are cancelled. Um, and for me I think, specifically, I really miss like going to rehearsals and, you know, just feeling like: okay, cool, we're learning something else now, or we're doing more rehearsals, or we're doing a concert, you know, like, dressing up— I miss dressing up for a concert and going to the concert. (Lia)

I'm not inspired by the things we [normally] have in life and the things I enjoy doing ... I don't have performances, or, orchestra, or gigs. I don't even see people. (Kyle)

In sum, although there were some positive sides to the lockdown, the participants mostly described the time in a negative light. Many experienced some newfound stressors and longed for the normal conditions of daily life, especially the musical activities that give them a sense of belonging.

### Subtheme 4.2: Practice During Lockdown

The lockdown affected the students' practice in several ways. Six of the participants generally practised less than usual.

I didn't practise as much as I normally do. (Cathy)

It definitely has decreased over the course of the lockdown, so, in the beginning I did practise more every day, I remember that because we logged that, I did practise more than I did in the later weeks, ja. (Lia)

I sometimes practised a bit less than I should have, because of the Corona virus stuff. (Greg)

There were also changes to the timing of their practice. Kyle described his practice routine as “completely inverted”, as he suddenly started practising at unusual times. While most participants previously held a preference for morning practice, during the lockdown, they practised later in the day.

I changed the time of day I practise a lot to sort of late morning and mid-afternoon, which is strange to me— not times I normally practise. (Cathy)

I started practising at different times ... I've moved most of my practice sessions to the afternoon. (John)

Under normal circumstances, I would have liked to practise first thing in the morning, so, I'd start with doing something at like 9 a.m., and now, I don't, because I've got the entire day. (Lia)

In the absence of other competing activities, Cathy and Lia found it easier to maintain a style of distributed practice. As a result, Lia noticed that her practice routine became more set during lockdown.

It's also helped that I can practise for 20 minutes, and then 20 minutes and 20 minutes, whereas at university you have 3 hours, so you either practise now, or you don't get anything done. (Cathy)

When I do practise under normal circumstances, I kind of try and use the time that I have in between things. But now, I kind of try to, um, divide it into specific, set sessions. Um, so I do like 45 minutes sometime during the day, and later, I do, like, another 45 minutes, and I stick— and I do it on a timer as well ... It was interesting to see, um, in this lockdown period, I— I think I

mainly, like, practised kind of at the same times. It wasn't scattered all over the place ... I've practised, not much, but more consistently. (Lia)

However, for others, the lack of overall routine during the lockdown resulted in difficulty maintaining a practice routine. This was especially true for Greg, who had a less structured approach to practice before the lockdown.

I'm not very structured in my way of practising, if I, like, especially now during this corona time, I was even less structured. (Greg)

In that sense it was really a difficult situation. I think being thrown out of your normal routine actually makes things harder. (Lily)

Now that everything's standing still, there's no routine, there's no, like, goals to work towards really, it's all kind of just up in the air now and, it becomes kind of difficult to ground yourself and to say, "okay, I should achieve this by then" and "I should work on this for that" because none of that's happening anymore. (Eric)

Multiple factors contributed to changes in practice during lockdown. The participants were demotivated by the cancellation of performances and exams. Having no immediate goals to work towards, they felt less pressured to prepare, and adopted a more relaxed approach to practising.

I wasn't the most motivated and I didn't practise as much as I normally do because, also, now we might not even play June exam ... I'm a lot more relaxed about practising ... So, now with only possibly a recital in November, if then, um, I sort of changed my focus a little bit more to technique and more scales, more studies. Um, I also tried a little bit of— I've been trying a little bit new things, like orchestra excerpts and things like that. So, I think my focus has changed a little bit. (Cathy)

I would've actually done a— like, a performance class on the 7th of April. So, when that got moved, I obviously lost the— the will to practise, um, the piece that I was going to play for that ... I've kind of stopped practising my repertoire for the end of the year, but, the good thing is I literally have a lot of time now to learn a lot of the repertoire that I haven't, you know, properly practised or performed previously. (Lia)



So, all of that stuff being gone, it's just like, I don't feel like practising, I don't feel like working.  
(Kyle)

The students also had to adopt a level of self-teaching while being separated from their instructors. Some participants found it difficult to monitor their progress based on self-evaluation only. Kyle, in particular, was demotivated by the absence of regular guidance from his teacher. Even though Cathy longed for social interaction, she found the process reassuring by discovering that she is more independent in her musicianship than she had believed.

You don't have your teacher who you see once a week and that kind of stuff, so it becomes a bit more difficult to um, kind of, set a benchmark for yourself or to realise where you're at 'cause it's just constant self-evaluation the whole time, and sometimes, if you don't take a step back, you can kind of fall into a rut and not realise what— where you actually are. (Eric)

Even though I'm in postgrad, I still see my teacher every week— or I did, and he was part of like, a motivation to practise— or just a direction in what to practise, how to practise it, and, you know, what I would focus on ... but now with this, I haven't seen him, I haven't spoken to him, the Zoom thing does not— cannot work, like, music-wise. So, the only thing I can do is send him recordings and, videos ... There's no interaction and that is affecting my practising because, again, I'm uninspired and I feel a little bit like I need my hand held. (Kyle)

I really was forced to sort of go on my own and be like, "What do I really want to do here?" Um, and when I did have my lesson, turned out, we were on the same page. So it was actually really nice, and it's quite a nice— it was quite nice to know that I am capable of teaching myself to an extent, I mean, so, but I think that's— that's what her teaching method has been all along, to make sure that I can teach myself when I need to. (Cathy)

The lockdown also brought about changes to the practice environment. Two participants did not have the necessary resources at home (e.g. pianos), while others had difficulty finding a solitary practice space free of distractions. Interestingly, some participants also felt self-conscious when practising within earshot of family and neighbours, and found it difficult to practise deliberately as a result.

I found that had a lot more distractions at home. Um, you know, there's Netflix and there's books and there's art and there's my family ... We also had drama with our neighbours... because they think we're too noisy. Um, so that limited my practice sessions a little bit as well.

... I tried to keep my practice sessions on the shorter side because otherwise they start to complain again. (Cathy)

At home I don't have an actual piano to access, so uh, that definitely influenced some things because a lot of technical things you can't do— you just can't practise [on a keyboard]. (Eric)

Things that affected it was, for example, not wanting to disturb anybody else while practising ... for example, when I practise at home, I don't want to practise the runs over and over and over again, I just want to practise and have it sound like, "Oh, that's a good product," since I'm infringing on other people's sound rights ... It was really challenging to practise repetitions and practising to fix something because I didn't want to just keep on singing the same run over and over and over again, just to get it relaxed in my voice. So, I would do it once and say, "Agh no, I'll come back. I'll come back to it later," and never did. So, in this lockdown I found more that I was singing through pieces than actually working section for section. (John)

As a result of these factors, the students noticed changes in the productivity of their practice. As demonstrated across their statements thus far, Cathy and Lia were satisfied with the results of their practice strategies during lockdown. However, the other participants found their practice to be generally less productive, despite having more time available to practise.

I think I've been more— more focused in my practising for short times as well ... It's quite interesting 'cause I've actually noticed a difference in my playing. (Cathy)

This specific way that I've been practising [in distributed sessions] in the lockdown has been working for me pretty well ... I do think it has been productive because, um, I've learned most of the repertoire that I wanted to learn during this time. (Lia)

I definitely see a— a bit of a dip in results and process, ja, but not, like, a deliberate change. It's just a result of what's going on ... Altogether, um, it it— has affected my practising in that it feels a lot more like work, it's a lot more effort to get it going. Um, it only— it takes an hour for me to like, hone in and focus. So, I end up doing the procrastination thing for an hour, and then I can only practise, and then that's more frustrating because it's taking even more time than it should. (Kyle)

John closed the discussion explaining that, although the lockdown does not accurately represent his usual practice habits, his practice has always been subject to influences and would vary from time to time.

The lockdown is not a true representation of my real practice habits ... but even before lockdown, there'd be times when I would practise and not reach those attainable goals that I set for myself. (John)

In sum, there were widespread changes to practice routines during lockdown. The participants generally practised less and later in the day than usual. Although the lockdown was beneficial for Cathy and Lia, who utilised the opportunity to adopt a style of distributed practice, most of students struggled to practise regularly and effectively. This was due to a lack of overall daytime structure, changes in the practice environment, and the cancellation of lessons, performances, and practical exams.

### **Subtheme 4.3: Sleep During Lockdown**

The lockdown had a definite impact on the participants' sleep. The students experienced an overall shift in their sleep-wake cycle, going to bed and getting up later. Only Lily kept the same bedtimes.

I've been going to bed a lot later and waking up a lot later than I normally would ... My sleep schedule has changed a lot. Whereas I used to go to bed about 10 or 11 at night, now I go to bed, like, 1 [a.m.]. (Cathy)

Definitely have been going to bed much later than I'm norm— than I'm used to, and also getting up later than I'm used to. (Lia)

Cathy and Lia did not experience much disparity in their sleep from night to night, only a general shift in bedtimes. However, the four male students' sleep was significantly more erratic during lockdown, which they connected to a lack of overall daytime structure. This was most true for Kyle, who tried to maintain a normal sleep routine at first, but soon reached a stage of near sleep-wake inversion.

The lack of routine and everything, certainly has a huge influence on your sleep pattern ... You can't call it a sleep pattern anymore, it's just sleep. Whenever I happen to sleep, it's when I sleep now. It's really— it's kind of all over the place. Um, I don't know why— what, what causes that, I guess, um, it's just the fact, you know, like, nothing is set anymore. (Eric)

[My sleep has been] uneven. Many nights it's almost like you go to sleep very late and then wake up a bit later, or other nights you go to bed early and wake up a bit earlier, so it's been a bit more difficult for me to get into a routine, actually, during this time. (Greg)

My sleep patterns became all messed up, and, like, non-existent, so, I would [go to] sleep at between 12 [a.m.] and 3 [a.m.] and then wake up at between 12 [p.m.] and 1 [p.m.] the next day ... just because I don't have anywhere to be early in the mornings. (John)

At first, it was pretty bad, like, because I— I tried to maintain that sleep schedule of, the world, you know, wake up in the day, sleep at night. It sort of, didn't work ... and it was just, everywhere. It was, like, all over the place, and I couldn't find, like, a sort of, consistency ... So now it's very weird, again, I am also going to bed at the weirdest times. (Kyle)

Furthermore, some participants mentioned that daytime inactivity during this time contributed to periods of restricted sleep via a lack of perceived tiredness.

This just sitting around the whole time really made sleeping a bit more, um, more of a problem than anything 'cause my body was so inactive that I was constantly tired, constantly feeling, um, out of it, if that's a way to say it. Um, so some nights I actually struggled to sleep or I had restless nights just because I was so, um, the whole day was spent doing nothing or just lying around or whatever, and then that would influence my sleep during the night as well. (Lily)

To add to it, not having these things that tire me out and drain me the way they normally would, having a very, very busy lifestyle to all of a sudden having a lot of time. (Kyle)

Lastly, participants experienced occasionally sleep trouble due to anxiety about the pandemic at bedtime.

There was a time, like, um, Week 3 [of Phase 2] or something, that I have had trouble falling asleep ... I think in that week I had a bit more anxiety surrounding, you know, the whole situation and so on. (Lia)

I think the uncertainty has made me a bit anxious, so I have— I did— especially in the beginning, have some trouble falling asleep, but then, you know, you can sleep 'til 11 o'clock the next morning if you want to. So, I didn't lose much sleep. (Cathy)

While the students experienced some sleep difficulties, these did not result in sleep loss, as the free routine allowed more daytime sleeping, such as sleeping later in the mornings or taking afternoon naps. Three participants reported improved sleep quality which they ascribed to being able to sleep more than usual.

I think maybe with the whole lockdown situation I'm sleeping more than I normally would ... I'm a better, better rested than I normally am. (Cathy)

I'm getting in a lot more sleep, um, just, ja, because now I don't have any obligation to be somewhere at seven in the morning ... I feel like I've been sleeping better, just because I've been sleeping more ... It's been very good, like, I've been a lot more upbeat, and, more rested and I think I have been getting more hours in. (Kyle)

I think it's [my sleep] actually been slightly better than usual. (Lily)

In sum, the students experienced an overall shift in their sleep routines, going to bed, as well as getting up, later during lockdown. A few managed to maintain some consistency in their sleep across nights; however, the majority experienced more erratic sleep. The main determinants of the students' sleep were a lack of daytime structure and activity, as well as anxiety causing difficulty falling asleep at times. Regardless, the students did not suffer from sleep loss, as the lockdown accommodated more daytime sleeping. Some even reported sleeping more than usual and experiencing improved sleep quality as a result.

#### **Subtheme 4.4: Practice and Sleep During Lockdown**

The time spent in isolation allowed the students to reflect on their practice and sleep. They mostly became aware of the influence of sleep patterns on daytime practice, especially pertaining to the timing and productivity of practice. Many realised that they began practising later in the day because they woke up later in the mornings. As a result, effects of sleep on the productivity of practice also became evident. For instance, Eric noticed strain on the effectiveness of his practice because his irregular sleep patterns either caused him to sleep too little sometimes, or to sleep through what he believes to be the optimal time for practice. On the contrary, Cathy noticed that being well rested benefited the productivity of her practice, despite practising later in the day than usual.

My practice sessions have moved over ... I think that my entire, sort of, clock just moved over a couple of hours. Um, it's also made me sometimes more productive because I'm a better—better rested than I normally am. (Cathy)

The erratic sleep schedule has definitely influenced my practice, I think, because obviously there will be a difference in your practising the day if you woke up at, like, 10 in the morning and you went to sleep at, like, 4, or 3 in the, like, the morning— in the same morning. Um, whereas if

you're up early and you've got a good night's sleep from, like, 11 [p.m.] or so, I feel like that definitely influences the amount of productivity ... There will be times [during lockdown] where I wake up late and then I'd struggle to kind of focus the day to really properly practise and, yeah, that has to do with the thing that I'm— I'm better in the mornings. (Eric)

John discovered a bidirectional nature between practice and sleep: Because he was waking up later than usual, he began practising later in the day. In turn, he fell asleep later at night. He described the implications on his sleep as resulting from a state of mental activity interfering with his ability to fall asleep after practising later in the day.

I started practising at different times. So, usually, before lockdown I'd practise in the morning, so, I would always practise between 8 [a.m.] and, anytime between 8 [a.m.] and 12 [p.m.], 'cause I started work from 12 [p.m.] on most days. So I would practise in the morning, and now, because I was probably sleeping in the morning or still waking up and catching up with the day, I would practise in the afternoon, so I've moved most of my practice sessions to the afternoon because, the morning I was sleeping;

I think it does affect my sleep because my practise sessions were now either later on in the day, so at very unusual times, so, sometimes I would practise at maybe 6 [p.m.] or even 4 [p.m.], 'cause those are times when I'm usually not on campus anymore. So, obviously, it affects my sleep in a way that I would sleep later because my mind would be still active and running from practising at this later stage than what I usually do, which— which I think contributes to why I started sleeping later during this period ... So, that's now in the lockdown period. And usually, when it's not lockdown, um, I would practise earlier on in the day, so, usually before 12 o'clock, or maybe between 2 [p.m.] or 3 [p.m.], and then I would sleep at what, what one could call a “normal time”, so maybe around 10 [p.m.] or 9 [p.m.] compared to now, like, 11 [p.m.] or 12 [a.m.] or 1 [a.m.] or 2 [a.m.] or sometimes 3 [a.m.]. (John)

While John became more aware of the impact of practice on his sleep during lockdown, Cathy realised that, in some ways, practice impacted her sleep less than usual. This was due to perceiving less pressure to practise following the cancellation of performances and exams. As academic and practice-related stress lessened, the influence of practice on sleep also became less noticeable.

In my past experiences, I would definitely say “yes” [practice impacts sleep], because, especially if I practise before I go to sleep, I tend to have a hard time to tell my brain to stop and then

actually go to sleep. But then, during these last couple of weeks [of lockdown], I don't think it really made much of a difference probably because my time was very much free for the most part and I didn't have a lot of my usual stress factors ... I'm not under a lot of pressure right now ... So, I'm not practising as much or as tensely as I normally would. (Cathy)

Overall, the interview analysis highlighted the subjective nature of practice and sleep and provided conclusive evidence of a bidirectional relationship between the two, with one impacting the other in several unique ways. Additionally, perceptions of stress surrounding performance training were highlighted as a significant variable in the relationship between practice and sleep. Lastly, the COVID-19 lockdown was shown to have influenced both participants' practice and sleep during this study, and should be taken into consideration when interpreting the overall results.

#### **4.5 Summary**

This chapter presented the results of the individual quantitative and qualitative analyses. The three data sets each provided unique insights into music students' practice and sleep. However, in order to acquire a comprehensive perspective on the associations between practice and sleep, it is essential to compare and synthesise the discrete data sets. Therefore, the following chapter embarks on integrating the results of the three phases and discussing the findings in relation to existing literature.

## Chapter 5

### Discussion

#### 5.1 Introduction

In this chapter, the quantitative and qualitative results are integrated and discussed according to pertinent literature. Music students' practice and sleep are discussed respectively, followed by a review of the associations between practice and sleep. Lastly, music students' experiences of COVID-19 lockdown and its influences on practice and sleep are considered.

#### 5.2 Practice

In this study, participants' self-reported practice times and their scores on the psychological instruments (Phase 1), as well as the practice logs they kept for four weeks (Phase 2), and their lived experiences shared during the interviews (Phase 3) each contributed distinct insights into music students' practice. This section provides context of the seven students' practice in terms of the quantity and quality of practice, individual differences and variation in practice, and, perceptions and experiences of practice.

##### Quantity and Quality of Practice

The practice logs showed that the students practised for an average of 1 hour 10 minutes per day, which is consistent with recent studies indicating that performance majors of higher institutions practise 1–2 hours on the average day of the academic term (Araújo, 2015; Burwell & Shipton, 2011). Comparison of these practice times (Phase 2) to the self-reported practice times on the questionnaires (Phase 1) and participants' reflections during the interviews (Phase 3) revealed that all students slightly overestimated their practice, a phenomenon that has also been observed by Ericsson et al. (1993). These findings suggest that music students' perceptions of time spent practising may be skewed.

Regardless, there is a consensus in music literature that, although the quantity of practice is significant, the quality of practice is central (Araújo, 2015; Bonneville-Roussy & Bouffard, 2014; Ericsson et al., 1993; Hallam et al., 2012; Jørgensen, 2002; Lehmann et al., 2007; Sloboda et al., 1996; Williamon & Valentine, 2000). Likewise, the seven students in this study value quality over quantity practice. They structure, plan, and evaluate their practice in line with the strategies of deliberate practice and self-regulation (Araújo, 2015; Bonneville-Roussy



et al., 2011; Bonneville-Roussy & Bouffard, 2014; Ericsson et al., 1993; Ericsson, 2006; Hallam et al., 2012; McPherson & Renwick, 2011; McPherson & Zimmerman, 2011; Miksza, 2011; Platz et al., 2014; Williamon & Valentine, 2000).

Most of the students also have similar strategies in the organisation of their practice routines, with a preference for morning practice and distributed practice time. Notably, the students specifically avoid practising at night. This was evident from some participants' feedback during the interviews, as well as the practice logs which showed that evening practice accounted for only 7.73% of the group's overall practice time. These findings support previous conclusions showing that planning the time and distribution of practice could be a valuable strategy for maximising both the effectiveness and experience of practice (Araújo 2015; Hallam et al., 2012; McPherson & Zimmerman, 2011), with special emphasis on the benefits of morning practice (Ericsson, 2006; Hallam et al. 2012; Sloboda et al., 1996; Williamon, 2004) and distributed sessions (Ericsson et al., 1993; Rubin-Rabson, 1940; Simmons, 2011).

There were some exceptions from these trends in the current sample. On that account, individual differences and variation in daily practice are explored in the next section.

### **Individual Differences and Variation in Practice**

In accordance with existing literature, the findings of this study demonstrated individual differences in practice among musicians (Ericsson et al., 1993; Hallam, 2001; Hallam et al., 2012; Hallam et al., 2016; Jørgensen, 2002; Jørgensen, 2004; Lehmann et al., 2007; Nielsen, 2004; Sloboda et al., 1996). Despite sharing similar approaches, strategies, and preferences, there were nuances in the students' practice routines in terms of the exact timing and distribution of practice sessions. For instance, one student practised more frequently at night than the others (25.24%,  $M = 7.73\%$ ). Comparison of the seven cases supports earlier observations that practice behaviours may vary with instruments played. Previous findings consistently indicate that keyboard and string players practise the most on average, while vocalists practise the least (Hallam et al., 2012; Hallam et al., 2016; Jørgensen, 2002; Lammers & Kruger, 2006; Williamon, 2004). In this sample, the classical guitarist practised the most. Consistent with the existing research, the two classical singers practised the least. An unanticipated finding was that the jazz vocalist practised second to most. As the only jazz participant in the sample, this student also showed a unique approach in his practice routine,

characterised as generally free and unstructured, without any specific strategies concerning the timing or distribution of practice. Although investigations on differences in practice approaches between genres are limited, some findings confirm that jazz musicians rely less on formal practice strategies (Creech et al., 2008; Gruber et al., 2004; Lehmann et al., 2007). However, the existing evidence base is not conclusive as it also shows exceptions in practice between musicians of similar groups, as well as similarities between skilled musicians of different groups (Hallam et al., 2016; Welch et al., 2008). Likewise, generalisable conclusions concerning group characteristics cannot be drawn from this study, due to the small sample size. The findings, however, broadly indicate individual differences in practice in line with previous research (Hallam et al., 2012; Lehmann et al., 2007; Nielsen, 2004; Welch et al., 2008).

The results also revealed variation in music students' practice over time in corroboration with earlier studies (Burwell & Shipton, 2011; Hallam et al., 2012; Sloboda et al., 1996; Williamon & Valentine, 2000). The students' practice varied slightly from day to day in terms of the amount and distribution of practice. Additionally, all the participants had occasional days without practice, as observed in even some of the most advanced musicians (Ericsson et al., 1993; Hallam et al., 2012; Sloboda et al., 1996). These fluctuations in practice were attributed to several factors, many of which correspond with influences on practice described in the literature, such as: accessibility and properties of the practice environment (Burwell & Shipton, 2011; Hallam et al., 2016; Lehmann et al., 2007), competing activities, such as academic and part time work (Lehmann et al., 2007), and physiological or psychophysiological limitations, such as feeling tired, ill, sore, demotivated, or not in the mood to practise (Lehmann et al., 2007). Additionally, the findings showed that students' practice routines would usually change pending upcoming performances as they experience an increased drive to practise. The influence of these various factors on practice behaviours became especially evident in this study due to changes in the conditions of practice (see: Practice During Lockdown, p. 85).

Altogether, individual differences in practice highlight the uniqueness of each musician, whereas variation in daily practice emphasises the effect of external influences on practice routines, and highlights practice as an activity in the broader context of music students' everyday lives.

## Perceptions and Experiences of Practice

Existing literature reveals that musicians have an ambivalent relationship with practice, sometimes loving and hating it at the same time (Chaffin et al., 2003; Hallam, 1995; Hallam et al., 2016; Lehmann et al., 2007). Likewise, the seven music students in this study described an array of attitudes towards practice, varying from one session to the next. This may partially be due to the varying conditions of practice from day to day. Moreover, it may also reflect an interplay between the level of effort and enjoyment of practice. Reiterating previous results, the findings of this study showed that the effort of practice sometimes outweighs the level of satisfaction, and that practice can be physically and emotionally taxing at times (Lehmann et al., 2007; McPherson & Renwick, 2011). These findings could also offer a plausible explanation for the mismatch between students' perceived and true practice times.

In line with Mazur and Laguna's (2019) model, practice was related with different types of affect in this study, including: context-free affect (CF-A), practice-related affect (PC-A) and performance-related affect (PF-A). Firstly, psychophysiological states (CF-A) were shown to affect students' motivation, as well as their engagement with and overall experience of practice. Although the group showed a higher propensity to positive affect (PA,  $M = 3.2$ ) than negative affect (NA,  $M = 2.83$ ), their moods were still an influence on their practice experiences. Regarding practice-related affect (PC-A), what stood out most was the direct association between students' practice experiences and the perceived success of their efforts. Whereas successful practice was associated with positive responses (e.g. "uplifted", "motivated", "energised", "happy"), failing to obtain a desired quantity or quality of practice had deterring effects (e.g. "annoyed", "frustrated", "upset", "demotivated", "anxious", "guilty", "angry"). Notably, self-expectations were shown to play a large role in how students perceive and experience their practising. Students' high expectations for their practice could result in self-disappointment and self-criticism at times. This was especially evident among the classical participants, who all related with perfectionism in their musical identities. Collectively, the interviews and the MIPS scores showed that the students impose high standards for themselves (S:  $M = 4.1$ ), and somewhat tend to react negatively to imperfect practice (NR:  $M = 3.8$ ), specifically in the form of fixation on mistakes, and, resultantly, over practising and/or rumination after practice is concluded. This is interesting, given the RRS scores for the sample showed no strong tendencies towards reflective (R,  $M = 2.23$ ) or

brooding ( $B, M = 2.26$ ) rumination in general. Perhaps these findings allude to music students' investment in music, and its priority in their lives (Marín, 2018; Sternbach, 2008). These experiences seemed to be more rooted in self-imposed standards than perceived pressure to be perfect ( $PP, M = 2.5$ ). Furthermore, these expectations and reactions towards practice would intensify leading up to performances. Thereby, these findings also corroborate the role of performance dimensions (PF-A) in practice, with the clearest indicator being students' experiences of performance anxiety. Although the group's PAI scores were only moderately high ( $M = 3.57$ ), the interviews showed conclusively that performance stress creates a perceived pressure to prepare which affects students' practice drive as well as their perceptions and experiences of practice in performance preparation stages.

Overall, these findings are in accordance with existing literature, showing that musicians' multidimensional experiences of practice (CF-A, PC-A, PF-A) are an important influence on the quantity and quality of practice undertaken (Burwell & Shipton, 2013; Chaffin et al. 2003; Hallam, 2001; Hallam et al., 2012; Lehmann et al., 2007; Mazur & Laguna, 2019; McPherson & Renwick, 2011; Renwick & McPherson, 2002; StGeorge et al., 2013). Therefore, learning how to optimise the practice experience — whether it be through emotional regulation (Bonneville-Roussy & Bouffard, 2014; McPherson & Renwick, 2011) or strategic periods of rest (Ericsson et al., 1993; Ericsson & Lehmann, 1999; Lehmann et al., 2007) — may be vital in directing and maintaining the effectiveness of practice too. This is relevant, since the students' experiences of practice were also found to transfer to other activities and situations after practice is concluded. Therefore, optimising the experience of practice might also be valuable to music students' overall enjoyment and quality of life.

### **5.3 Sleep**

Similarly, insights into music students' sleep were acquired from different angles in this study, including participants' subjective accounts of their sleep indicated on the questionnaires (Phase 1), their sleep logs recorded objectively with the use of sleep monitoring watches (Phase 2), and their personal reflections on sleep shared during the interviews (Phase 3). Accordingly, these perspectives are integrated in this section, formulating a discussion of the quantity and quality of sleep, as well as individual differences and variation in sleep.

## Quantity and Quality of Sleep

Based on their sleep logs the students slept for an average of 7 hours per night, which likens to the typical sleep durations for this age group of Fitbit users (Kosecki, 2017). These figures are also within the ranges recommended for young adults (7–9 hr), albeit at the lower end (U.S. National Sleep Foundation, as cited in Hirshkowitz et al., 2015). The group's sleep stage distribution was also normal according to the benchmarks provided by Fitbit (2021), with 51.57% spent in light sleep (40–60%), 20% in REM (15–25%), 15.29% in deep sleep (12–23%), and 13.14% awake (5–20%). These findings are also consistent with the baselines of normal young adult sleep according to seminal sleep scientists, Carskadon and Dement (2011) and Rama et al. (2005).

Regarding overall sleep quality, the group showed a *fair* sleep quality (60–79%) in their questionnaire scores ( $M = 64.57\%$ ) as well as their sleep logs ( $M = 77.43\%$ ) compared to Fitbit's (2021) classifications of sleep scores. The disparity between the two sets of sleep scores can be justified by two explanations: Firstly, with one based on participants' subjective accounts, and the other based on recordings by sleep monitoring watches, the findings corroborate previous research showing that subjective sleep differs from physiological sleep (Hirshkowitz et al., 2015). Regardless, perception is still considered an essential component of overall sleep quality (Buysse et al., 1989; Krystal & Edinger, 2008). Secondly, this could reflect changes in the students' sleep patterns and the conditions of sleep, as the first set of sleep scores were recorded during the normal academic term, whereas the sleep logs were completed during the COVID-19 lockdown (see: 5.5 Sleep During Lockdown, p. 86). The interview results elaborated on these figures, highlighting an interesting paradox: Despite usually maintaining more conventional bedtimes, the students still experience periods of poor sleep during the normal academic term, in line with other observations of music students' sleep in context of the conservatoire environment (Araújo et al., 2017; Marín, 2018). Oppositely, while their bedtimes were later and/or more erratic during this time, they seemed to experience improved sleep quality. The following section considers in more detail the changes in sleep between conditions and individuals.

## Individual Differences and Variation in Sleep

As with practice, the students displayed unique, individualised sleep routines, consistent with previous findings indicating that there may be significant differences in the quantity, quality, timing, and staging of sleep between persons (Carskadon & Dement, 2011; Ferrara & De Gennaro, 2001).

Studies over the past decades have suggested differences in sleep between genders. The general pattern of results is that women maintain stricter bedtimes and thereby sleep longer than men but, paradoxically, also report poorer quality of sleep (Ferrara & De Gennaro, 2001; Grandner, 2017). In this study, the female music students also maintained more regular bedtimes, but, contrary to the literature, experienced slightly better sleep quality than their male peers. The sleep logs and interview conversations collectively showed that the male students' bedtimes varied considerably across nights. Among them, one drew particular interest as he was the only student who admitted to a history of not prioritising sleep. Of all the students, he slept the least on average (5 hr 56 min), reported the most frequent daytime naps, and obtained the lowest overall sleep quality score (71%). Furthermore, his portion of deep sleep (11%) fell short of the norms (12-23%) provided by Fitbit (2021), even though his REM portion was high. This unusual distribution of sleep stages may be indicative of habitual late bedtimes: Because the circadian distribution of REM stages peak in early morning hours, REM tends to predominate over deep, slow wave sleep if sleep is regularly delayed until morning hours (Carskadon & Dement, 2011). This student, who showed the poorest sleep quality, was the classical guitarist. Oppositely, the student with the most ideal sleep was the violinist. These findings directly contrast observations of Vaag et al. (2016) showing that bowed string instruments and keyboard players experience the poorest sleep of musicians. Furthermore, despite their findings suggesting that classical musicians are more prone to sleep difficulty than musicians of other genres, no conclusive differences were seen concerning the one jazz student in this study. While the small sample size prevented drawing generalisations about groups such as gender, genre, or instrument, it served the purpose of indicating broad individual differences in sleep. At this stage, the mechanisms underlying sleep among different types of musicians, even among musicians in general, also remain unknown in the literature.

In agreement with the existing knowledge base (Carskadon & Dement, 2011; Grandner, 2017), this study also showed variation in sleep over time. Fluctuations in students' sleep were broadly attributed to the effects of overall daytime routines and activities on sleep at night, as became especially evident during the abnormal circumstances of this period (see 5.5 Sleep During Lockdown, p. 86). These findings are also in line with observations in the general population (Carskadon & Dement, 2011; Grandner, 2017) and musicians specifically (Marín, 2018; Saksvik-Lehouillier et al. 2017; Vaag et al. 2016), indicating that varying routines may impact on the sleep-wake cycle. Another consistent cause for variation in the students' sleep was occasional sleep difficulties resulting from stress and active thoughts at bedtime. In another sample of music students, this was identified as the main cause of music students' sleepless nights and poor sleep quality nights and was closely related with the demands of studying music (Marín, 2018). Likewise, this group identified with these concerns under normal circumstances, but due to the changed conditions of the lockdown, they experienced these to a lesser extent than usual. Instead, they were more concerned with the COVID-19 pandemic.

As mentioned earlier, what was interesting about these findings was that the students seemed to experience improved sleep quality during this time, suggesting that stressors associated with the performing arts milieu are more influential on music students' sleep than their mere routines. Nonetheless, a variety of mechanisms underlying periods of restricted sleep in music students have been identified in the existing literature base, including attitudes towards health in general, the musical temperament, and the nature and demand of making music (Araújo et al., 2017; Lehmann et al., 2007; Marín, 2018; Sternbach, 2008). Likewise, the unique sleep pattern observed in each music student in this study, as well as the variations in their sleep from one night to another highlight sleep as a reflection of internal as well as external aspects. At this stage, there remains a paucity in research concerning sleep and the aspects of music students' daily lives.

## **5.4 Associations Between Practice and Sleep**

With the background provided thus far, this section evaluates the associations between practice and sleep. The bidirectional nature of practice and sleep is discussed broadly, and then deconstructed into the impact of sleep on practice, and practice on sleep in turn.

### **Bidirectional Nature of Practice and Sleep**

While the importance of sleep for practice and musical learning have been characterised in recent years (Marín, 2018; Simmons, 2011; Tucker et al., 2016; Van Vugt et al., 2013), the impact of practice behaviours on sleep is yet to be investigated. This study, however, provided compelling evidence of a bidirectional nature between practice and sleep.

An awareness of the interactions between practice and sleep was evident among all the classical students, but not the jazz student. One probable explanation is that this may be a result of the jazz student's unique relaxed approach to practice. This might also be due to underlying differences in temperament affecting perceptions and experiences of practice, as this student exhibited the least negativity, perfectionism, and rumination related to practice. Although a small handful of existing studies have confirmed similar observations in practice behaviours and psychological characteristics between genres (Creech et al., 2008; Papageorgi et al., 2011; Welch et al., 2008), these differences are yet to be fully investigated, especially in relation to beliefs about sleep.

Earlier in this chapter, both practice and sleep were discussed as being sensitive to individual and situational change. Therefore, it is expected that the relationship between practice and sleep would be complex and variable. The following sections engage with a more detailed discussion of the influence of sleep on practice, and practice on sleep.

### **Impact of Sleep on Practice**

The findings of this study showed that sleep influences practice in several ways by way of its effects on perceived energy, mood, and daytime functioning. Whereas good sleep was broadly associated with increased practice, positive perceptions and enjoyable experiences of practice, poor sleep was associated decreased motivation and focus, resulting in less effective and enjoyable practice. These findings are supported by a strong existing evidence base highlighting the importance of sleep in ensuring music students are in top physical and



mental condition to meet the demands of performance training (Araújo et al., 2017; Marín, 2018).

Firstly, the restorative and cognitive functions of sleep have been found to be essential for relieving physical and emotional fatigue between practising (Ericsson et al., 1993; Simmons, 2011; Williamon, 2004). This study offered some insights into potential connections between optimal periods for practice and sleep timing. This seems only natural as the essence of the optimal periods holds that practising when one feels most alert and awake optimises practice, whereas fatigue likely leads to frustrating and ineffective practice (Lehmann et al. 2007; Simmons, 2011; Williamon, 2004). As discussed earlier, the classical students reported experiencing optimal focus and productivity during morning practice. One student drew a direct link between the timing of sleep and the timing of practice in maximising the efforts of formal practice.

Furthermore, previous research has also characterised sleep as essential for optimal concentration, mood, motivation, self-regulatory capacity, and self-efficacy (Ban & Lee, 2001; Edens, 2006; Ferrara & De Gennaro, 2001; Hagger, 2010; Marín, 2018; Okun, 2011; Schlarb et al., 2012; Williamon et al., 2009) — factors that have all been linked to the quantity, quality, and experience of practice. This study extended on the existing body of knowledge by suggesting that, through its implications on these dimensions, sleep could also influence the specific goals set and repertoire selected for practice sessions. These findings reiterate the role of context-free affect in practice, with sleep as an underlying determinant.

Lastly, although it has not been directly addressed in the current findings, numerous scientific studies confirm that sleep improves musicians' capacity to learn and consolidate motor skills and to attain the sensorimotor precision required in music making (Allen, 2007; Duke et al., 2009; Lehmann et al., 2007; Simmons, 2011; Simmons & Duke, 2006; Tucker et al., 2016; Van Vugt et al., 2013). Overall, this study corroborates existing literature showing that the importance of sleep routines cannot be factored out from the success of musical learning, practice, and performance training (Van Vugt et al., 2013). There is still, however, ample opportunity for research from the macro perspective of practice into how sleep can be utilised as an essential strategy of managing the mind and body to optimise the quantity, quality, and experience of practice.

### **Impact of Practice on Sleep**

This study revealed a combination of factors of practice that collectively influence music students' sleep. Consistent with the literature (Ericsson et al., 1993; Lehmann et al., 2007) this study alluded to the notion that practice can be physically and emotionally taxing for a musician. Resultantly, the amount of time spent practising was suggested to contribute to sleep, by way of its effects on music students' experienced tiredness. However, the precise nature of these connections was unclear. Although there were some indications that increased practice may promote faster sleep onset and longer sleep durations, it is unclear to what extent this has to do with the sheer amount of practice. Quantitative analysis of the practice-sleep logs revealed no strong evidence supporting a linear relationship between practice and sleep, implying that variables other than the quantity of practice could be at work. The study also demonstrated that perceptions of practice times are often much higher than actual practice times. This could suggest that the amount of time spent practising has an effect on sleep, albeit, more in terms of subjective perceptions of the amount and effort of practice.

More conclusively, the findings showed influences of the timing of practice on sleep. Night time practice was consistently associated with difficulty falling asleep, due to causing a sleep-interfering state of mental activity among music students. Notably, the findings indicated a level of self-awareness of these effects among the students, with some mentioning that they deliberately avoid evening practice as it usually interferes with their sleep. This was also reflected in the practice logs, showing that the group rarely practised at night. This is somewhat contradictory to the theories of Araújo et al. (2017) and Marín (2018), suggesting that music students' sought after 24-hour access to practice rooms may potentially influence their sleep. Nevertheless, existing research broadly supports the connections between the timing of practice and sleep, indicating that music students' overall high levels of night time activity (which may include practising among other activities, such as rehearsals, performances, studying, etc.) might produce a rhythm issue and disrupt the natural sleep-wake cycle (Marín 2018; Saksvik-Lehouillier et al., 2017; Vaag et al., 2016). However, what was striking about the current findings was that some students occasionally seemed to experience similar effects on their sleep even when practising late in the afternoon,

suggesting that these impacts may also have something to do with the specific nature of practice.

From the findings, it was clear that implications on sleep are most noticeable following formal practice. Although, the effects were not necessarily limited to a product of formal practice only, as various other forms of musical engagement were also shown to have the potential to impact on sleep. Interestingly, one student shared that the associations between practice and sleep are most evident after practising polyphonic music, owing to his appreciation for the contrapuntal writing, and its stimulation on his brain. Perhaps these findings could thus be explained by the influences of focused, emotionally-engaged practice on arousal and affect. Existing literature shows that musical activities engage diverse regions of the brain (Juslin, 2013) and may be accompanied by feature-specific physiological and emotional responses (Hallam, 2013; Juslin & Sloboda, 2001). The relationship is complex, although, generally moves in the anticipated direction, with lively music leading to increased arousal, and calming music to the opposite (Hallam, 2013). However, much more research is required to fully grasp the nature and extent of practice-related affect and arousal in order to fully assess its impacts on sleep.

Perceptions of practice emerged as the strongest influence on sleep via its effects on music students' state of mind at bedtime. The findings revealed conclusively that the perceived success of practice influences sleep adversely when self-expectations are not met. This was particularly troubling as the six classical students exhibited perfectionistic traits and recognised that their high self-imposed standards would drive them to fixate on flaws in their practising at bedtime, resulting in delayed sleep. This is in line with Marín's (2018) findings showing that high self-expectations alongside self-doubts of musical ability can give rise to sleep-interfering rumination in music students. These findings also give some nuance to the broad links between perfectionism and sleep problems previously observed in musicians (Araújo et al. 2017; Stoeber & Eismann, 2007; Williamon et al., 2009). Furthermore, the findings revealed that these experiences typically intensify leading up to performances, implying that through perceptions of pressure and stress surrounding performance and performance preparation, practice also impacts sleep. The students commonly described feeling anxious and thinking about the repertoire and the performance on the nights (or weeks) before performing. Resultantly, they would have difficulty falling asleep and sleep

little. Interestingly, this activity likened to a process of rumination, but also to mental practice. This corresponds with an interesting comparison by Jones et al. (2014) between the repetitive, cognition-focused nature of reflective rumination and the self-evaluating nature of music practice. The students used analogies such as having a persistent “ear worm”, or continually going through the music in their head in terms of specific sections, phrasings, harmonies, or movements that need to be executed. Although these responses do not appear inherently negative, they are not always deliberate and can become “overwhelming” to the extent of hindering sleep. This finding corroborates with previous reports that “musical representations can also haunt us when our brains produce them involuntarily” (Lehmann et al. 2007, p. 215), similar to how ruminative thoughts may persist when no demand exists (Verhaeghen et al., 2005). Interestingly, research shows that areas in the brain involved when “audiating” music in the absence of physical sounds or simulating motor acts internally without overt output activate similar neural structures used when engaging with actual music or performing the actual movements (Halpern, 2003; Pascual-Leone, 2001). Therefore, it seems possible that simulating music making can produce a level of arousal interfering with sleep. In this context, mental practice potentially functions similar to rumination as an active attempt to assess and solve the origins of distress (Nolen-Hoeksema et al., 2008; Treynor et al., 2003) specifically that originating from perfectionism and performance anxiety. Additionally, both may become maladaptive in a way of hampering sleep. In conclusion, these findings practically demonstrate previous research suggesting that music students have alarmingly lacking coping strategies for stress (Araújo et al., 2017), which could be a primary concern in music students’ sleepless nights (Marín, 2018). In this study, this manifested specifically in the relationship between practice and sleep.

### **5.5 Music Students’ Experiences of Lockdown**

At the beginning of March 2020, the South African Government, like many other countries, imposed a strict national lockdown to contain the spread of the COVID-19 virus (South African Government, 2021; Stiegler & Bouchard, 2020). The lockdown was implemented according to five “alert levels” determining the level of restrictions to be applied during the national state of disaster. Beginning at the highest alert level from 26 March until 30 April, all nonessential businesses, shops, and restaurants, as well as schools and tertiary education institutions were closed. Social and religious gatherings, as well as any outdoor activities were prohibited.

People stayed at home, only permitted to leave home to seek medical care or to buy essential goods. This section includes a discussion of the music students' experiences of these first weeks of "hard lockdown", and its impacts on practice and sleep.

### **Emotions During Lockdown**

The findings of this study indicate an array of attitudes towards the pandemic. Like many others under lockdown (Chapple et al., 2020; Stiegler & Bouchard, 2020; Sundarassen et al., 2020), the music students enjoyed the benefits of having more free time and staying at home with their families. However, they described the period mostly in a negative way.

Consistent with other reports that emerged during lockdown, this study found that the pandemic and imposed lockdown introduced many stressors. University students in general were confronted mainly by the stressors of financial constraints, remote online learning, and uncertainty about the future with regard to their studies and careers (Elmer et al., 2020; Sundarassen et al., 2020). The biggest concerns, however, pertained to the spread of the virus and the fear of falling sick or losing loved ones (Elmer et al., 2020; Stiegler & Bouchard, 2020). Similarly, the seven music students in this study expressed sometimes having anxiety, uncertainty, and fear surrounding the pandemic, their health, their academics, and their futures. Consequently, several global web-based surveys conducted during this time indicate that these circumstances had significant negative impacts on wellbeing — especially among people of this age group (Aymerich-Franch, 2020; Cellini et al., 2020; Elmer et al., 2020; Gupta et al., 2020; Marelli et al., 2020; Sundarassen et al., 2020; Wang et al., 2020).

In line with other findings, this study showed that lockdown measures disrupted normal life routines which also contributed to declining affect during the pandemic (Aymerich-Franch, 2020; Gupta et al., 2020). While some work and learning activities continued remotely (Stiegler & Bouchard, 2020), the lockdown had devastating effects on creative professionals whose activities were suspended due to social distancing regulations (Datta, 2020; Karwowski et al., 2021). In the absence of performances, rehearsals, lessons, and gigs, the music students in this sample described feeling as though their lives were "standing still." Not only did this affect their daily routines, it also had social implications. This is in line with other findings indicating that, for musicians, performing and rehearsing are not just labour but also sources of identity, sociality, and emotional sustenance, especially for those who perform in

ensembles (Datta, 2020; Philippe et al., 2020). One important outcome related to social distancing is loneliness (Jeste, 2020). Likewise, the music students reported feeling lonely at times and longing for the normal conditions of daily life, especially the musical activities that give them a sense of belonging. In turn, these conditions and experiences of lockdown also impacted on the students' solitary practice, as explored in the following section.

### **Practice During Lockdown**

The lockdown affected practice behaviours in several ways. Firstly, the students generally reported practising less than usual, thereby offering another plausible explanation for the misalignment between participants' self-reported practice times (Phase 1) and their practice logs (Phase 2). Furthermore, there were also changes to the timing of their practice: Due to the absence of other daytime commitments, the group began practising later in the day than usual. One participant did not practise whatsoever during this time due to being ill. Multiple factors contributed to changes in the students' practice during lockdown.

In line with another case study of Italian conservatory students under lockdown, the findings of this study showed that lockdown measures impacted the students' time management (Schiavio et al., 2021). With more time at their disposal, the Italian sample reported improved concentration and more effective practice (Schiavio et al., 2021). This was true for some students in the current sample, who found it easier to maintain a consistent style of distributed practice while not having to balance practice with other competing activities. However, for most of the sample, the lack of overall daytime routine also resulted in difficulty maintaining regular and productive practice despite having more time available for practice. These findings also corroborate previous research showing that consistent patterns of practice are tied to higher musical achievement (Ericsson et al., 1993).

There were also changes to the practice environment. Some students did not have access to the necessary resources for practice (e.g. pianos) or struggled finding a solitary space free of distractions. Additionally, they felt self-conscious when practising within earshot of family and neighbours and found it difficult to practise deliberately as a result. These findings are not surprising, as previous research indicates that, as the conditions of practice become less optimal, practice also becomes less effective (Lehmann et al., 2007).

Furthermore, the suspension of musical activities also had significant influences on the music students' practice. In the absence of practical lessons, the students had to adopt a level of self-teaching. While some benefitted from this experience by discovering their independence and ability to self-regulate as musicians, others found it difficult to monitor their progress based on self-evaluation only. This shows that the need for a degree of mentorship still exists among some postgraduate performers. These findings also reiterate the interplay between personal resources and external feedback in optimising practice (Araújo, 2015) and emphasise the fundamental role of the teacher-student dyad in musical learning (Rosenshine et al., 2002). Additionally, the loss of social interaction gained from lessons, rehearsals, and gigs affected the students' moods and motivation to practise. Moreover, the students were discouraged by losing the opportunity to showcase their efforts in the performances and exams that were cancelled. Having no immediate goals to work towards, they felt less motivated to prepare and adopted a more relaxed approach to practising. Despite the increase in other stressors related to the pandemic, the students faced less performance stress, which also caused them to perceive less pressure surrounding practice. These findings are in line with Williamon and Valentine's (2000) observations that music students' practice often increases leading up to practical exams. The lockdown thus highlighted practice as an activity within the context of performance training, showing that performances may be a critical motivator of music students' practice. To conclude, although it may be argued that practice is always subject to various influences, the practice logs in this study do not represent the students' usual practice habits, as the results were confined to the conditions of this specific period in time.

### **Sleep During Lockdown**

The COVID-19 lockdown has been associated with significant changes in the quantity and quality of night time sleep. Several reports indicate changes in sleep timing, with a shift to later bedtimes and waking times, as well as reduced night time sleep and consequent increased daytime napping (Cellini et al., 2020; Gupta et al., 2020; Li et al., 2020; Voitsidis et al., 2020). Although people were spending more time in bed, paradoxically, they reported lower quality of sleep (Cellini et al., 2020; Gupta et al., 2020). Marelli et al. (2020) confirmed a similar pattern of results in university students under lockdown, including delayed bedtimes, poor sleep hygiene, prolonged sleep onset, and poor sleep quality.

Consistent with these reports, the music students in this sample described an overall shift in their sleep timing. A few managed to maintain some consistency in their sleep across nights; however, the majority experienced more erratic sleep. More specifically, the female students showed little disparity in their sleep across nights, only a general delay in bedtimes, whereas the four male students struggled maintaining consistent sleep routines and had varying bedtimes across nights.

A number of likely reasons for these changes have been identified in the literature, including the disruption of normal life routines, which are key circadian cues for maintaining regular sleep, as well as increased stressors and declining psycho-emotional wellbeing related to the circumstances (Gupta et al., 2020; Marelli et al., 2020). Likewise, the music students attributed the changes in their sleep to a lack of daytime routine and activity, as well as anxiety causing occasional difficulty falling asleep.

Despite the negative effects on their sleep at night, the students did not experience overall sleep loss, as the lockdown allowed more daytime sleeping. Contrary to other reports (Cellini et al., 2020; Gupta et al., 2020), it seemed as though the music students experienced improved sleep quality during lockdown. This could also explain why the sleep scores from the sleep logs ( $M = 77.43\%$ ) were higher than those indicated on the questionnaires prior to the lockdown ( $M = 64.57\%$ ). From the interview findings, the improvements in sleep quality could be attributed to the students' ability to sleep more than usual. However, this might also have been due to a respite of academic and performance stressors. Thus, as with practice, it should be kept in mind that the sleep findings in this study were confined to the conditions of this specific period in time. It is therefore unclear to which extent these findings reflect music students' usual experiences of sleep.

### **Practice and Sleep During Lockdown**

As the final part of this discussion, this section briefly considers the changes in practice and sleep in tandem for a view of music students' perceptions of the associations between the two routines during this specific time. Due to the shift in their sleep timing, the students also began practising later in the day and noticed impacts on the productivity of their practice as a result. For instance, one participant found that their practice was hampered by their irregular sleep patterns, as they would occasionally sleep past their usual optimal practice



time or have limited focus due to feeling tired. Oppositely, another noticed that being better rested than normally holds benefits for practice. In both instances, the importance of sleep for effective practice became apparent. At the same time, the lockdown highlighted influences of practice on sleep. For instance, one student noticed that practising later in the afternoon than usual caused a state of mental activity interfering with their ability to fall asleep at night, similar to the results described previously (5.4 Impact of Practice on Sleep). While the impact of practice on sleep became more apparent to this individual, it was less noticeable to another in this time due to the absence of performance-related stress. Altogether, these findings reiterate the bidirectional nature between practice and sleep, as well as the significant role of pressures associated with performing in this relationship.

Interestingly, the findings also revealed that students who practised more consistently during lockdown also maintained more consistent sleep routines, whereas those who struggled maintaining consistent practice routines also experienced erratic sleep in this time. These findings highlight both practice and sleep as behaviours that are optimal when kept under a regular routine, and suggest that changes to one routine might produce changes to the other. Furthermore, this suggests that the impact of practice on sleep may also be determined by individuals' attitudes towards routines in general, rather than just the nature of practice. Therefore, it seems plausible that traits such as self-efficacy, self-regulation, and grit might provide further insight into the consistency of practice and sleep between the two conditions, and could also be valuable in the study of associations between the two.

## **5.6 Summary**

This chapter integrated multiple perspectives into a discussion of music students' practice and sleep. Both were highlighted as unique between individuals and subject to situational change. Consequently, the complex bidirectional associations between practice and sleep were discussed and interpretations of meaning of the findings were formulated against existing theories from the literature. Additionally, the impact of the COVID-19 lockdown on music students' lives and its implications on the overall pattern of findings was also considered. The following chapter continues with a final synopsis of the research.

## Chapter 6

### Conclusions

#### 6.1 Introduction

This study set out to investigate the impact of practice on sleep quality in performance major music students through a multifaceted paradigm and a mixed methods approach. Objective and subjective insights into seven student musicians' practice and sleep routines were acquired through questionnaires, practice-sleep logs, and semistructured interviews. The synthesis of these quantitative and qualitative perspectives offered a deeper and more nuanced understanding of the impacts of practice on sleep. Resultantly, this chapter summarises the overall results according to the research questions that guided the study. As a final point, limitations of this study are considered and recommendations for future research are provided.

#### 6.2 Addressing the Research Questions

The relationship between practice and sleep is complex and variable. Ultimately, several pathways have been identified through which practice influences sleep. Accordingly, this section first addresses the three subsidiary questions concerning the impact of distinct factors of practice on sleep. Thereafter, the main research question is addressed in an overall interpretation of the findings.

##### **Subquestion: How Does the Total Amount of Practice Impact Sleep?**

Because formal practice can be physically and emotionally tiring for music students, the amount of time spent practising has been shown to influence sleep. Although there are some indications that increased practice promotes faster sleep onset and longer sleep durations, the precise nature of this relationship remains somewhat unclear. Rather than a linear causality between the amount of practice and sleep, the findings suggest a more complex dynamic in which other dimensions of practice are also at work. Taking into account that self-reported practice times are often an overestimation of true practice times, it is evident that the quantity of practice has some effect on sleep, albeit, more in terms of music students' subjective perceptions of the amount of effort invested in practice.

**Subquestion: How Does the Timing of Practice Impact Sleep?**

One of the more significant findings emerging from this research is the association observed between the timing of practice and the quality of sleep. More specifically, night time practice has been consistently linked to experiences of sleep difficulty in music students. The findings specifically point to a sleep-interfering state of hyperarousal and mental activity at bedtime following evening practice. This could broadly be attributed to a misalignment between active hours and the natural sleep-wake cycle; however, it could also reflect on the specific nature of formal practice and the effects of attentive musical engagement on arousal and affect. The timing of practice is thus identified as a significant determinant of sleep; however, the exact mechanisms underlying its influence are open for further investigation.

**Subquestion: How do Students' Perceptions of Practice Have a Bearing on Sleep?**

The findings reveal students' perceptions of their practice as the most conclusive determinants of their sleep due to its effect on emotional states and cognitive processes at bedtime. The perceived success of practice, in relation to self-expectations of musical ability, impacts directly on sleep. Given the perfectionistic traits exhibited in all six the classical students in this study, this is particularly troubling: These high self-imposed standards may drive students to dwell on their practising and their repertoire at bedtime, resulting in difficulty falling asleep and short sleep. Furthermore, the findings suggest that students' experiences of nighttime rumination about practice intensify leading up to performances, revealing that perceptions of stress surrounding performance and performance preparation also play a determining role in the influence of practice on sleep. Interestingly, the students' persistent thoughts about their repertoire resemble a process of rumination mixed with mental practice. Although these thought processes seem solution-focused, the students revealed they are not always deliberate and can become "overwhelming" to the extent of hindering sleep. In this context, mental practice is thus suggested to function alongside rumination as an active attempt to assess and cope with distress, specifically that originating from perfectionism and performance anxiety. However, both rumination and mental practice also seem to have a maladaptive side by causing sleepless nights at a time in which sleep is most essential to ensure music students are fit to perform. These findings thus demonstrate how experiences of stress without healthy coping strategies may manifest adversely in the relationship between practice and sleep.

## **Main Research Question: How Does Practice Impact Quality of Sleep in Performance Major Music Students?**

Altogether, the findings reveal an interplay of several dimensions of practice which collectively impact music students' sleep. Although the quantity and organisation of practice show some influences, the qualitative components of practice, such as the nature, perceptions, and experiences of practice seem most influential on sleep. Ultimately, music students' perceptions of their practice have the biggest impact on sleep, specifically pertaining to the perceived success of practice and the perceived pressures associated with performance training. Taken together, the findings suggest that intensive practice, especially into the evenings, that falls short of one's expectations and is accompanied by stress would impact adversely on sleep whereas enjoyed time spent practising during the day has a lesser effect.

Importantly, both the subjective nature, as well as the conditions of practice and sleep are identified as significant variables in this relationship. The findings reveal individual differences in perceptions of the interactions between practice on sleep, especially between classical and jazz students. Classical students experience a more direct impact of practice on sleep. This may be a result of unique practice strategies associated with each genre, or underlying differences in temperament affecting attitudes and responses to practice. Besides these personal determinants, situational change in the conditions of practice are also a strong determinant of the degree to which practice impacts sleep. The study particularly highlights increased impacts of practice on sleep within the context of the demands and stressors associated with performance training and the conservatoire culture. Under these conditions, music students' investment in practising may be at the expense of their sleep due to its influences on their emotional states at bedtime, which, in turn, cause sleep difficulty and restrict the quantity and quality of sleep.

These findings imply that optimising music students' experiences of practice by developing strategies to manage the emotions and stressors often associated with practice may benefit their sleep in periods when the demands of making music are high.

### **6.3 Limitations of the Study**

The outcomes of this study should be interpreted in light of certain limitations. The results of this study are confined to certain music students' experiences at a specific point in time. Firstly, the small sample size was not fully representative of the demographic diversity of music students at large. Music students self-selected to participate in the research, therefore, the results reflect practice-sleep experiences of a particular sample, consisting of six classical students and only one of the jazz school. The fact that fewer jazz students volunteered for this study could potentially suggest that classical students suffer more from sleep difficulty than their peers, or are more self-aware of their practice behaviours and its impacts on sleep. Secondly, although some students indicated playing second instruments, they did not report on practice activity during this period. The role of the second instrument was thus not clearly monitored in this study. Furthermore, a particular situational influence in this multiple case study was the COVID-19 pandemic and imposed lockdown, which may have had significant impacts on students' practice and sleep behaviours and affected some of the findings as a result.

### **6.4 Recommendations for Future Research**

There is currently a paucity in research exploring music students' sleep and its interactions with practice and performance training. Further investigation into the impact of practice routines on sleep routines is relevant though, as this may influence music students' wellbeing, musical learning, and performance in turn.

To better understand the impacts of practice on sleep, further research encompassing more students across multiple conservatoires, genres, and academic years is required to ascertain whether similar patterns of findings would emerge among the wider population of music students. Such studies could explore in more depth the influence of self-efficacy, self-regulation, and grit in the relationship between practice and sleep. The unique profile of classical pianists with regard to perfectionism, practice habits, and sleep in particular asks for a follow up investigation with purposive sampling of this specific group of musicians. Potential follow up studies could also investigate how music students' practice and sleep habits change over years of study and consider the role of second instruments more closely. Lastly, because the study indicated significant influences of the demands of performance training and the

conservatoire culture context, replicating this study during a normal academic term with the prospect of performances could provide a more rounded perspective of the associations between practice and sleep within the context of the pressures usually associated with the performing arts milieu.

## **6.5 Conclusion**

As the first study of its kind to explore the association between practice and sleep in music students in the South African context, the study makes a novel contribution to field by providing an initial step in our understanding of the bidirectional nature of practice and sleep, specifically from the direction of the influences of practice on sleep. The main findings reveal an interplay of factors of practice which collectively influence sleep, including aspects of the practice routine as well as music students' perceptions and experiences of practice. Importantly, the study shows that music students' investment in music studies may be at the expense of their sleep in context of the conservatoire culture and performance training. The value of developing an understanding of how practice strategies and experiences of practice impact sleep should not be underestimated, since this, in turn, directly affects music students' daily practice, performance, and ultimately overall wellbeing.

## References

- Ajidahun, A. T., & Phillips, J. (2013). Prevalence of musculoskeletal disorders among instrumental musicians at a center for performing arts in South Africa. *Medical Problems of Performing Artists, 28*(2), 96–99. <https://doi.org/10.21091/mppa.2013.2017>
- Allen, S. E. (2007). *Procedural memory consolidation in musicians*. [Doctoral dissertation, The University of Texas at Austin].  
<https://repositories.lib.utexas.edu/bitstream/handle/2152/3172/allens66501.pdf>
- Alvaro, P. K., Roberts, R. M., & Harris, J. K. (2013). A systematic review assessing bidirectionality between sleep disturbances, anxiety, and depression. *Sleep, 36*(7), 1059–1068. <https://doi.org/10.5665/sleep.2810>
- American Psychological Association. (2020). Stress. APA Dictionary of Psychology.  
<https://dictionary.apa.org/stress>
- Araújo, L. S., Wasley, D., Perkins, R., Atkins, L., Redding, E., Ginsborg, J., & Williamon, A. (2017). Fit to perform: An investigation of higher education music students' perceptions, attitudes, and behaviors toward health. *Frontiers in Psychology, 8*, 1558.  
<https://doi.org/10.3389/fpsyg.2017.01558>
- Araújo, M. V. (2015). Measuring self-regulated practice behaviours in highly skilled musicians. *Psychology of Music, 44*(2), 278–292.  
<https://doi.org/10.1177/0305735614567554>
- Aymerich-Franch, L. (2020). COVID-19 lockdown: Impact on psychological well-being and relationship to habit and routine modifications. *PsyArXiv*.  
<https://doi.org/10.31234/osf.io/9vm7r>
- Ballenberger, N., Möller, D., & Zalpour, C. (2018). Musculoskeletal health complaints and corresponding risk factors among music students: Study process, analysis strategies, and interim results from a prospective cohort study. *Medical Problems of Performing Artists, 33*(3), 166–174. <https://doi.org/10.21091/mppa.2018.3023>

- Ban, D. J., & Lee, T. J. (2001). Sleep duration, subjective sleep disturbances and associated factors among university students in Korea. *Journal of Korean Medical Science*, *16*(4), 475. <https://doi.org/10.3346/jkms.2001.16.4.475>
- Beatty, R. E., Silvia, P. J., Nusbaum, E. C., & Vartanian, O. (2013). Tired minds, tired ideas? Exploring insomnia and creativity. *Thinking Skills and Creativity*, *9*, 69–75. <https://doi.org/10.1016/j.tsc.2013.03.004>
- Biasutti, M., & Concina, E. (2014). The role of coping strategy and experience in predicting music performance anxiety. *Musicae Scientiae*, *18*(2), 189–202. <https://doi.org/10.1177/1029864914523282>
- Bonneville-Roussy, A., & Bouffard, T. (2014). When quantity is not enough: Disentangling the roles of practice time, self-regulation and deliberate practice in musical achievement. *Psychology of Music*, *43*(5), 686–704. <https://doi.org/10.1177/0305735614534910>
- Bonneville-Roussy, A., Lavigne, G. L., & Vallerand, R. J. (2011). When passion leads to excellence: The case of musicians. *Psychology of Music*, *39*(1), 123–138. <https://doi.org/10.1177/0305735609352441>
- Botha, M. (2015). *Perfectionism in South African university music students: Correlations with academic motivation and performance anxiety* [Doctoral dissertation, University of Pretoria]. <http://hdl.handle.net/2263/48953>
- Brown, F. C., Buboltz, W. C., & Soper, B. (2002). Relationship of sleep hygiene awareness, sleep hygiene practices, and sleep quality in university students. *Behavioral Medicine*, *28*(1), 33–38. <https://doi.org/10.1080/08964280209596396>
- Buboltz, W. C., Brown, F., & Soper, B. (2001). Sleep habits and patterns of college students: A preliminary study. *Journal of American College Health*, *50*(3), 131–135. <https://doi.org/10.1080/07448480109596017>



- Burwell, K., & Shipton, M. (2011). Performance studies in practice: An investigation of students' approaches to practice in a university music department. *Music Education Research, 13*(3), 255–271. <https://doi.org/10.1080/14613808.2011.603041>
- Burwell, K., & Shipton, M. (2013). Strategic approaches to practice: An action research project. *British Journal of Music Education, 30*(3), 329–345. <https://doi.org/10.1017/s0265051713000132>
- Buysse, D. J. (2014). Sleep health: Can we define it? Does it matter? *Sleep, 37*(1), 9–17. <https://doi.org/10.5665/sleep.3298>
- Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193–213. [https://doi.org/10.1016/0165-1781\(89\)90047-4](https://doi.org/10.1016/0165-1781(89)90047-4)
- Carskadon, M. A., & Dement, W. C. (2011). Monitoring and staging human sleep. In M.H. Kryger, T. Roth, & W.C. Dement (Eds.), *Principles and practice of sleep medicine (5th ed., pp. 16–26)*. Elsevier Saunders. <https://www.researchgate.net/publication/287231408>
- Cash, C. D. (2009). Effects of early and late rest intervals on performance and overnight consolidation of a keyboard sequence. *Journal of Research in Music Education, 57*(3), 252–266. <https://doi.org/10.1177/0022429409343470>
- Cellini, N., Canale, N., Mioni, G., & Costa, S. (2020). Changes in sleep pattern, sense of time and digital media use during COVID-19 lockdown in Italy. *Journal of Sleep Research, 29*(4), e13074. <https://doi.org/10.1111/jsr.13074>
- Chaffin, R., Imreh, G., Lemieux, A. F., & Chen, C. (2003). “Seeing the big picture”: Piano practice as expert problem solving. *Music Perception, 20*(4), 465–490. <https://doi.org/10.1525/mp.2003.20.4.465>
- Chapple, S., Fletcher, M., Prickett, K., & Smith, C. (2020). What people said about life under lockdown. *Policy Quarterly, 16*(3). <https://doi.org/10.26686/pq.v16i3.6556>

- Cohen, S., & Panebianco, C. (2020). The role of personality and self-efficacy in music students' health-promoting behaviours. *Musicae Scientiae*, 102986492096677. <https://doi.org/10.1177/1029864920966771>
- Creech, A., Papageorgi, I., Duffy, C., Morton, F., Hadden, E., Potter, J., De Bezenac, C., Whyton, T., Himonides, E., & Welch, G. (2008). Investigating musical performance: Commonality and diversity among classical and non-classical musicians. *Music Education Research*, 10(2), 215–234. <https://doi.org/10.1080/14613800802079080>
- Creswell, J. & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). SAGE Publications.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed methods approaches* (4th ed.). SAGE Publications.
- Datta, A. (2020). 'Virtual choirs' and the simulation of live performance under lockdown. *Social Anthropology*, 28(2), 249–250. <https://doi.org/10.1111/1469-8676.12862>
- De Niet, G., Tiemens, B., Lendemeijer, B., & Hutschemaekers, G. (2009). Music-assisted relaxation to improve sleep quality: Meta-analysis. *Journal of Advanced Nursing*, 65(7), 1356–1364. <https://doi.org/10.1111/j.1365-2648.2009.04982.x>
- Diekelmann, S., & Born, J. (2010). The memory function of sleep. *Nature Reviews Neuroscience*, 11(2), 114–126. <https://doi.org/10.1038/nrn2762>
- Duckworth, A. (2016). *Grit: The power of passion and perseverance*. Vermilion.
- Duke, R. A., & Davis, C. M. (2006). Procedural memory consolidation in the performance of brief keyboard sequences. *Journal of Research in Music Education*, 54(2), 111–124. <https://doi.org/10.1177/002242940605400203>
- Duke, R. A., Allen, S. E., Cash, C. D., & Simmons, A. L. (2009). Effects of early and late rest breaks during training on overnight memory consolidation of a keyboard melody. *Annals of the New York Academy of Sciences*, 1169, 169–172. <https://doi.org/10.1111/j.1749-6632.2009.04795.x>

- Edens, K. M. (2006). The relationship of university students' sleep habits and academic motivation. *Journal of Student Affairs Research and Practice*, 43(3), 432–445.  
<https://doi.org/10.2202/1949-6605.1677>
- Elmer, T., Mepham, K., & Stadtfeld, C. (2020). Students under lockdown: Comparisons of students' social networks and mental health before and during the COVID-19 crisis in Switzerland. *PLOS ONE*, 15(7), e0236337. <https://doi.org/10.1371/journal.pone.0236337>
- Erdur-Baker, Z., & Bugay, A. (2010). The short version of ruminative response scale: Reliability, validity and its relation to psychological symptoms. *Procedia — Social and Behavioral Sciences*, 5, 2178–2181. <https://doi.org/10.1016/j.sbspro.2010.07.433>
- Ericsson, K. (2006). The influence of experience and deliberate practice on the development of superior expert performance. In K. Ericsson, N. Charness, P. Feltovich, & R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 683–704). Cambridge University Press. doi:10.1017/CBO9780511816796.038
- Ericsson, A. (2016). *Peak: Secrets from the new science of expertise*. Houghton Mifflin Harcourt.
- Ericsson, K. A., & Lehmann, A. C. (1999). Expertise. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity* (2nd ed., Vol. 1, pp. 695–708). Academic Press.
- Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100(3), 363–406.  
<https://doi.org/10.1037/0033-295x.100.3.363>
- Ferrara, M., & De Gennaro, L. (2001). How much sleep do we need? *Sleep Medicine Reviews*, 5(2), 155–179. <https://doi.org/10.1053/smr.2000.0138>
- Fishbein, M., Middlestadt, S. E., Ottati, V., Straus, S., & Ellis, A. (1988). Medical problems among ICSOM musicians: Overview of a national survey. *Medical problems of performing artists*, 3(1), 1–8.  
<https://www.sciandmed.com/mppa/journalviewer.aspx?issue=1145&article=1451>

- Fitbit. (2021, April 14) Sleep. In *Fitbit* (Version 3.41) [Mobile app]. Google.  
<https://www.fitbit.com/sleep>
- Forquer, L. M., Camden, A. E., Gabriau, K. M., & Johnson, C. M. (2008). Sleep patterns of college students at a public university. *Journal of American College Health, 56*(5), 563–565. <https://doi.org/10.3200/jach.56.5.563-565>
- Freeman, D., Sheaves, B., Waite, F., Harvey, A. G., & Harrison, P. J. (2020). Sleep disturbance and psychiatric disorders. *The Lancet Psychiatry, 7*(7), 628–637.  
[https://doi.org/10.1016/s2215-0366\(20\)30136-x](https://doi.org/10.1016/s2215-0366(20)30136-x)
- Gaultney, J. F. (2010). The prevalence of sleep disorders in college students: Impact on academic performance. *Journal of American College Health, 59*(2), 91–97.  
<https://doi.org/10.1080/07448481.2010.483708>
- Gilbert, S. P., & Weaver, C. C. (2010). Sleep quality and academic performance in university students: A wake-up call for college psychologists. *Journal of College Student Psychotherapy, 24*(4), 295–306. <https://doi.org/10.1080/87568225.2010.509245>
- Ginsborg, J., Kreutz, G., Thomas, M., & Williamon, A. (2009). Healthy behaviours in music and non-music performance students. *Health Education, 109*(3), 242–258.  
<https://doi.org/10.1108/09654280910955575>
- Gjermunds, N., Brechan, I., Johnsen, S., & Watten, R. G. (2020). Personality traits in musicians. *Current Issues in Personality Psychology, 8*(2), 100–107.  
<https://doi.org/10.5114/cipp.2020.97314>
- Grandner, M. A. (2017). Sleep, health, and society. *Sleep Medicine Clinics, 12*(1), 1–22.  
<https://doi.org/10.1016/j.jsmc.2016.10.012>
- Gruber, H., Degner, S., & Lehmann, A. C. (2004). Why do some commit themselves in deliberate practice for many years — and so many do not? Understanding the development of professionalism in music. In M. Radovan & N. Đorđević (Eds.), *Current issues in adult learning and motivation* (pp. 222–235). SIAE.

- Gupta, R., Grover, S., Basu, A., Krishnan, V., Tripathi, A., Subramanyam, A., Nischal, A., Hussain, A., Mehra, A., Ambekar, A., Saha, G., Mishra, K. K., Bathla, M., Jagiwala, M., Manjunatha, N., Nebhinani, N., Gaur, N., Kumar, N., Dalal, PK, ... Avasthi, A. (2020). Changes in sleep pattern and sleep quality during COVID-19 lockdown. *Indian Journal of Psychiatry*, 62(4), 370–378. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7597722/>
- Hagger, M. S. (2010). Sleep, self-regulation, self-control and health. *Stress and Health*, 26(3), 181–185. <https://doi.org/10.1002/smi.1345>
- Haghayegh, S., Khoshnevis, S., Smolensky, M. H., Diller, K. R., & Castriotta, R. J. (2019). Accuracy of wristband Fitbit models in assessing sleep: Systematic review and meta-analysis. *Journal of Medical Internet Research*, 21(11), e16273. <https://doi.org/10.2196/16273>
- Hallam, S. (1995). Professional musicians' orientations to practice: Implications for teaching. *British Journal of Music Education*, 12(1), 3–19. <https://doi.org/10.1017/s0265051700002357>
- Hallam, S. (2001). The development of expertise in young musicians: Strategy use, knowledge acquisition and individual diversity. *Music Education Research*, 3(1), 7–23. <https://doi.org/10.1080/14613800020029914>
- Hallam, S. (2013). The effects of background music on health and wellbeing. In R. MacDonald, G. Kreutz & L. Mitchell (Eds). *Music, Health, and Wellbeing* (pp. 491–495). Oxford University Press.
- Hallam, S., Rinta, T., Varvarigou, M., Creech, A., Papageorgi, I., Gomes, T., & Lanipekun, J. (2012). The development of practising strategies in young people. *Psychology of Music*, 40(5), 652–680. <https://doi.org/10.1177/0305735612443868>
- Hallam, S., Varvarigou, M., Creech, A., Papageorgi, I., Gomes, T., Lanipekun, J., & Rinta, T. (2016). Are there gender differences in instrumental music practice? *Psychology of Music*, 45(1), 116–130. <https://doi.org/10.1177/0305735616650994>

- Halpern, A. (2003). Cerebral substrates of musical imagery. In I. Peretz & R. Zattore (Eds.), *The cognitive neuroscience of music* (pp. 217–230). Oxford University Press.
- Harmat, L., Takács, J., & Bódizs, R. (2008). Music improves sleep quality in students. *Journal of Advanced Nursing*, 62(3), 327–335. <https://doi.org/10.1111/j.1365-2648.2008.04602.x>
- Healey, D., & Runco, M. A. (2006). Could creativity be associated with insomnia? *Creativity Research Journal*, 18(1), 39–43. [https://doi.org/10.1207/s15326934crj1801\\_5](https://doi.org/10.1207/s15326934crj1801_5)
- Hinkamp, D., Morton, J., Krasnow, D. H., Wilmerding, M. V., Dawson, W. J., Stewart, M. G., Sims, H. S., Reed, J. P., Duvall, K., & McCann, M. (2017). Occupational health and the performing arts. *Journal of Occupational & Environmental Medicine*, 59(9), 843–858. <https://doi.org/10.1097/jom.0000000000001052>
- Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., DonCarlos, L., ... & Adams Hillard, P. J. (2015). National Sleep Foundation's sleep time duration recommendations: Methodology and results summary. *Sleep Health*, 1(1), 40–43. <https://doi.org/10.1016/j.sleh.2014.12.010>
- Ivankova, N. V., Creswell, J. W., Plano Clark, V. L. (2016). Foundations and approaches to mixed methods research. In K. Maree (Ed.), *First steps in research* (2nd ed., pp. 313–314). Van Schaik Publishers.
- Jeste, D. V. (2020). Coronavirus, social distancing, and global geriatric mental health crisis: Opportunities for promoting wisdom and resilience amid a pandemic. *International Psychogeriatrics*, 32(10), 1097–1099. <https://doi.org/10.1017/s104161022000366x>
- Jones, M. E., Roy, M. M., & Verkuilen, J. (2014). The relationship between reflective rumination and musical ability. *Psychology of Aesthetics, Creativity, and the Arts*, 8(2), 219–226. <https://doi.org/10.1037/a0035634>
- Jørgensen, H. (2002). Instrumental performance expertise and amount of practice among instrumental students in a conservatoire. *Music Education Research*, 4(1), 105–119. <https://doi.org/10.1080/14613800220119804>

- Jørgensen, H. (2004) Strategies for individual practice. In A. Williamon (Ed.), *Musical excellence: Strategies and techniques to enhance performance* (pp. 85–103). Oxford University Press.
- Juslin, P. N. (2013). From everyday emotions to aesthetic emotions: Towards a unified theory of musical emotions. *Physics of Life Reviews*, *10*(3), 235–266.  
<https://doi.org/10.1016/j.plrev.2013.05.008>
- Juslin, P. N., & Sloboda, J. A. (2001). *Music and emotion: Theory and research (Series in Affective Science)*. Oxford University Press.
- Kalmbach, D., Cuamatzi-Castelan, A., Tonnu, C., Tran, K. M., Anderson, J., Roth, T., & Drake, C. (2018). Hyperarousal and sleep reactivity in insomnia: Current insights. *Nature and Science of Sleep*, *10*, 193–201. <https://doi.org/10.2147/nss.s138823>
- Karwowski, M., Zielińska, A., Jankowska, D. M., Strutyńska, E., Omelańczuk, I., & Lebuda, I. (2021). Creative lockdown? A daily diary study of creative activity during pandemics. *Frontiers in Psychology*, *12*, 23. <https://doi.org/10.3389/fpsyg.2021.600076>
- Kegelaers, J., Schuijjer, M., & Oudejans, R. R. (2020). Resilience and mental health issues in classical musicians: A preliminary study. *Psychology of Music*, 030573562092778. <https://doi.org/10.1177/0305735620927789>
- Kenny, D., Driscoll, T., & Ackermann, B. (2012). Psychological well-being in professional orchestral musicians in Australia: A descriptive population study. *Psychology of Music*, *42*(2), 210–232. <https://doi.org/10.1177/0305735612463950>
- Kosecki, D. (2017, June 29). How much sleep do Fitbit users really get? A new study finds out. *Fitbit News, Sleep*. <https://blog.fitbit.com/sleep-study>
- Kreutz, G., Ginsborg, J., & Williamon, A. (2008). Health-promoting behaviours in conservatoire students. *Psychology of Music*, *37*(1), 47–60.  
<https://doi.org/10.1177/0305735607086047>

- Krystal, A. D., & Edinger, J. D. (2008). Measuring sleep quality. *Sleep Medicine, 9*(1), 10–17.  
[https://doi.org/10.1016/s1389-9457\(08\)70011-x](https://doi.org/10.1016/s1389-9457(08)70011-x)
- Lammers, M., & Kruger, M. (2006). Brass and woodwind student practice habits in Norway, Japan, and the United States. *NACWAPI, 54*(4), 4–13.  
<https://www.researchgate.net/publication/294729118>
- Leedy, P. & Ormrod, J. (2001). *Practical research: Planning and design* (7th ed.). SAGE Publications.
- Lehmann, A. C., & Davidson, J. (2002). Taking an acquired skills perspective on music performance. In R. Colwell & C. Richardson (Eds.), *The new handbook of research on music teaching and learning* (pp. 542–560). Oxford University Press.
- Lehmann, A. C., Sloboda, J. A., & Woody, R. H. (2007). *Psychology for musicians: Understanding and acquiring the skills*. Oxford University Press.
- Leon-Guerrero, A. (2008). Self-regulation strategies used by student musicians during music practice. *Music Education Research, 10*(1), 91–106.  
<https://doi.org/10.1080/14613800701871439>
- Li, Y., Qin, Q., Sun, Q., Sanford, L. D., Vgontzas, A. N., & Tang, X. (2020). Insomnia and psychological reactions during the COVID-19 outbreak in China. *Journal of Clinical Sleep Medicine, 16*(8), 1417–1418. <https://doi.org/10.5664/jcsm.8524>
- Lund, H. G., Reider, B. D., Whiting, A. B., & Prichard, J. R. (2010). Sleep Patterns and Predictors of Disturbed Sleep in a Large Population of College Students. *Journal of Adolescent Health, 46*(2), 124–132. <https://doi.org/10.1016/j.jadohealth.2009.06.016>
- Madigan, D. J. (2016). Confirmatory factor analysis of the Multidimensional Inventory of Perfectionism in Sport. *Psychology of Sport and Exercise, 26*, 48–51.  
<https://doi.org/10.1016/j.psychsport.2016.06.003>
- Maquet, P. (2001). The role of sleep in learning and memory. *Science, 294*, 1048–1052.  
<https://doi.org/10.1126/science.1062856>



- Maree, K. (2016). Planning a research proposal. In K. Maree (Ed.), *First steps in research* (2nd ed., pp. 26–49). Van Schaik Publishers.
- Marelli, S., Castelnuovo, A., Somma, A., Castronovo, V., Mombelli, S., Bottoni, D., Leitner, C., Fossati, A., & Ferini-Strambi, L. (2020). Impact of COVID-19 lockdown on sleep quality in university students and administration staff. *Journal of Neurology*, *268*, 8–15.  
<https://doi.org/10.1007/s00415-020-10056-6>
- Marín, L. S. (2018). *The pathways through which sleep impacts the well-being of music conservatoire students* (Publication No. 328283044) [Master's thesis, Royal College of Music]. <https://www.researchgate.net/publication/328283044>
- Matei, R., Broad, S., Goldbart, J., & Ginsborg, J. (2018). Health education for musicians. *Frontiers in Psychology*, *9*, 1137. <https://doi.org/10.3389/fpsyg.2018.01137>
- Mazur, Z., & Laguna, M. (2019). The role of affect in practicing a musical instrument: A systematic review of the literature. *Psychology of Music*, *47*(6), 848–863.  
<https://doi.org/10.1177/0305735619861831>
- McCormick, J., & McPherson, G. (2003). The role of self-efficacy in a musical performance examination: An exploratory structural equation analysis. *Psychology of Music*, *31*(1), 37–51. <https://doi.org/10.1177/0305735603031001322>
- McPherson, G. E., & McCormick, J. (2006). Self-efficacy and music performance. *Psychology of Music*, *34*(3), 322–336. <https://doi.org/10.1177/0305735606064841>
- McPherson, G. E., & Renwick, J. M. (2011). Self-regulation and mastery of musical skills. In D. H. Schunk & B. Zimmerman (Eds.), *Handbook of self-regulation of learning and performance* (pp. 234–248). Routledge. <https://doi-org.uplib.idm.oclc.org/10.4324/9780203839010>
- McPherson, G. E., & Zimmerman, B. J. (2011). Self-regulation of musical learning: A social cognitive perspective on developing performance skills. In R. Colwell & P. R. Webster

- (Eds.), *MENC handbook of research on music learning* (Vol. 2, pp. 130–175). Oxford University Press.
- Miksza, P. (2007). Effective practice. An investigation of observed practice behaviors, self-reported practice habits, and the performance achievement of high school wind players. *Journal of Research in Music Education*, 55(4), 359–375.  
<https://doi.org/10.1177/0022429408317513>
- Miksza, P. (2011). The development of a measure of self-regulated practice behavior for beginning and intermediate instrumental music students. *Journal of Research in Music Education*, 59(4), 321–338. <https://doi.org/10.1177/0022429411414717>
- Milojevich, H. M., & Lukowski, A. F. (2016). Sleep and mental health in undergraduate students with generally healthy sleep habits. *PLOS ONE*, 11(6), e0156372.  
<https://doi.org/10.1371/journal.pone.0156372>
- Morgan, D. L. (2014). Pragmatism as a paradigm for social research. *Qualitative Inquiry*, 20(8), 1045–1053. <https://doi.org/10.1177/1077800413513733>
- Mosing, M. A., Madison, G., Pedersen, N. L., Kuja-Halkola, R., & Ullén, F. (2014). Practice does not make perfect. *Psychological Science*, 25(9), 1795–1803.  
<https://doi.org/10.1177/0956797614541990>
- Nedelcut, S., Leucuta, D. C., & Dumitrascu, D. L. (2018). Lifestyle and psychosocial factors in musicians. *Medicine and Pharmacy Reports*, 91(3), 312–316.  
<https://doi.org/10.15386/cjmed-959>
- Nielsen, S. G. (2004). Strategies and self-efficacy beliefs in instrumental and vocal individual practice: a study of students in higher music education. *Psychology of Music*, 32(4), 418–431. <https://doi.org/10.1177/0305735604046099>
- Nielsen, S. G. (2008). Achievement goals, learning strategies and instrumental performance. *Music Education Research*, 10(2), 235–247. <https://doi.org/10.1080/14613800802079106>

- Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science, 3*(5), 400–424. <https://doi.org/10.1111/j.1745-6924.2008.00088.x>
- Noor, K. B. M. (2008). Case Study: A strategic research methodology. *American Journal of Applied Sciences, 5*(11), 1602–1604. <https://doi.org/10.3844/ajassp.2008.1602.1604>
- Okun, M. L. (2011). Biological consequences of disturbed sleep: Important mediators of health? *Japanese Psychological Research, 53*(2), 163–176. <https://doi.org/10.1111/j.1468-5884.2011.00463.x>
- Osborne, M. S., Greene, D. J., & Immel, D. T. (2014). Managing performance anxiety and improving mental skills in conservatoire students through performance psychology training: A pilot study. *Psychology of Well-Being, 4*(1), 18. <https://doi.org/10.1186/s13612-014-0018-3>
- Pajares, F. (2002). Gender and perceived self-efficacy in self-regulated learning. *Theory into Practice, 41*(2), 116–125. [https://doi.org/10.1207/s15430421tip4102\\_8](https://doi.org/10.1207/s15430421tip4102_8)
- Panbianco, C. (2017). Musculoskeletal and other performance related disorders in South African undergraduate music students. *Journal of Occupational Health and Epidemiology, 6*(2), 61–69. <https://doi.org/10.29252/johe.6.2.61>
- Panbianco-Warrens, C. R., Fletcher, L., & Kreutz, G. (2014). Health-promoting behaviors in South African music students: A replication study. *Psychology of Music, 43*(6), 779–792. <https://doi.org/10.1177/0305735614535829>
- Papageorgi, I., Creech, A., & Welch, G. (2011). Perceived performance anxiety in advanced musicians specializing in different musical genres. *Psychology of Music, 41*(1), 18–41. <https://doi.org/10.1177/0305735611408995>
- Pascual-Leone, A. (2001). The brain that plays music and is changed by it. *Annals of the New York Academy of Sciences, 930*, 315–329. <https://doi.org/10.1111/j.1749-6632.2001.tb05741.x>

- Pereira, R. F., Teixeira, C. S., Kothe, F., Merino, E. A. D., & Daronco, L. S. E. (2010). Sleep quality and quality of life perception in orchestra musicians. *Archives of Clinical Psychiatry, 37*(2), 48–51. <https://doi.org/10.1590/s0101-60832010000200003>
- Perkins, R., Reid, H., Araújo, L. S., Clark, T., & Williamon, A. (2017). Perceived enablers and barriers to optimal health among music students: A qualitative study in the music conservatoire setting. *Frontiers in Psychology, 8*, 968. <https://doi.org/10.3389/fpsyg.2017.00968>
- Perry, G. S., Patil, S. P., & Presley-Cantrell, L. R. (2013). Raising awareness of sleep as a healthy behavior. *Preventing Chronic Disease, 10*, e133. <https://doi.org/10.5888/pcd10.130081>
- Philippe, R. A., Schiavio, A., & Biasutti, M. (2020). Adaptation and destabilization of interpersonal relationships in sport and music during the Covid-19 lockdown. *Heliyon, 6*(10), e05212. <https://doi.org/10.1016/j.heliyon.2020.e05212>
- Platz, F., Kopiez, R., Lehmann, A. C., & Wolf, A. (2014). The influence of deliberate practice on musical achievement: A meta-analysis. *Frontiers in Psychology, 5*, 646. <https://doi.org/10.3389/fpsyg.2014.00646>
- Rae, G., & McCambridge, K. (2004). Correlates of performance anxiety in practical music exams. *Psychology of Music, 32*(4), 432–439. <https://doi.org/10.1177/0305735604046100>
- Rama, A. N., Cho, S. C., & Kushida, C. A. (2005). Normal human sleep. In T. Lee-Chong (Ed.), *Sleep: A comprehensive handbook* (pp. 1–9). <https://doi.org/10.1002/0471751723.ch1>
- Reid, A., & Baker, F. C. (2008). Perceived sleep quality and sleepiness in South African university Students. *South African Journal of Psychology, 38*(2), 287–303. <https://doi.org/10.1177/008124630803800203>

- Renwick, J. M., & McPherson, G. E. (2002). Interest and choice: Student-selected repertoire and its effect on practising behaviour. *British Journal of Music Education*, 19(2), 173–178. <https://doi.org/10.1017/s0265051702000256>
- Rickert, D. L. L., Barrett, M. S., & Ackermann, B. J. (2015). Are music students fit to play? A case study of health awareness and injury attitudes amongst tertiary student cellists. *International Journal of Music Education*, 33(4), 426–441. <https://doi.org/10.1177/0255761415582343>
- Ritchie, J., Lewis, J., & Elam, G. (2003). Designing and selecting samples. In J. Ritchie & J. Lewis (Eds.), *Qualitative research practice* (pp. 77–108). SAGE Publications.
- Roberts, C. M. (2010). *The dissertation journey: A practical and comprehensive guide to planning, writing, and defending your dissertation*. Corwin Press. <https://www.doi.org/10.4135/9781452219219>
- Rosenshine, B., Froehlich, H., & Fakhouri, I. (2002). Systematic instruction. In R. Colwell & C. Richardson (Eds.), *The new handbook of research on music teaching and learning* (pp. 229–314). Oxford University Press
- Roy, M. M., Radzevick, J., & Getz, L. (2016). The manifestation of stress and rumination in musicians. *Muziki*, 13(1), 100–112. <https://doi.org/10.1080/18125980.2016.1182385>
- Rubin-Rabson, G. (1940). Studies in the psychology of memorizing piano music: II. A comparison of massed and distributed practice. *Journal of Educational Psychology*, 31(4), 270–284. <https://doi.org/10.1037/h0061174>
- Saksvik-Lehouillier, I., Bjerkeset, O., & Vaag, J. R. (2017). Individual, lifestyle, and psychosocial factors related to insomnia among Norwegian musicians. *Scandinavian Psychologist*, 4, e19. <https://doi.org/10.15714/scandpsychol.4.e19>
- Schiavio, A., Biasutti, M., & Philippe, R. A. (2021). Creative pedagogies in the time of pandemic: A case study with conservatory students. *Music Education Research*, 23(2), 167–178. <https://doi.org/10.1080/14613808.2021.1881054>

- Schlarb, A., Kulesa, & Gulewitsch. (2012). Sleep characteristics, sleep problems, and associations of self-efficacy among German university students. *Nature and Science of Sleep*, 4, 1–7. <https://doi.org/10.2147/nss.s27971>
- Simmons, A. L. (2011). Distributed practice and procedural memory consolidation in musicians' skill learning. *Journal of Research in Music Education*, 59(4), 357–368. <https://doi.org/10.1177/0022429411424798>
- Simmons, A. L., & Duke, R. A. (2006). Effects of sleep on performance of a keyboard melody. *Journal of Research in Music Education*, 54(3), 257–269. <https://doi.org/10.1177/002242940605400308>
- Sloboda, J. A., & Davidson, J. (1996). The young performing musician. In I. Deliège & J. A. Sloboda (Eds.) *Musical beginnings: Origins and development of musical competence* (pp. 171–190). Oxford University Press.
- Sloboda, J. A., Davidson, J. W., Howe, M. J. A., & Moore, D. G. (1996). The role of practice in the development of performing musicians. *British Journal of Psychology*, 87(2), 287–309. <https://doi.org/10.1111/j.2044-8295.1996.tb02591.x>
- Smith, B. P. (2005). Goal orientation, implicit theory of ability, and collegiate instrumental music practice. *Psychology of Music*, 33(1), 36–57. <https://doi.org/10.1177/0305735605048013>
- South African Government. (2021, March 18). *Regulations and guidelines — Coronavirus COVID-19*. <https://www.gov.za/covid-19/resources/regulations-and-guidelines-coronavirus-covid-19>
- Spahn, C., Strukely, S., & Lehmann, A. (2004). Health conditions, attitudes toward study, and attitudes toward health at the beginning of university study: Music students in comparison with other student populations. *Medical Problems of Performing Artists*, 19(1), 26–33. <https://doi.org/10.21091/mppa.2004.1005>

- Spahn, C., Voltmer, E., Mornell, A., & Nusseck, M. (2017). Health status and preventive health behavior of music students during university education: Merging prior results with new insights from a German multicenter study. *Musicae Scientiae*, 21(2), 213–229. <https://doi.org/10.1177/1029864917698197>
- Stephoe, A., Peacy, V., & Wardle, J. (2006). Sleep duration and health in young adults. *Archives of Internal Medicine*, 166(16), 1689. <https://doi.org/10.1001/archinte.166.16.1689>
- Sternbach, D. J. (2008). Stress in the lives of music students. *Music Educators Journal*, 94(3), 42–48. <https://doi.org/10.1177/002743210809400309>
- Stewart-Brown, S., Evans, J., Patterson, J., Petersen, S., Doll, H., Balding, J., & Regis, D. (2000). The health of students in institutes of higher education: An important and neglected public health problem? *Journal of Public Health*, 22(4), 492–499. <https://doi.org/10.1093/pubmed/22.4.492>
- StGeorge, J., Holbrook, A., & Cantwell, R. (2013). Affinity for music: A study of the role of emotion in musical instrument learning. *International Journal of Music Education*, 32(3), 264–277. <https://doi.org/10.1177/0255761413491178>
- Stiegler, N., & Bouchard, J. P. (2020). South Africa: Challenges and successes of the COVID-19 lockdown. *Medical-Psychological Annals, Psychiatric Review*, 178(7), 695–698. <https://doi.org/10.1016/j.amp.2020.05.006>
- Stoeber, J., & Eismann, U. (2007). Perfectionism in young musicians: Relations with motivation, effort, achievement, and distress. *Personality and Individual Differences*, 43(8), 2182–2192. <https://doi.org/10.1016/j.paid.2007.06.036>
- Sundarasan, S., Chinna, K., Kamaludin, K., Nurunnabi, M., Baloch, G. M., Khoshaim, H. B., Hossain, S. F. A., & Sukayt, A. (2020). Psychological impact of COVID-19 and lockdown among university students in Malaysia: Implications and policy recommendations. *International Journal of Environmental Research and Public Health*, 17, 6206. <https://doi.org/10.3390/ijerph17176206>

- Teddle, C. & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioural sciences*. SAGE Publications.
- Thompson, E. R. (2007). Development and validation of an internationally reliable short-form of the Positive and Negative Affect Schedule (PANAS). *Journal of Cross-Cultural Psychology, 38*(2), 227–242. <https://doi.org/10.1177/0022022106297301>
- Treynor, W., Gonzalez, R. & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research, 27*(3), 247–259. <https://doi.org/10.1023/A:1023910315561>
- Tsai, L. L., & Li, S. P. (2004). Sleep patterns in college students. *Journal of Psychosomatic Research, 56*(2), 231–237. [https://doi.org/10.1016/s0022-3999\(03\)00507-5](https://doi.org/10.1016/s0022-3999(03)00507-5)
- Tucker, M. A., Nguyen, N., & Stickgold, R. (2016). Experience playing a musical instrument and overnight sleep enhance performance on a sequential typing task. *PLOS ONE, 11*(7), e0159608. <https://doi.org/10.1371/journal.pone.0159608>
- Vaag, J., Bjørngaard, J. H., & Bjerkeset, O. (2015). Symptoms of anxiety and depression among Norwegian musicians compared to the general workforce. *Psychology of Music, 44*(2), 234–248. <https://doi.org/10.1177/0305735614564910>
- Vaag, J., Saksvik-Lehouillier, I., Bjørngaard, J. H., & Bjerkeset, O. (2016). Sleep difficulties and insomnia symptoms in Norwegian musicians compared to the general population and workforce. *Behavioral Sleep Medicine, 14*(3), 325–342. <https://doi.org/10.1080/15402002.2015.1007991>
- Van de Laar, M., Verbeek, I., Pevernagie, D., Aldenkamp, A., & Overeem, S. (2010). The role of personality traits in insomnia. *Sleep Medicine Reviews, 14*, 61–68. <https://doi.org/10.1016/j.smr.2009.07.007>
- Van Selms, M., Kroon, J., Tuomilehto, H., Peltomaa, M., Savolainen, A., Manfredini, D., Lobbezoo, F., & Ahlberg, J. (2020). Self-reported sleep bruxism among Finnish symphony



- orchestra musicians: Associations with perceived sleep-related problems and psychological stress. *CRANIO*, 1–8. <https://doi.org/10.1080/08869634.2020.1853310>
- Van Vugt, F. T., Treutler, K., Altenmüller, E., & Jabusch, H. C. (2013). The influence of chronotype on making music: Circadian fluctuations in pianists' fine motor skills. *Frontiers in Human Neuroscience*, 7, 347. <https://doi.org/10.3389/fnhum.2013.00347>
- Verhaeghen, P., Joorman, J., & Khan, R. (2005). Why we sing the blues: The relation between self-reflective rumination, mood, and creativity. *Emotion*, 5(2), 226–232. <https://doi.org/10.1037/1528-3542.5.2.226>
- Voitsidis, P., Gliatas, I., Bairachtari, V., Papadopoulou, K., Papageorgiou, G., Parlapani, E., Syngelakis, M., Holeva, V., & Diakogiannis, I. (2020). Insomnia during the COVID-19 pandemic in a Greek population. *Psychiatry Research*, 289, 113076. <https://doi.org/10.1016/j.psychres.2020.113076>
- Walker, M. P., & Stickgold, R. (2006). Sleep, memory, and plasticity. *Annual Review of Psychology*, 57(1), 139–166. <https://doi.org/10.1146/annurev.psych.56.091103.070307>
- Walker, M. P., Brakefield, T., Morgan, A., Hobson, J., & Stickgold, R. (2002). Practice with sleep makes perfect. *Neuron*, 35(1), 205–211. [https://doi.org/10.1016/s0896-6273\(02\)00746-8](https://doi.org/10.1016/s0896-6273(02)00746-8)
- Wang, C. F., Sun, Y. L., & Zang, H. X. (2014). Music therapy improves sleep quality in acute and chronic sleep disorders: A meta-analysis of 10 randomized studies. *International Journal of Nursing Studies*, 51(1), 51–62. <https://doi.org/10.1016/j.ijnurstu.2013.03.008>
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, 17(5), 1729. <https://doi.org/10.3390/ijerph17051729>

- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063–1070. <https://doi.org/10.1037/0022-3514.54.6.1063>
- Welch, G., Papageorgi, I., Haddon, L., Creech, A., Morton, F., de Bézenac, C., Duffy, C., Potter, J., Whyton, T., & Himonides, E. (2008). Musical genre and gender as factors in higher education learning in music. *Research Papers in Education*, 23(2), 203–217. <https://doi.org/10.1080/02671520802048752>
- Williamon, A. (2004). *Musical excellence: Strategies and techniques to enhance performance*. Oxford University Press.
- Williamon, A., & Thompson, S. (2006). Awareness and incidence of health problems among conservatoire students. *Psychology of Music*, 34(4), 411–430. <https://doi.org/10.1177/0305735606067150>
- Williamon, A., & Valentine, E. (2000). Quantity and quality of musical practice as predictors of performance quality. *British Journal of Psychology*, 91(3), 353–376. <https://doi.org/10.1348/000712600161871>
- Williamon, A., Wasley, D., Perkins, R., Ginsborg, J., & Hildebrandt, W. (2009, December 15–18). Profiling musicians' health, wellbeing, and performance. In A. Williamon, S. Pretty & R. Buck (Chairs). *International Symposium on Performance Science*. New Zealand. <http://performancescience.org/publication/isps-2009/>
- Willig, C. (2008). *Introducing qualitative research in psychology* (2nd ed.). Open University Press.
- Wynn Parry, C. B. (2004). Managing the physical demands of musical performance. In A. Williamon (Ed.), *Musical excellence: Strategies and techniques to enhance performance* (pp. 41–60). Oxford University Press.

Zwaan, K., & Ter Bogt, T. F. (2009). Research Note: Breaking into the popular record industry. *European Journal of Communication*, 24(1), 89–101.  
<https://doi.org/10.1177/026732310809894>

## Appendix A: Letter of Information and Informed Consent Form



March 2020

### LETTER OF INFORMATION

Dear music student

I am currently pursuing a Master's of Musicology at the University of Pretoria and would like to invite you to participate in my research, described as follows:

#### Research Topic

The aim of the study is to explore the impact of practice on sleep in performing musicians. Your personal experience as a performance major music student will be valuable in contributing an understanding of the associations between practice, sleep, and performing.

#### Research Procedures

The study will take place over three phases. The first phase will involve completion of a questionnaire. The second phase will entail completion of a logbook, in which you will be required to make daily numerical entries of your practice and sleep over four weeks using data calculated by a sleep monitoring watch (Fitbit). For the final phase, a semistructured interview will be held at the University of Pretoria in which you will be invited to share your experiences of practice and sleep. An audio recording of this session will be taken.

#### Risks and Benefits

There are no potential risks or direct benefits associated with this study. By participating in the research, you will advance the understanding of music students' practice and sleep behaviours.

## **Participant's Rights**

Participation in this study is entirely voluntary. You are free to withdraw from the research at any time. There will be no negative consequences to you, nor will you need to explain your reasons for withdrawing from the study.

Should you wish to view your contributions to the study, you will have access to the raw data for verification, as well as the final report upon completion.

## **Access to Results**

The research will be handled by myself as principle researcher, and my supervisor. Any information you supply will be used for academic purposes only and will be treated with strict confidentiality and anonymity.

After the study is completed, raw data will be archived at the Department of Music for a minimum of 15 years in a password-protected electronic format. During this time the data could also be used for further research.

Please feel free to contact me if you require more information about the study.

Many thanks

Carina Heymans

u15005420@tuks.co.za

Supervisor: Prof. C. R. Panebianco

clorinda.panebianco@up.ac.za



## INFORMED CONSENT FORM

**Full name:** \_\_\_\_\_

**Title of the Study:** The impact of practice on the quality of sleep in performance major music students

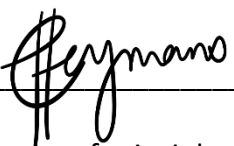
I hereby give my consent to participate in the aforementioned research project and acknowledge that the data may be used in current and future research. I confirm that I understand what is required of me and that I am aware of my right to withdraw from the study at any time, should I wish to do so.

\_\_\_\_\_

Signature of participant

\_\_\_\_\_

Date

  
\_\_\_\_\_

Signature of principle researcher

## Appendix B: Questionnaire



### QUESTIONNAIRE

The aim of this questionnaire is to understand music students' perceptions of practice, sleep, and psychological states.

#### Instructions

- This questionnaire consists of sections A to E. Make sure to complete all the necessary sections.
- Please circle your answers on the scales given, or fill in as prompted.
- Please answer the questions truthfully, with answers based on how you think or feel and not how you believe you ought to think or feel.

## Section A: General Information, Practice, and Sleep

This section consists of general items gathering a demographic background.

1. What degree are you currently enrolled for?

2. How would you describe your gender?

Male	<input type="checkbox"/>	Female	<input type="checkbox"/>	Prefer to self-describe:	<input type="text"/>
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3. Please indicate your first instrument.

4. Please indicate your second instrument.

5. On average, how much time do you spend practising your main instrument per day?

6. On average, how much time do you spend practising your second instrument per day?

7. Using a scale from 0–100%, how much would you score your sleep quality on average?



### Section B: Positive and Negative Affect (PANAS-SF)

This section consists of a 20-item questionnaire formulated to assess mood. Indicate to which extent you have felt the following ways over the past week. Circle your choice on the scale.

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
1. Interested	1	2	3	4	5
2. Distressed	1	2	3	4	5
3. Excited	1	2	3	4	5
4. Upset	1	2	3	4	5
5. Strong	1	2	3	4	5
6. Guilty	1	2	3	4	5
7. Scared	1	2	3	4	5
8. Hostile	1	2	3	4	5
9. Enthusiastic	1	2	3	4	5
10. Proud	1	2	3	4	5
11. Irritable	1	2	3	4	5
12. Alert	1	2	3	4	5
13. Ashamed	1	2	3	4	5
14. Inspired	1	2	3	4	5
15. Nervous	1	2	3	4	5
16. Determined	1	2	3	4	5
17. Attentive	1	2	3	4	5
18. Jittery	1	2	3	4	5
19. Active	1	2	3	4	5
20. Afraid	1	2	3	4	5

### Section C: Multidimensional Inventory of Perfectionism (MIPS-R)

This section consists of 18 items and is designed to measure different facets of perfectionism. After reading carefully, please rate the statements ranging from 1 (Strongly disagree) to 6 (Strongly agree).

	Strongly disagree					Strongly agree
1. I strive to be as perfect as possible.	1	2	3	4	5	6
2. I feel extremely stressed if everything doesn't go perfectly.	1	2	3	4	5	6
3. My parents expect my performance to be perfect.	1	2	3	4	5	6
4. My parents criticise everything I do not do perfectly.	1	2	3	4	5	6
5. I feel depressed if I have not been perfect.	1	2	3	4	5	6
6. I am a perfectionist as far as my targets are concerned.	1	2	3	4	5	6
7. I get absolutely furious if I make mistakes.	1	2	3	4	5	6
8. My teacher makes extremely high demands of me.	1	2	3	4	5	6
9. It is important to me to be perfect in everything I attempt.	1	2	3	4	5	6
10. My teacher demands nothing less than perfection of me.	1	2	3	4	5	6

	Strongly disagree					Strongly agree
11. I get frustrated if I do not fulfil my high expectations.	1	2	3	4	5	6
12. My parents set extremely high standards for me.	1	2	3	4	5	6
13. I feel the need to be perfect.	1	2	3	4	5	6
14. My teacher expects my performance to be perfect.	1	2	3	4	5	6
15. I am dissatisfied with the whole day if one class doesn't go perfectly.	1	2	3	4	5	6
16. My parents are dissatisfied if my performance is not top class.	1	2	3	4	5	6
17. I have the wish to do everything perfectly.	1	2	3	4	5	6
18. My teacher is disappointed in me if my performance is not perfect.	1	2	3	4	5	6

### Section D: Performance Anxiety Inventory (PAI-R)

This section consists of 11 items designed to measure music performance anxiety. Rate the statements below with regard to how you normally feel in the face of your performances or practical exams.

	Strongly disagree					Strongly agree
1. I feel confident and relaxed while performing before an examiner.	1	2	3	4	5	6
2. During an exam, I find myself thinking about whether I will get through it.	1	2	3	4	5	6
3. I feel very jittery when doing an important exam.	1	2	3	4	5	6
4. I wish exams did not bother me so much.	1	2	3	4	5	6
5. I worry a great deal before important exams.	1	2	3	4	5	6
6. When the exam is over, I find myself still worrying about it.	1	2	3	4	5	6
7. I feel my heart beating very fast during exams.	1	2	3	4	5	6
8. During exams I am so tense that I feel physically ill.	1	2	3	4	5	6
9. I feel anxious about an exam even when I am well-prepared.	1	2	3	4	5	6
10. Thoughts of doing poorly interfere with my performance.	1	2	3	4	5	6
11. If I make a mistake, I start to panic.	1	2	3	4	5	6

### Section E: Ruminative Response Scale (RRS-SF)

After reading each statement carefully, please indicate how you usually respond to negative events and/or depressed mood. Please circle your answer on the scale.

	Almost never	Sometimes	Often	Almost always
1. I think "What am I doing to deserve this?"	1	2	3	4
2. I analyse recent events to try and understand why I am feeling unhappy.	1	2	3	4
3. I think "Why do I always react this way?"	1	2	3	4
4. I go away by myself and think about possible reasons for my feelings.	1	2	3	4
5. I write down what I am thinking and analyse it.	1	2	3	4
6. I think about a recent situation, wishing it had gone better.	1	2	3	4
7. I think "Why do I have problems other people don't have?"	1	2	3	4
8. I think "Why can't I handle things better?"	1	2	3	4
9. I go someplace alone to think about my feelings.	1	2	3	4
10. I analyse my personality to try and understand why I am feeling unhappy.	1	2	3	4

## Appendix C: Practice-Sleep Logbook



### PRACTICE-SLEEP LOGBOOK

The aim of this logbook is to record the nature of music students' practice and sleep routines over time. Please refer to the provided list of instructions and the example entry for more information on how to complete the logbook. Should you have any questions, you are welcome to contact me for clarification or assistance. Your participation is greatly appreciated.

Kind regards

Carina Heymans

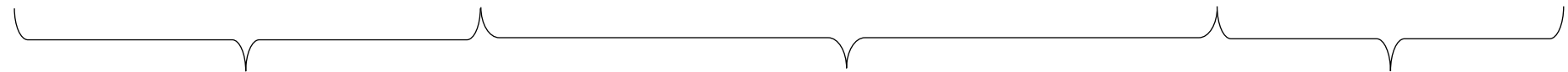
[u15005420@tuks.co.za](mailto:u15005420@tuks.co.za)

### Instructions

- Only record your solitary practice. Do not include time spent in lessons, performances, or rehearsals in your practice entries.
- Please copy the sleep data recorded by your watch exactly as indicated on the accompanying mobile application.
- If you forget to complete the logbook at some stage, kindly refer to your sleep history on the mobile application.
- Please make sure to charge your heart rate monitoring watch during the daytime to prevent battery failure from occurring while recording sleep.
- Please make note of any *all-nighters* or *naps*.
- Kindly refer to the example entry demonstrated on the next page.

**Example Entry**

	PRACTICE		SLEEP						NOTES
DATE	TOTAL AMOUNT	TIME OF DAY	TOTAL AMOUNT	AWAKE	REM	LIGHT	DEEP	SLEEP SCORE	
Mon.	1hr 10 <sub>min</sub>	10:15–11:00, 13:00–14:00	7hr 32 <sub>min</sub>	56 <sub>min</sub>	1hr 47 <sub>min</sub>	3hr 46 <sub>min</sub>	1hr 59 <sub>min</sub>	70	I took a nap at midday. I went to bed late.



<p>The practice logs are best completed in retrospect at the end of the day.</p> <p>e.g. Monday evening.</p>	<p>The sleep logs are best when completed first thing in the morning after waking up.</p> <p>e.g. Tuesday morning.</p>	<p>This column can be used to make notes about your practice or sleep.</p>
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**Week 1**

DATE	PRACTICE		SLEEP						NOTES
	TOTAL AMOUNT	TIME OF DAY	TOTAL AMOUNT	AWAKE	REM	LIGHT	DEEP	SLEEP SCORE	
Mon.									
Tue.									
Wed.									
Thu.									
Fri.									
Sat.									
Sun.									

## Appendix D: Semistructured Interview Schedule

1. How did you experience keeping practice logs?
2. How did you experience keeping sleep logs?
3. Do you think there is a relationship between your practice and your sleep? If so, in what way?
4. In what ways do you think practice impacts your sleep?
  - Do you think the amount of time you spend practising affects your sleep?
  - Do you think the time of day you practise affects your sleep?
5. Tell me about practice and your mood.
  - How do you normally feel after practising?
  - How do you feel if you miss a day's practice, or practise less than you planned to?
6. Do you experience music performance anxiety? If so:
  - Tell me about performance anxiety and your practising.
  - Tell me about performance anxiety and your sleep.
7. To what extent do you relate with perfectionism? If so:
  - Can you relate to perfectionism in the sense that you find it difficult to be happy with your practising?
  - How would you say perfectionism relates to your sleep?
8. Do you experience ruminative thoughts, where your mind thinks about negative events over and over? If so:
  - Why do you think this happens?
  - When does this normally happen?
  - Does this have any effects on your sleep?
9. How did you experience the lockdown and the pandemic in general?
  - Tell me about your experiences of practice during this time.
  - Tell me about your experiences of sleep during this time.