The suffering artist — Depression and anxiety symptoms in music students:

Understanding hidden influences and planning effective intervention

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Abstract

Musicians show higher depression prevalence compared to the normal population. Little is known, however, to what extent standardised contributory factors affect musicians in their early careers when still at university or music college. Furthermore, beliefs surrounding the creative mystique, in essence that musical creativity and accomplishment are closely associated with mental illness, promote self-stigma and impede prevention and treatment compliance. This thesis investigated depression prevalence and selected depression predictors in a student population and examined if professional identity with being a musician could be an additional depression predictor. One hundred and two participants under- and postgraduate students from various institutions and with varying primary subjects participated in an online survey featuring standardised scales for depression and selected predictors. Students were allocated into three groups depending on their main study subject and musical training: music college students, university musicians (music and non-music university students with comparable levels of music professional identity and musical training) and university non-musicians (no professional musical identity and training in music). Music college students showed significantly higher depression prevalence compared to the two other groups. University non-musicians presented significantly higher depression predictor(s). A hierarchical regression and a tree analysis found that depression was best predicted with a combination of predictors (high anxiety and low burnout of students with academic staff). A further study examined how professional musicians experienced a (medically diagnosed) depression. Taken together, results demonstrate that standardised instruments, rather than profiling by profession, offer a more differentiated and therefore promising depression risk analysis for musicians in training in higher education. Furthermore, they underscore the relevance of the culture surrounding music learning and the musical profession, and play an important role in how depression is experienced. These findings support the use of selective depression prevention programmes, delivered in so-called safe locations, that target dysfunctional ideas and beliefs.

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Glossary

Affect . . . . . collective term for phenomena that include subjective wellbeing, i.e. emotions and moods (affective illness)

Comorbidity . . . . occurrence of two different conditions, either a combination of psychological and physical, two psychological, or two physical conditions within the same time frame

Compliance . . . . . willingness to follow medical advice, treatment adherence

Cut-off scores . . . . when questionnaires, such as depression or pain questionnaires, refer to a defined point above which an individual is considered to be highly likely affected by the illness or condition. These scores are generally defined by the authors of the questionnaire. They may, however, be adapted with growing evidence or in different cultural environments

Endorphins . . . . . endogenous opioid peptides produced by humans and mammals (vertebrates) whose principal function is to prevent or inhibit the communication of pain signals within the body

GABA . . . . . gamma-aminobutyric acid or γ-aminobutyric acid is the most frequently found inhibitory neurotransmitter in the brains of adult humans and other mammals

Monoamines . . . . neurotransmitters (derived from amino acid), for instance dopamine, noradrenalin (norepinephrine) or serotonin

Monoaminergic . . working on monoamine neurotransmitters

Neurotransmitters endogenous chemical messenger substances

Nocebo . . . . . (from latin *nocebo*, I shall harm) is a negative health effect experienced by patients after having been exposed to a particular factor; for instance, patients experience a nocebo effect (in this case the diminished effect) of a certain medicine, if they perceive that medicine to be unhelpful based on a previous experience or even based on overhearing medical personnel who say so. The nocebo effect is thus the opposite of the placebo effect

Nosology . . . . . pathology or systematic classification of diseases

Placebo . . . . . a placebo effect refers to the phenomenon that individuals perceive a beneficial effect from an inactive substance (or medicine). The placebo effect is thus the opposite of the nocebo effect

Predisposition . . . physical and/or psychological state that favours or fosters an illness or condition

Prevalence . . . . . proportion of a population with a specific characteristic or illness; in this case the prevalence of depression refers to the proportion of participants significantly affected by depressive symptoms, either at a certain point in time (point prevalence) or during a certain year (year prevalence) or during a life-time (life-time prevalence)

Remission . . . . . diminishing of symptoms of an illness, either as defined by the literature or by a particular study

Somatoform . . . . . physical

Stigma . . . . . attribution of characteristics that society perceives to be negative and which thus contribute to discrimination

Symptom . . . . . sign of an illness

Yellow flag . . . . . in pain there are (psychosocial) indicators suggesting a risk of chronification of pain. They relate to the individual's attitudes, beliefs (belief systems), emotions, behaviours, family and work-place. **Red flags** in pain are not an indication for a higher probability of chronification, but are instead possible signs for serious underlying conditions such as traumata, fractures or neurological deficits.

To doubt everything or to believe everything are two equally comfortable solutions as they both relieve us of reflection.

—La science et l'hypothèse, Henri Poincaré (1902)

1 Introduction

1.1 Motivation

In his presentation at the *Mental Health throughout Life* conference, neuro-psychiatrist Prof. Dr. med. Mathias Berger illustrated current progress in psychotherapy as exemplified in the treatment of depression (Berger, 2013). He made the case that depression had been ignored by psychiatrists for too long, and while it had been left unattended, a wide variety of non-evidence-based methods had sprouted that were each sold to help-seeking patients as the 'one and only therapy to cure depression'. At the top of his list of culprits he named both psychiatrists and psychologists. According to him, Psychologists were responsible for only partially understanding the complex concept of depression and then accentuating it dogmatically, while psychiatrists were responsible for having treated depression as an 'inferior illness', because it appeared to be 'just a psychological condition', providing little interest to psychiatrists and neurologists. This lack of interest in the illness had not only pushed patients away from seeking psychiatric help, but the vacuum thus created had been filled by, and helped to propagate and maintain, a scientifically outdated, mono-causal view of depression, despite the multifactorial viewpoint set out in the *International Statistical Classification of Diseases and Related Health Problems* (ICD, World Health Organization, 1992).

On the face of it, such judgement appears overly harsh and little differentiated. Yet in light of Berger's standing as an eminent researcher in the field of depression, a patients' advocate, and a (former) president and honorary member of the largest governing body for medical research and practice (*Deutsche Gesellschaft für Psychiatrie, Psychotherapie und Nervenheilkunde*; German Society of Psychiatry, Psychotherapy and Nervous Diseases, DGPPN), his presentation carried considerable weight, and thus investigating his statements is a necessary exercise in due diligence.

In fact, a closer look reveals that Berger is not alone in his critique of this phenomenon. Helmchen (2013) observed that the problem of non-evidence-based methods in researching and treating depression indeed became more pronounced, and the concepts progressively more rigid, the further the therapist/researcher was (educationally) removed from the psychiatric world. He, for instance, cited an example from the UK in the 1960s, where this phenomenon had led some practitioners to believe that the 'family' as a social nucleus was pathogenic, or in more colloquial terms, family was at the centre of all evil. Thus, all mental illnesses, including depression, were assumed to be a reaction to this pathology. Some went even further in this belief: mental illness was by some practitioners considered to be a fabrication of psychiatrists. This development has been laid out in a range of critical volumes by Szasz and Alexander (1968), Szasz (1987, 2011), Sarbin and Mancuso (1980) and Gergen (1985). As a consequence, practitioners who believed in the 'social nucleus theory' went as far as to refuse patients treatment if they had somatic (physical) symptoms. Their reasoning was that if patients were 'somatically ill' - for instance in a delirium - they could not at the same time be 'socially ill' – i.e. have a mental condition.

One might argue that such a view was propagated 60 years ago, 30 years before the publication of the current, internationally accepted, definition of depression in the ICD (World Health Organization, 1992). However, as Helmchen (2013) further demonstrated in the example of Biegler (2011)'s psychoanalysis, dogmatism in depression can in fact not be relegated to the history books. It is still alive and

potentially dangerous. Biegler went as far as to declare his depression theory an ethical imperative to support 'the autonomy of depressive patients', excluding all other therapeutic approaches. As a consequence, patients who had been treated by psychologists following Biegler's dogmatic depression theory, finally sued their therapists for withholding drugs, demanding compensation for the years lost due to this refusal to prescribe antidepressants/antipsychotics (Klerman, 1990; Kirk, 2017). Furthermore, Leichsenring and Rabung (2013) demonstrated that blame for the rise of non-evidence-based treatment and ignorance of evidence-based methods could not uniquely be assigned to psychologists, but had to be assigned to psychiatrists in equal measure: both fields were equally prone to being more concerned with political aspects and not enough with scientific evidence.

Such dogmatic therapy approaches have serious consequences for patients, and particularly for groups who are found to be more vulnerable to depression than the norm, such as musicians (Hildebrandt, Nübling & Candia, 2012). With the risks presented by dogmatic therapists on one hand and existing prejudice regarding depression on the other hand, educating vulnerable groups, such as musicians, regarding depression becomes imperative (World Health Organization, 1992). The following story illustrates the vital importance for musicians to understand the symptoms of depression as an illness, and how their choices and lifestyle may influence or even artificially produce it. While entirely fictitious, the story is based on the challenges that can typically arise around the diagnosis and successful treatment of depression in view of some common experiences of musicians.

Classical musician X is a young female in her early 20s[1] during her postgraduate music college years or shortly thereafter. Like a lot of her peers, X suffers from performance anxiety. During a particularly stressful period of auditions and concerts, she accepts some pills from her friends to alleviate her symptoms. Her friends assure her that the drug should make her feel calmer. They have all taken it, as they say,

[1]The choice of a female musician is deliberate as depression has its first peak during the teenage years / early twenties, and women are supposedly more affected than men (H.-U. Wittchen & Jacobi, 2005)

without experiencing any unwanted side effects. After taking the pills a couple of times, X feels that she does much better without her pre-performance anxiety, is seemingly side-effect free, and so keeps taking the drugs. After a few months, she starts to experience inexplicable moments of low motivation and sadness, and in addition rejections after auditions cause her more grief than she has previously experienced in her young career. These symptoms increase as time goes by. Finally, she decides to see a doctor who evaluates her as a young female who is very stressed, with low motivation and deep sadness, and diagnoses a depression. He prescribes antidepressants. However, X does not mention the other pills to her doctor, and now continues to take both the antidepressants and her friends' pills.

At this point, it is necessary to look into the properties of the drugs that most likely were given to X by her friends: it is highly likely that these drugs, as described above, are β-blockers (Mahkorn & Starostzik, 2014). They are freely available and low in side-effects compared to other tranquillisers. Neftel et al. (1982) showed in musicians that β-blockers help to suppress fear though a feedback-mechanism. Lahme, Klein-Vogelbach and Spirgi-Gantert (2000) claim that one in two musicians takes β-blockers whilst more conservative estimates are between 8% Langendörfer, Hodapp, Kreutz and Bongard (2006) and 31% Kenny and Ackermann (2015).

β-blockers attach to the body's β-adreno-receptors, thereby suppressing adrenaline and noradrenaline production. An abnormally low concentration of adrenaline and/or noradrenalin in the body, for instance induced by drugs, tumours, etc., has been linked to depression (Lambert, Johansson, Ågren & Friberg, 2000; Manji, Drevets & Charney, 2001). The antidepressants taken by X are likely to override the β-blockers, and thus also the demotivation and sadness. This might cause performance anxiety to reappear in the same intensity as before X started to take the drugs. At this point, there are a number of different possible future scenarios, however, ideally X would stop taking drugs (both β-blockers and antidepressants) and start managing anxiety differently; the worst-case scenario would be for X to end up playing medical ping-pong with antidepressants and β-blockers, thus ending

up with a diagnosis of bipolar depression due to the accompanying symptoms caused by this combination of drugs (Preuss et al., 2006; Graf-Czikajlo, 2010).

The reason for the inclusion of this story is twofold: on one hand it illustrates the vulnerability of musicians to becoming (involuntarily) addicted to medication such as β-blockers, on the other hand it shows the possible points where primary prevention strategies and education could successfully be implemented. In medical science, where both students and doctors are found to be at high risk of depression, this process has been implemented (Ibrahim, Kelly, Adams & Glazebrook, 2013). Freudenberg (2005) and Bscheid (2009) demonstrated in reviewing a longitudinal study for a depression awareness campaign, how successful an awareness of the problem (e.g. recognising symptoms), help seeking behaviour (e.g. search for qualified professional help), and compliance with treatments (e.g. by reinforcement of the social surrounding) can be implemented. These are points that can already be influenced on basic (educative) levels. A similar success could be achieved with music students in mental and physical health prevention classes.

As a consequence, the motivation for my thesis was to approach the topic of musicians and depression using the IDC-10 (World Health Organization, 1992) as a starting point. While this approach is seldom applied in music psychology, it nevertheless enables to scrutinise the existing specialist literature on musicians and depression in the field of musicians' mental health and wellbeing, and critically review its findings and conclusions against a medical backdrop[2].

[2]Some of the material that has contributed towards, and/or was extracted from this thesis in form of publications or presentations, can be found under the author's name in references, with the exception of the pre-print (Korte, Cerci, Wehry, Timmers & Williamson, 2020)

Wo mit der Dumpfheit sich die Wissenschaft verbündet,
Wird Unerfreuliches kunstmäßig fest gegründet.

When science allies with ignorance
unfortunate [things] will artistically be proclaimed.

— Friedrich Rückert Rückert, 1839

2 Literature review

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2.1 Introduction

Numerous diseases affect musicians and would therefore be of interest to research, but amongst them there is one illness that, while it may appear average and unremarkable at first glance, is crippling, pervasive, widely spread, and burdened with stigma and myth: depression.

For World Health day in April 2017, the World Health Organisation (WHO) focussed on depression as one of the leading pathologies worldwide: 11% of all years lived with disability/illness in the world are due to depression (World Health Organization, 2013). With an estimated 350 million people affected worldwide, depression remains an important topic clinically, economically, and in society (World Health Organization, 2015). Although in Europe, compared to the USA, only a small fraction of research has focussed on the actual costs to society, Andlin-Sobocki, Jönsson, Angst and Rehnberg (2006) estimated the cost of depression in Europe at 118 billion EUR in 2004, including hospitalisation, outpatient care and medicine. In other words, 253 EUR were spent per inhabitant in Europe in 2004 alone. With one in four individuals suffering from depression at any one point during a given a year, this makes depression the most costly brain disorder accounting for 33% of the total cost of brain disorders (Andlin-Sobocki, Jönsson, H.-U. U. Wittchen & Olesn, 2005). Depression not only impacts life quality, but also heightens the risk for other conditions such as diabetes (Type II), coronary heart disease and chronic pain conditions (Schulz & Dörr, 2012). Against this backdrop, music specific literature identified musicians to be more vulnerable or at risk of depression (Kenny & Ackermann, 2015; Williamon & S. Thompson, 2006; Spahn, Walther & Nusseck, 2016)[1]. But is this so? This thesis proposes to investigate depression in a more interdisciplinary way using a medical approach to depression. While there is a psychological aspect to depression, it is, in essence, a medical condition, and research into it should thus reflect this approach.

Thererfore the introduction to this thesis is divided into two major sections: Section 1 reviews depression (e.g. classification systems, symptoms and predictors, see paragraph 2.2.1, p. 10), while section 2 reviews the specific literature on depression in musicians / music students (see paragraph 2.3 p. 58).

[1]Please note that these papers provide no details or information about musical genre, qualifications or education style of their participants. The participants were musicians of premier state and opera orchestra (Kenny & Ackermann, 2015), UK conservatoire students (Williamon & S. Thompson, 2006) and students from a Musikhochschule (Spahn, Hildebrandt & Seidenglanz, 2001).

Approaching my research topic with well-founded questions and a sound study design for all three studies required a solid, fundamental understanding of depression as a medical condition. Therefore, section 1 of this introduction is sub-divided into (a) a presentation of depression as a medical condition see paragraph 2.2.3, p. 14) and (b) a review of specific depression predictors, also referred to as depression variables (see paragraph 2.2.9, p.40). The points discussed in this section are vital for understanding the rest of my thesis - from literature choices to study design and formulation of research questions.

Section 2, the review of specific literature on depression in musicians / music students, also divides into two parts: (a) a review of literature that investigates depression in musicians see paragraph 2.3, p. 58), and (b) a review of studies that investigate depression predictors such as pain (see paragraph 2.3, p. 63).

2.2 Depression

This first section focusses on the topic of depression and reviews the following aspects:

1. the history of depression, particularly depression in the arts and music
2. common prejudices regarding depression
3. nosology or systematic classification of depression including international classifications and epidemiology
4. means to diagnose depression
5. aetiology
6. means to measure (quantitative questionnaires)
7. risk factors

The following sections discussing the medical condition depression build the corner stone for this thesis. As depression is a medical condition, a solid knowledge about depression as an illness, as defined by pertinent medical literature and

current medical practice, is the first prerequisite in order to understand what constitutes a true at-risk population in depression, and to evaluate whether a particular population such as musicians should or could be considered as being at risk. The subsequent sections allow an understanding of the condition depression, but they are especially tailored to musicians as a target population. In this context, historic events as well as contemporary multifactorial models, to just name a few, need to be taken into account in the approach formulating valid research questions selecting the most fitting questionnaires.

2.2.1 History of depression

The following presents a brief outline of the history of depression. It describes that depression has an evolutionary origin, similar to anxiety, and thus also has a written track record though history. Instead of giving a complete historical outline, this section highlights the different historical systems of thought that still influence contemporary thinking regarding depression, with a special focus on those thought systems or patterns relevant to the arts/music. While, to be absolutely correct, all historical depression references should refer to *depression like symptoms* and not depression since the definition and understanding of the condition has evolved over time, all historical references to the condition in this thesis will henceforth be to depression for ease of reading.

Drawing from anxiety analogy, evolutionary depression research assumes that depression has an evolutionary origin to enable humans to react to a depressive strain appropriately (M. C. Keller & Nesse, 2006). In contrast to anxiety however, depression is not seen as a reaction to an avoidable threat, but as a consequence of an event that already occurred (e.g. loss), or a reaction to an uncontrollable life situation. While anxiety leads to an activation that enables flight, the main expression of depression is devitalisation. Since depression is almost retrograde, it is easy to overlook that it has evolutionary, biological benefits. In an uncontrollable, stressful situation, where rash decisions heighten the risk of (life) danger and exertion, the retrograde character of depression can be sensible, for instance loss

of motivation (Böker & Hell, 2002), a slower thinking process (Marneros, 2004), and psycho-motor slowdown (Bader, Bühler, Endrass, Klipstein & Hell, 1999). Moreover, depressive behaviour is not unique to humans, but can be found in many mammals. This is firstly demonstrated by the close link between stress factors and the frequency of depression, secondly by continuous changes in the metabolism during ongoing stress and depression, and thirdly by the analogous depressive behaviour of mammals (Kendler, Karkowski & Prescott, 1999; Kendler, Gardner & Prescott, 2002; Van Praag, De Kloet & van Os, 2004). Since depressive behaviour follows a regular pattern and appears with a relatively high frequency in humans and other mammals, it is therefore reasonable to expect behavioural maladaptations as well as functional disturbances.

An evolutionary origin of depression makes it likely that individuals have always experienced depression and, moreover, that historical written recollection is available. Historical descriptions of depression can already be found in one of the oldest known medical documents, the Papyrus Ebers ca. 1550 BC (Ebers, 1875). Here depression has no particular name and is rather associated with anatomical organs (liver, uterus). The illness's first name, *melancholia*, was coined by early Greek scientists and can be found in the Corpus Hippocraticum - collection of medical texts dating back to 5th century BC-2nd century AC (see for example Flashar, 1962). This description would be picked up much later to qualify a personality structure as *typus melancholicus* (Tellenbach, 1961). The Roman politician Aurelius Gellius (ca. 130-180) wrote about it:

> 'Melancholia does not appear in small-minded or low-spirited people. She is rather almost a heroic condition and those affected by her practically always bravely tell the truth without consideration for time or moderation.' (Flashar, 1962, p.750)

Here is the first written record of melancholia, or black gall, being interpreted positively. The text says that affected individuals stand out from the crowd – subject to certain conditions. Whether the Corpus Hippocraticum, that Gellius refers to, was de facto written by Aristoteles is, however, debated. Nevertheless, this text has

had a significant impact on the interpretation of melancholia and the understanding of genius (and madness) - an impact that lasts into this century (Radestock, 1884; Fichtner, 1980; Jütte, 2006; Eichhorn, Völlnagel & Wullen, 2006). Later authors went further in their interpretation of this sentence, which described the melancholic person as a hero. Based on this description, melancholia achieved a special status. Numerous personalities, from religion and philosophy to the arts and music, have analysed it in various ways (Laux, 2011). The melancholic was not only associated with being pathological or sick, but also with a type or temperament. Time and again, there is reference to melancholia as a character trait of exceptional people, and depending on the time period, this character trait has been associated with either negative or positive aspects (Burton, 1621; Flashar, 1962). For artists, the positive aspects dominated, for instance for the painter Edvard Munch (A.-L. Henkel, 2006), or as presented in the descriptions of famous composers and other creative artists (Thys, Sabbe & M De Hert, 2013). This belief that melancholia, and thus depression, was not only a 'necessary ingredient', but vital for a more-than-average creativity and successful career, has survived in the arts/music *creative-mystic* (Jamison, 1995; Zhang, Chan, Zhong & Yu, 2015). Wiedemann, Burgmair and Weber (2007) illustrate how researching genius was not just a single occurrence. On the contrary, until 90-100 years ago, it was still being seriously undertaken in order to find ways to create so-called *super-brains* - not only in the arts, but also in other professional disciplines. When investigating depression in musicians, this surviving belief in the creative myth or creative mystique cannot be ignored, but has to be taken into account (see paragraph 2.3.1, p. 71 on creative myth)[2].

When looking at historical mentions of depression, a uniform description and understanding cannot be assumed. To put this into perspective, in 1863 Kahlbaum found more than 30 different medical classifications of mental health in his European mental health review. Throughout history biological, psychological or social causes

[2]These convictions can artificially foster the belief that one suffers from depression, while the experience medically only qualifies as a normal phase of low mood. This idea is reflected in the overarching research question one

of depression have been emphasised or investigated in isolation - both in (treatment) practice and in research. (Therapy) institutions such as *social-psychiatry institutions* or *biological psychiatry institutions* have accused one another of one-dimensional thinking and -beliefs (Lieb & Frauenknecht, 2012). However, this mono-causal approach to depression – using only one variable to explain the cause of depression – was superseded in the 1960s, when H-J Bochnik introduced his 'Bochnik Triangle', in which the somatic, psychological and social influences on the state of mental health/disease, and thus depression, had to be equally taken into account (Bochnik, Broszio, Donike, Pitthich & Wilbrandt, 1967). This is currently reflected in the multifactorial model by both standard manuals describing (mental) health: the International Statistical Classification of Diseases and Related Health Problems (ICD) (World Health Organization, 1992) and the Diagnostic and Statistical Manual of Mental Disorders (DSM) by the American Psychiatric Association (American Psychiatric Association, 2013).

2.2.2 Prejudices and stigma

Despite the introduction of a formal and internationally agreed definition of depression as a medical condition almost 70 years ago, prejudices and stigma attached to depression exist not only in the general population, but also in medical students in training (Lieb & Frauenknecht, 2012). General stigma attached to depression patients includes for instance the belief that depression is hereditary and thus, depending on parentage, either inevitable or avoidable. It also includes beliefs that depressed patients are (legally) insane, retarded (e.g. idiots), or that depression will become chronic when treated, which deters individuals in need from seeking help (Lieb & Frauenknecht, 2012; Barney, Griffiths, Jorm & Christensen, 2006). Furthermore, there is a self-stigma in the eyes of patients, who believe that they are 'not worth anything', thus loose confidence and try to hide their condition in various ways (Aydin & Fritsch, 2015). Lastly, there are beliefs that classifications for depression are confusing and that diagnostic means and treatment

options follow neither a causal approach nor are they based on evidence (Lieb & Frauenknecht, 2012; Hermans, 2014; Gaebel et al., 2015).

Some of these beliefs are rooted in depression history, as laid out above, and some stem from the fact that research in depression is far behind, when compared to the progress of research in physical illnesses (McGorry, Hickie, Yung, Pantelis & Jackson, 2006). Nevertheless, these points need to be considered, not only to ensure internal and external validity of a depression-related study, but also in order to find mitigation measures to apply when such beliefs are shared by participants and interfere in a study – for instance by preventing individuals from participating based on self-stigma.

The following paragraphs explore in more detail the nosology and epidemiology of depression, as well as diagnostic possibilities, in regards to the three studies that constitute part of this thesis.

2.2.3 Nosology of depression

Creating a nosology for depression (i.e. a compendium documenting causes, progression, frequency, etc.), has been problematic for medical researchers and practitioners, compared to other physical illnesses – not least because the aetiology of depression can only be assumed. It is thus is essentially classified as a syndrome: a collection of recognisable symptoms that are present at the same time. The separation into organic, endogenous (non-organic), and psychogenetic depression has been replaced by a classification based on phenomenological criteria (the subjective perception of depression) since the introduction of the ICD-10 (1992) and the DSM-V (1994). This change is important to take into account, when reading studies on depression written prior to 1992.

The current ICD-10 (World Health Organization, 1992) is binding for the medical description of illnesses, although some countries have released country-specific issues: for instance, the ICD-10-GM (Germany) or the ICD-USA (in transition from the DSM to the ICD-10). The DSM, a classification system introduced by the APA, was first published in 1952. It was based upon US census documents. Only in its

third version[3] did it include the required ICD criteria for psychiatric illnesses. Since the DSM was the national classification system for the USA and uniquely referred to US-based data, it never had to take into account the numerous compromises and addendums that the ICD requires to this day in order to be applicable worldwide. It logically follows that the DSM is more vulnerable to cultural bias. The DSM has been mostly used for scientific studies and as a US reference tool (health insurance, health plan, care, etc.). In diagnosis, experienced physicians point out that the ICD is written as a guideline, reflecting the current knowledge. Moreover, it has to code all medical problems/accidents and should be used as a reference tool, as it also includes codes for conditions such as 'sucked into a jet engine' (V97.33), spacecraft collision' (W22.02) or 'struck by duck' (W61.62, World Health Organization, 1992). Points in the ICD-10 can be, should be and are being revised for its 11th edition. Nevertheless, the ICD-10 is currently the last official version and since the USA started to transfer to the use of the ICD-10 (since October 2015, American Psychiatric Association, 2013) this thesis will refer to depression using the ICD-10.

2.2.4 Classification

Psychiatric diseases, such as depression, are described and classified in section F of the ICD-10. Here, depression is reviewed in F3 under affective disorders, meaning depression, mania and bipolar depression (F30.- to F39.-, see Fig. 2.1).

The phenomenological principle by which the ICD-10 is ordered can best be described using the example of depression. Depression is characterised by

1. certain psychopathological symptoms: three main and six minor criteria (see paragraph 2.2.6, p. 20 and Tab. 2.1 for an overview of depression symptoms)

2. a certain degree of severity, namely what constitutes a minor, moderate or severe episode. This is decided by the amount of symptoms present. (see Fig. 2.3 for an overview)

[3]DSM-III, published in 1980

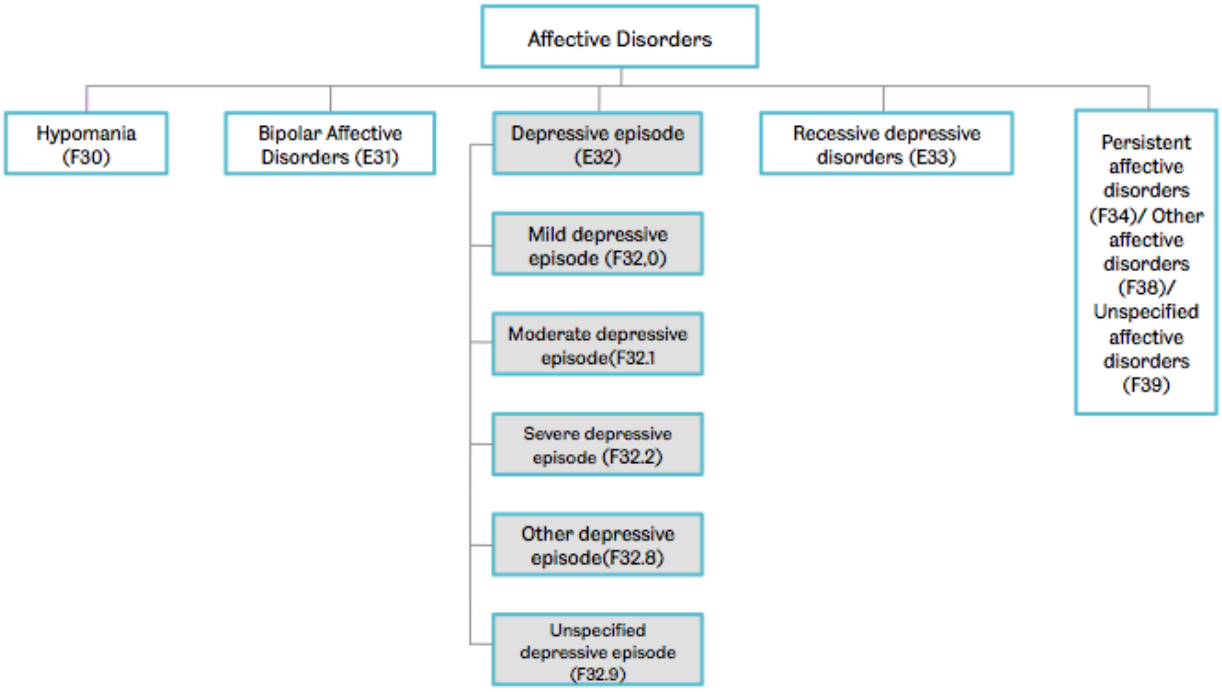

Figure 2.1: ICD-10: Affective disorders; depression (F30.- to 39.- only, ICD-10 (World Health Organization, 1992)

Note: the grey boxes highlight the diagnosis keys of depression as it investigated in this thesis

3. a certain development or course: depression can occur as a one-off episode or as recurring episodes or be intersected by manic components (bipolar) (see Fig 2.4 for an overview)

Depression only falls under the F3 diagnostic code, if no organic causes can be found. If, on the contrary, an organic malfunction causes depression for instance a tumour or hypothyroidism, it is then classified as organic under F0 (organic malfunctions) and not F3. This also means that, in essence, depression remains an illness that is diagnosed verbally through the patients and the psychiatrist/psychologist, and that all physical means to detect depression are used to exclude a depression with an organic cause.

2.2.5 Epidemiology

Is depression an illness on the rise, and do musicians have reasonable grounds to assume that they are more affected than the norm and/or previous generations of musicians?

Taking into account the contemporary burden of depression from 16 European countries, and using a participant pool of 82.7 million people, H.-U. Wittchen and Jacobi (2005) argue in their meta-analysis that giving an answer to these two closely related questions is not straightforward. This is firstly due to the stigma attached to depression which varies depending on age, as can be seen in Figure 2.2.

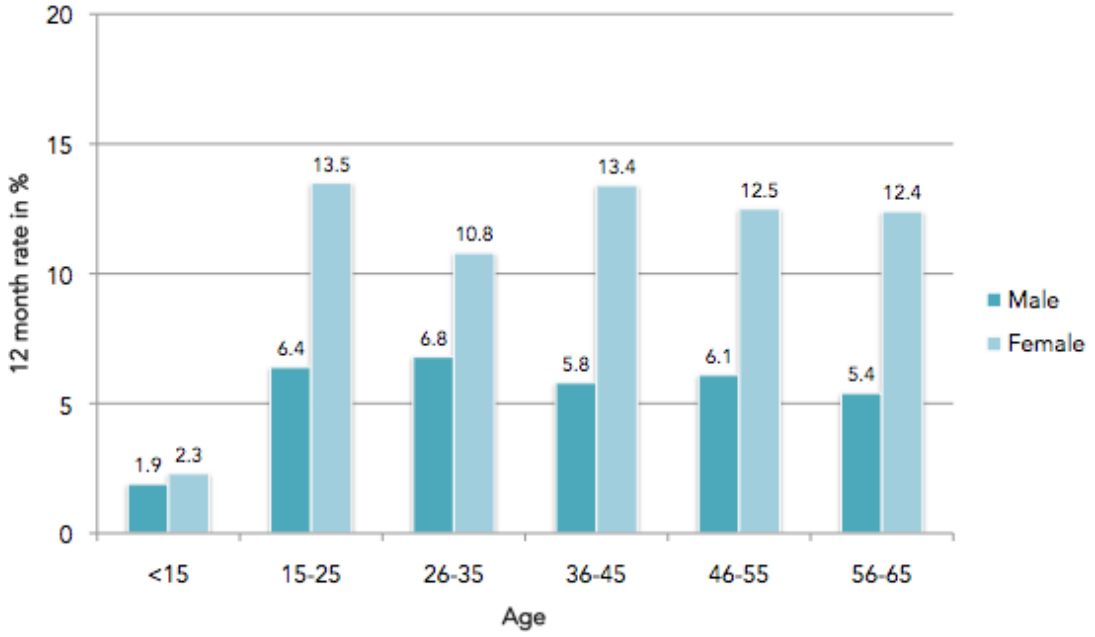

Figure 2.2: Prevalence of depression in Europe based on H.-U. Wittchen (2009) showing that depression is an illness affecting all ages, but particularly individuals during their developmental years

Figure 2.2 documents that while depression is an illness that affects all ages, it affects individuals particularly during peak development years or adolescence (15-25 years of age). In this regard, H.-U. Wittchen (2009) takes the standard medical view that adolescence, a process linking childhood to adulthood and defined by particular physical, psychological and emotional problems, is seen as complete in Western Societies by the age of 25 (de Guyter, 2010). While the numbers regarding

depression in older adults need to be interpreted with caution[4] (Mauz & Jacobi, 2008; H.-U. Wittchen, Jacobi, Klose, Ryl & Ziese, 2010), this graph shows that proper longitudinal studies (i.e. studies looking at the same population over a number of years) are scarce and do not support the idea of a disproportional growth or, in other words, the idea of a recent depression epidemic.

However, juxtaposing H.-U. Wittchen and Jacobi's meta-analysis that found a depression prevalence of 27% within a 12-month period, with the WHO's statement that one in four suffers from depression during their lifetime (World Health Organization, 2015), how should this discrepancy in numbers be judged? To put prevalence into perspective: among adults, the 12-month prevalence of a physical illness is currently estimated to be over 60% Jacobi (2009). This means that over 60% of adults will likely contract a physical illness during any given year. This could be the annual flu or cold in the winter, a gastro-intestinal virus in the summer or any other physical illness. Furthermore, all physical illnesses record a wide variability in severity and treatment needs, without this casting doubt on their frequency. Why should a similar prevalence rate not apply to mental health?

Critics appear to convey that it is unacceptable, and therefore impossible, that every fourth person experiences depression at least once in their lifetime, and state that such a high prevalence would be more than any health care system should be able to cope with (Narrow, Rae, Robins & Regier, 2002). Jacobi (2009) questions why the brain and nervous system, and with it mental health problems, should be less affected in terms of illness than other, less complex, (organ) areas. It is likely that the smaller depression numbers reported in research occur due to the stigma attached to mental illness (Rüsch, Berger, Finzen & Angermeyer, 2004), and are not based on a lack of validity of medical diagnoses (Kendell, 2002).

These findings show that psychological diagnoses used in epidemiological studies do not constitute an inadmissible extension of the concept of illness ('psychiatry of normal problems') or 'invent new diseases'. On the contrary, relationships between

[4]Older adults rarely tend to complain about mental health problems compared to younger individuals.

these diagnoses and negative outcomes − such as days off work as an external criterion − are highly significant (Jacobi, Klose & Wittchen, 2004).

Depression literature demonstrates that there are general risk factors in depression, such as age, stressful professions, job insecurity or other insecurity, uncontrollable life situations, and lack of social support and resources (e.g. family, friends or social support, job gratifications and services) (Mauz & Jacobi, 2008). Furthermore, in general practice younger patients, men, individuals with a low-level depression, and individuals from lower social classes are considerably underestimated and misdiagnosed for depression, compared to older adults, female patients, and severe cases of depression (Mauz & Jacobi, 2008; Jacobi, Höfler, Meister & Wittchen, 2002). Many of these risk factors apply to (UK) musicians and music students. Musicians mostly do not have long term working contracts and have to be 'on the road' for their jobs, for instance for touring or projects in other cities or countries. Music students, falling into the adolescent category, add another level of social stress to this: they often move away from home to pursue their studies and live on their own for the first time in their lives, which means that social contacts from childhood are likely to break up and life concepts need to be re-evaluated (H.-U. Wittchen, Jacobi, Klose et al., 2010)[5]. All of these points from general depression literature make a case that music students and musicians, as a profession, could be more vulnerable to depression than other groups.

In summary and answering the questions from the beginning of this paragraph, while depression is fairly prevalent (i.e. it affects one in four) based on scientific findings, there is little evidence to point towards a depression epidemic within the past 60 years. Moreover, the expectation of a 60% prevalence for any physical illness within a 12-month period establishes reasonable grounds to anticipate a similar prevalence for any mental illness. The reason for finding a lower depression prevalence, then, is seen in the stigma attached to the diagnosis of a mental illness. A first inspection of general depression literature, in view of the possibly hypothesis

[5]These concepts are reflected in all overarching research questions, but especially in the overarching research questions one and two.

that musicians and student musicians are more at risk, shows that musicians have some grounds for this belief, based on social and work related challenges.

2.2.6 Diagnosis

Affective disorders occur in phases which appear several times during life time. Phases of affective disorder may be characterised by a depressive mood (uniploar) and/or manic phases (bipolar). Between phases of affective disorder, a normal mental health state is assumed as a rule. Remission, the state after a depressive disorder is diagnosed and before the normal state of mental health is reached, is yet not fully understood. At the point of first diagnosis, 20% of affective disorders take a chronic course (Lieb & Frauenknecht, 2012).

Recapitulating from the previous paragraphs, unipolar depression is the most frequent depression diagnosis with 70% of the cases, while bipolar courses are diagnosed about 25% of the time. Manic course on their own (i.e. without any depression phases) make up about 5% of cases (Lieb & Frauenknecht, 2012).

Current knowledge sees unipolar depression essentially as a syndrome, that is a collection of recognisable symptoms (see Tab. 2.1) that are present at the same time, of which the aetiology is more or less known or can at least be assumed[6].

Anhedonia or a depressive state

Anhedonia is not only the major and key criteria in diagnosing a depression, but it is also described as not comparable to other states of mental or physical illness, and represents a special burden (Rudolf, Bermejo, Schweiger, Hohagen & Härter, 2006). The symptoms may well fluctuate during the course of the day. Classically, however, individuals experience a pronounced 'morning low' that might subside during the day. Those affected often characterise their state as a feeling hopelessness and despair, often accompanied by diffuse fears and feelings of insecurity. Others describe a 'feeling of numbness' with an absence of any emotions: neither can they look forward to positive events, nor feel grief or sorrow (Rudolf et al., 2006).

[6]This concept is especially reflected in the overarching research question two.

Table 2.1: Symptoms of unipolar depression separated in main and minor criteria, based on the ICD-10, (World Health Organization, 1992)

Symptoms of depression
Main criteria
Anhedonia (loss of interest and happiness)
Depressive state
Minor criteria
Change in appetite or weight
Insomnia or increased need of sleep
Psycho-motor inhibition or restlessness
Feeling of worthlessness or guilt
Reduced energy level or fatigue
Disturbances in concentration or difficulties in decision making
Thoughts or ideas about death and suicide or attempt of suicide

Thought disorder

Content or formal thought disorder is defined by a slow-down of the thinking process - up to a blockage. The characteristic symptoms, as shown in 2.1, are disturbances in concentration and difficulties in decision making, which makes patients appear monosyllabic or taciturn. Thought disorder (content) can cause a feeling of worthlessness or guilt, or even delusion, for instance a conviction of impending poverty or an impending death from a physical illnesses such as cancer.

Vegetative symptoms

Vegetative symptoms in depression are sleeping difficulties and loss of appetite. Sleeping difficulties are characterised by problems with falling asleep, problems to sleep through the night, and early morning wakening. Most depressed patients have severe eating problems and a loss of 5% of their body weight is here seen as a significant indication for a depression symptom.

Figure 2.1 shows how a depressive syndrome or a depressive episode is diagnosed. A depressive syndrome is the collection of symptoms that do not quite reach the level of a depressive episode. For instance, this is the case when all symptoms of a depressive episode are present, but last for less than two weeks, or when there is less

than the required number of symptoms for the diagnosis of a depressive episode. A depressive episode is defined by a minimum number of symptoms that are present for two weeks or more. This is further categorised by severity as mild, moderate or severe. The difference between these categories of severity is determined by the amount of minor criteria present: the more minor criteria are present, the more severe the episode. However, the severity of the depressive episode does not give insight into how much the life of the individual is impaired (Judd, H. S. Akiskal & Paulus, 1997; Klein, Shankman, Lewinsohn & Seeley, 2009).

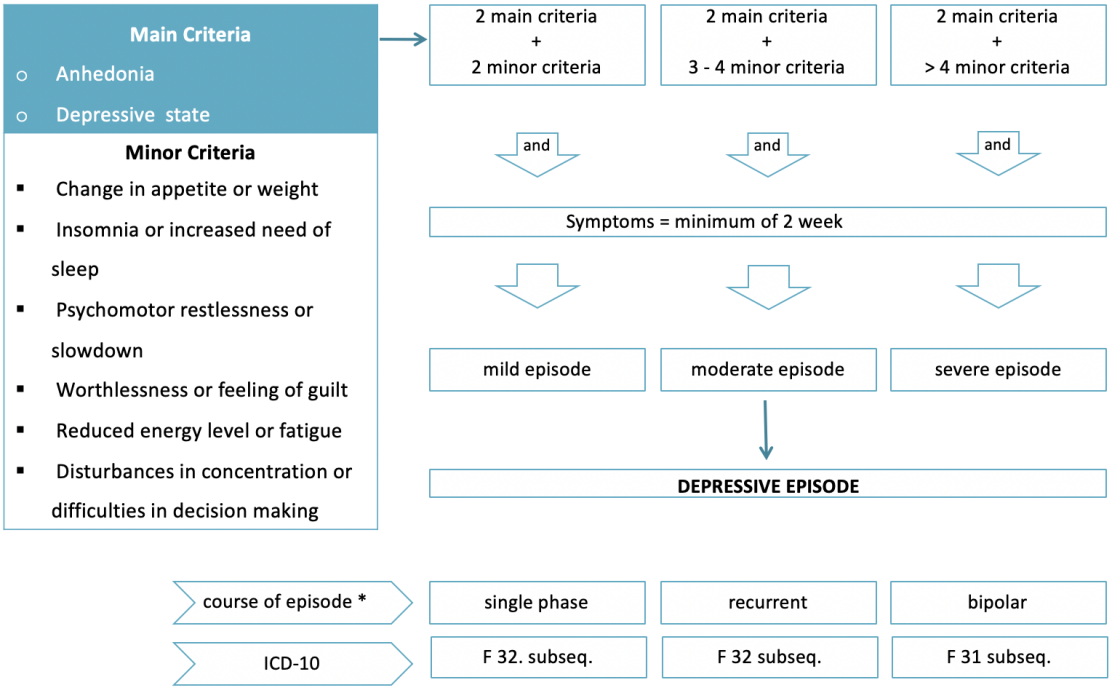

Figure 2.3: Diagnostic model of depression based on ICD-10, modified after Lieb and Frauenknecht (2012)

Note:* the course of the episode(s) (single, recurrent or bipolar) is independent of the degree of severity (mild, moderate or severe

While research in this thesis is limited to depression in its unipolar form, researching depression in a musicians' population makes it necessary to also have an understanding of its bipolar form, since some of the depression-related beliefs shared within this specific population are based upon bipolar depression. This is important in order to evaluate such shared beliefs in the course of this thesis (see paragraph 2.2.1, p.10 and paragraph 2.3.1 , p. 71).

Bipolar depression consists of alternate phases of mania and depression (see Tab. 2.1, p. 21 for detailed symptoms and Fig. 2.4 p. 24 for differences between phases). Bipolar has a much lower life-time prevalence of 1-2% and starts earlier in life (around 12-14 years of age), compared to unipolar depression that has a prevalence of 27% and shows its first peak between 20-29 years of age (Angst et al., 2005). Figure 2.4 illustrates the difference in phases between unipolar depression, bipolar and mania.

Bipolar courses are, in general, more severe than unipolar depression courses (Lieb & Frauenknecht, 2012), and about half start with a phase of mania. Patients with bipolar are, in general, more affected by depression than by mania. Table 2.2 compares the different symptoms of depression and mania. The three key symptoms for mania, being abnormally upbeat up to irritable, increased activity, and illusions of grandeur are almost the inverse to those experienced in depression phases.

Table 2.2: Symptoms of phases of unipolar depression and mania

	Unipolar depression	**Mania**
Activity	Anhedonia	Euphoria
Psychomotor	Inhibition	Increased
Thoughts (contents)	Delusional (e.g. having an undiagnosed life threatening illness, falling into poverty)	Delusions of grandeur, racing thoughts
Sleep	Early morning wakening (perceived as agonising)	Reduced need for sleep (without agony)

A 13-year study with 146 bipolar patients showed that patients were asymptomatic (i.e. show no symptoms) for 53% of the time. 32% of the time patients were depressed, 9% of the time they showed mixed symptoms, and only 6% of the time they showed a clear phase of mania. What does this mean in terms of musicians' belief in a 'creative mystique'[7]? The answer is firstly that there is a low probability, based on the prevalence of bipolarity that musicians are affected by it. Secondly, the creativity or genius that is supposedly being sparked by bipolarity would be experienced at a high cost as most of the time (or 85% of the time) individual affected

[7]Creative mystique or creative myth here means in short the belief that creativity can be enhanced by mental health problems, such as for instance bipolarity (for more details see paragraph 2.3.1, p. 71).

by bipolar depression would experience none of the 'creative advantage' ascribed to the illness, due to being either asymptomatic or depressed. During the the latter state, they would also be unable to work or at least be severely incapacitated.

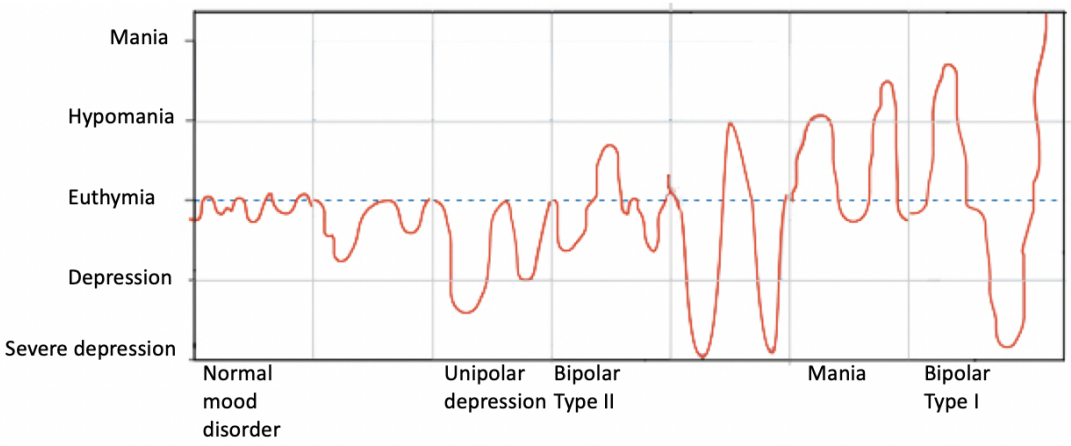

Figure 2.4: Model comparing the various phases of affective disorders based on ICD-10, modified after Lieb and Frauenknecht (2012)

Note: This model focusses on the differences between normal mood disorder, unipolar and bipolar depression

Thirdly, Lieb and Frauenknecht (2012) point out that in symptom-free phases 20-30% of patients are affected by personality disorders and/or are prone to mood swings and learning disabilities, and thus may also experience impairments (interpersonal and/or professional). The reason might be found in the early start of the illness in adolescence, which leads to difficulties in adapting to (new) situations. In summary, this paragraph illustrates that while both conditions, depression and bipolar, are affective disorders, both have a distinct symptomatology.[8]

2.2.7 Aetiology

The aetiology of affective disorders, such as depression, is only partially understood. Current knowledge assumes a complex multi-level depression model or multifactorial depression model (World Health Organization, 1992) (see paragraph 2.2.1, p. 13). One-dimensional models, targeting only one aspect in isolation, such as biological,

[8]This concept is reflected in the overarching research question two, especially when applied to Study III.

psychological or social causes, have fallen short in research and practice (Engel, 1977; J. A. den Boer, 2006). In turn, the critique point for this concept has not been its departure from mono-causal towards multidimensional theory, but rather the question which aspect should take the lead (Ghaemi, 2009) or, as Stier (2014) puts it more musically, who shall 'be the maestro in the orchestra' of biological, psychological and social causes. However, more recent publications such as Wittenborn, Rahmandad, Rick and Hosseinichimeh (2016) (see Fig. 3.10 below for the integrated model) have shown that the arbitrariness of the model can be reduced by focusing on scientifically demonstrated concepts and modelling. This opens the way to look at how the individual factors interact, rather than focus on the question of which one them plays the leading role.

Current depression knowledge assumes an integrative model that includes three aspects: (neuro)biological causes, psychological causes and social causes (World Health Organization, 1992). Biological causes are mainly genetic predisposition and neurological factors. Psychological causes are represented by their various cognitive models. Social causes are a collection of various types of stressors, both somatic and psychosocial. Somatic stressors can be (chronic) illness or the need to take specific medication (e.g. in patients with transplants), and psychosocial factors comprise all forms of trauma and conflict. These include, but are not limited to, loss of a loved one, stress due to ethnical background and/or financial stress. The graph in Figure 2.5 illustrates this concept using a simplistic, linear model.

Linearity between biological, psychological and social variables in depression, however, should not be assumed. I have included this here to introduce the concept of multifactorial (or multimodal) models as they are essential - not only to the understanding of depression, but also that of pain (see paragraph 2.2.10, p. 44), and therefore prevention strategies.

The multifactorial model for depression shows that for instance hypercortisolism, such as Morbus Cushing (Parker, Schatzberg & Lyons, 2003), and REM-sleep-destabilisation (Sander, Schmidt, Mergl, Schmidt & Hegerl, 2018) can be a cause or correlate with depression. Moreover, on a practical level this model explains

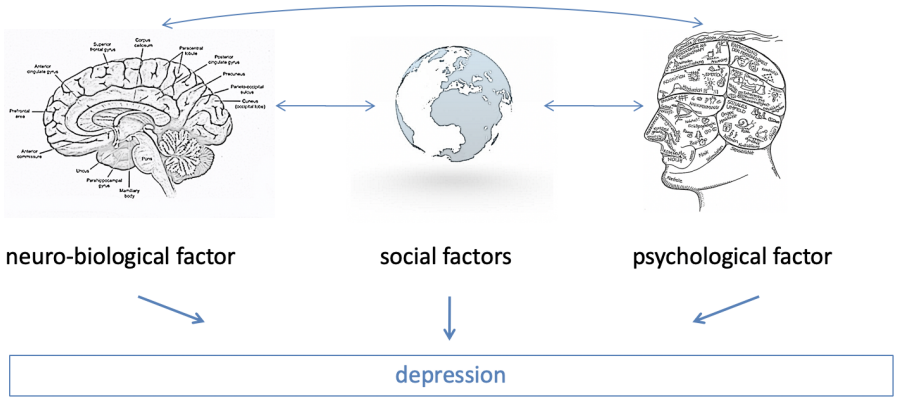

Figure 2.5: Simple causal diagram for depression aetiology, based on the current multifactorial understanding using biological, psychological and social dimensions (World Health Organization, 1992), design by the author

why medication (e.g. anti-depressive medication) and psychotherapy are usually prescribed together. Medication works on the biological side, in this case regulating the neurotransmitter balance, while the psychological side, or talking therapies, approach the behavioural issues (e.g. symptoms such as grief or guilt see Tab. 2.1).

Neuro-biological factors

An explanation of neuro-biological depression factors in the context of a study that does not investigate brain areas, neurotransmitters or genetics, might raise questions regarding its necessity. However, the reason for its inclusion lies in a common misconception regarding the role of genetics in depression, which is particularly represented amongst musicians: musicians' belief in the 'creative mystique' often involves a conviction that they are inherently and by nature – that is genetically - predisposed to (bipolar) depression. Such an inherent cause for depression has been supported by some studies either by demonstrating a higher suicide rate amongst musicians (Ludwig, 1994; Jamison, 1995) or pointing towards a generally higher percentage of musicians being depressed compared to the normal population (Vaag, Bjørngaard & Bjerkeset, 2016) (for more details on the creative mystique see paragraph 2.3.1, p. 71). Following this line of thought, this would mean that depression can be inherited, and that the presence of a so-called 'depression gene' would inevitably lead to a depression – similarly to the genetic cause identified

for instance for Huntington's disease (Myers, 2004). This is, however, not the case. Table 2.3 shows that the heritability of depression is around 20-40%, which is about the same rate as for a heart attack.

Table 2.3: Heritability of depression compared to other physical illnesses and norm variables based on Lieb and Frauenknecht (2012)

Heritability in %	**Psychiatric illnesses**	**Other illnesses or norm variables in comparison**
20 - 40	Depression, anxiety diseases, bulimia, personality disorders	Heart attack
40 - 60	Alcohol and substance abuse disorder(s)	Blood pressure, asthma
60 - 80	Bipolar, schizophrenia	Body weight, density of bones
80 - 100	Autism	Huntington's, body height, brain volume

Bipolarity, but not unipolarity, has a 60-80% risk of heritability. However, here the severity of the risk depends on the degree of kinship: as a reminder, the general risk of bipolar depression within the norm population is at 1-2%. This general risk increases to 15% if an individual's first degree relatives suffer from bipolar depression. It can increase further to 80% if both parents are affected by bipolar depression (Edvardsen et al., 2008). If no parent is affected, the likelihood for children to be affected by bipolar depression is at 1%, or in other words within the general norm. In contrast, if both parents are affected by unipolar depression, the likelihood for the child to also be affected by unipolar depression is at 28.5%, and to complete the picture, a child whose parents are both affected by unipolar depression faces a 5% risk of being affected by bipolar depression (H.-U. Wittchen, Jacobi, Klose et al., 2010).

Looking at the larger picture and taking into account depression prevalence (as discussed in paragraph 2.2.6 above, there is a 1-2% overall prevalence of bipolar depression within the general population, compared to a 27% prevalence of unipolar depression) as well as heritability, it is far more likely that a musician may be affected by unipolar- and not bipolar depression. So, how do genes influence depression?

The answer here is that genes function in combination with the social/psychological factor within the depression model. A genuine depression gene has not (yet) been identified. Current knowledge assumes several 'risk genes' that work together in an inter-individual and complex way. Therefore, the genetic model for depression is called the vulnerability-stress model. The important take-away for genetics in depression is that genes do not affect depression in a static way, but that genetic activity can be affected by epigenetic mechanisms during the developmental process or in other words, by stress in early life. For instance, a child that loses a parent at a young age is significantly more prone to future depression than his or her peers (Brent, Melhem, Donohoe & Walker, 2009; P. Kristensen, Weisæth & Heir, 2012; Berg, Rostila, Arat & Hjern, 2019).

The gene that has been found to play a role in depression, has been located on the promotor-region of the serotonin-transporter-gene, the 5-HTTLPR (5HT **T**ransporter **L**ength **P**olymorphic **R**egion), on the chromosome 17q11.1-q12 (Mayberg, 2004).

One exemplary presentation of the vulnerability-stress model can be found in the study by Caspi et al. (2003). Here, Caspi et al. show that this particular gene, that has been found in three different lengths (short (s/s), medium (s/l) and long (l/l)), works differently for the carriers of the different versions of this gene (see Fig. 2.6).

Caspi et al. demonstrate that initially, or at baseline in early childhood, there is little difference in depression occurrence between carriers of the short and the long versions of the gene. However, with an increasing number of adverse life events (e.g. trauma), a significant difference in depression appears between carriers of the short and the long versions of the gene. The earlier the onset of these adverse events, such as experiencing the early loss of a parent during childhood, the more the individual became prone to depression. In other words, the difference between carriers of the short and the long version of the gene only became significant when four or more adverse life events occurred.

Two more neuro-biological factors in depression that are relevant to mention in the context of this thesis are sleep (i.e. REM phases, Riemann, Berger and

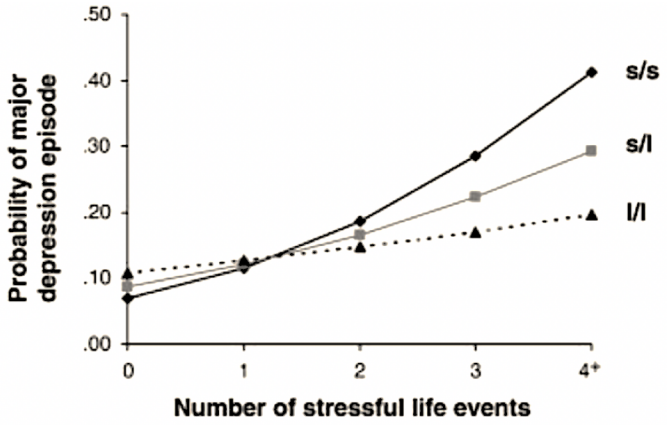

Figure 2.6: The probability of depression in carriers of different length [short (s/s), a medium (s/l) and a long version (l/l)] of the 5-HTTLPR (5HT **T**ransporter **L**ength **P**olymorphic **R**egion) over time and with increasing adverse life events, (Caspi et al., 2003)

Voderholzer, 2001) and pain (i.e. substance P, M. Keller et al., 2006). Both can be measured and have been shown to significantly predict or affect depression - depending on whether an individual already has depression or not.

In summary, neuro-biological causes for depression encompass brain areas, neurotransmitters and genetics. However, none of these factors have been identified as the single cause for depression. Research shows that, so far, no genuine depression gene has been identified, and even those genes that have been found to play a role in the illness only carry a 20-40% risk for an individual to fall ill with depression. Only bipolar depression carries a heritability risk of up to 80%, but only if both parents had bipolar depression. However, with a 1-2% prevalence of bipolar compared to a 27% prevalence of unipolar depression, it is far more likely that musicians – like the general population – experience unipolar and not bipolar depression if they do experience depression.

Psychological causes

Psychological causes for depression have been elucidated in depression models by Beck (1979) and Seligman (1975). Beck's theory assumes that depression develops due to specific distorted depressive cognitions based on the environment, the future, and the person itself (cognitive triad). These causes are for instance associated

with unusual feelings of grief and/or guilt (see Tab. 2.1). According to this theory the individual suffers from typical dysfunctional thought processes as follows:

1. inappropriate or overstating generalisation, for instance: I have missed the train, therefore the entire day will go wrong

2. selective generalisation, for instance: only negative aspects are considered, positive ones are overlooked

3. self-attribution, for instance: negative events are found to be based on the individual's own wrongdoing

This self-perception and negative interpretation of events leads to constant disappointment and rejection. The negative experiences also lead to a selective perception of events. This means that according to Beck's theory, these experiences and perceptions lead to the symptoms that are recognised to be specific to depression, such as feelings of guilt/grief/worthlessness. The therapy, according to Beck's theory, is better known as cognitive behavioural therapy (CBT) and plays a key role in current depression therapy.

According to Seligman's learned helplessness theory, depression develops if an individual learns that (certain) negative events/experiences constantly repeat themselves and are therefore uncontrollable by the individual's behaviour. This theory was based on animal models, where the animal experienced pain irrespective of its own behaviour, and was found to subsequently resign itself to its fate after a period of time. This resignation was judged to be similar to behaviour observed in depression. According to Seligman, a person experiences an event as uncontrollable, but is convinced that other individuals would have been able to control the same situation (internal attribution). Helplessness results based on the feeling of personal failure and is judged as self-inflicted. This leads to a decrease of self-esteem, which in turn promotes the development of a depression (feeling of worthlessness). In summary, two central theories in this section are of importance: Seligman's learned helplessness, and Beck's cognitive model. The latter is reflected in CBT, one of the most frequently used psychological approaches to treating depression.

Social causes

Social causes for depression entail one aspect, however, in many facets: stress. An individual can draw on a variety of personal and social assets to buffer stress. Of these, three have emerged as particularly effective (Thoits, 2010):

1. a sense of self-control or control over one's own life
2. high self-esteem or self-efficacy
3. social support

A sense of self-control is understood here as a belief that one's life is mainly under one's personal control and does not depend on other people's decisions. High self-esteem is the perception of oneself as a competent, valued person. Social support is understood as the emotional, informational and practical assistance a person receives from family, friends, co-workers etc., or perceives as readily available when needed. These resources enable people to cope with stressful demands in life. Social and emotional support – whether actually received or perceived as being available – cushions stress-induced psychological stress and arousal, while a sense of self-control - as defined above - and self-esteem promote active attempts at problem solving. Stress can be chronic, for instance due to an illness (Turner, Wheaton & Lloyd, 1995) or due to social inequalities (Thoits, 2010), or it can be based on gender or ethnicity (Umberson, Wortman & Kessler, 1992). Stress is not necessarily attached to one individual at one moment in time. It can be carried over a lifetime or be transferred to future generations (stress proliferation) (Umberson et al., 1992). Menaghan, Kowaleski-Jones and Mott (1997) explain that stress proliferation processes are significant, because they are a key component in the reproduction of social disadvantages over the course of a lifetime and from one generation to the next. The difference between stress proliferation and accumulative stress is that stress proliferation accumulates the effects of stress experiences on health while cumulative stress accumulates the structural life factors themselves over time (e.g. financial struggles, segregation, education, occupation). Depression

research should therefore keep in mind that there are inequalities within groups of people that can either promote or buffer stress and in turn depression.

In the paragraph on the bio-psycho-social model of depression, I introduced a simple linear depression model (see Fig. 2.5). The brief introduction of each individual factor (biological, psychological, and social factors) within the model demonstrated that the integration and inter-individuality of all variables - predictors and symptoms alike – is complex and requires at the very least moderation and/or mediation. Moreover, their function as predictor or symptom changes depending on whether a person has a depression or not. This shows again that research in and diagnosis of depression cannot be a discrete set of symptoms/predictors, but has to be dimensional as a continuum of symptoms/predictors. The first integrative depression visual model for depression as a multifactorial illness was presented by Wittenborn et al. (2016) and shows the complexity of depression (see Fig. 2.7). It is, however, noteworthy that unlike physical illnesses, where those types of models are standard, there are next to no illness models for psychiatric illnesses such as depression. Even though this model is essentially the same as the simple model presented in Figure 2.5, the crucial difference is that the Wittenborn et al. model does not assume linearity between variables. It separates variables into depression promoting and depression buffer variables. I am using Wittenborn et al.'s diagram here to illustrate the complexity of depression. Before looking at the entire model, a closer look at the bare structure of this model will help to understand the reasoning behind the design (Fig.2.7).

The model features built-in feedback loops for every main depression variable, which are in the model referred to as *stock variables*. These stock variables are displayed in a square box (*regulatory resources*), which will later include variables from all three categories (biological, psychological and social). Regulatory resources can either be influenced positively by a buffer that builds up resilience (**B**-loop), or negatively. This will then promote depression by diminution of resources (**R**-loop). The building-up and erosion of resources is represented in the model as a natural flow (e.g. positive and/or negative experiences and consequences) and

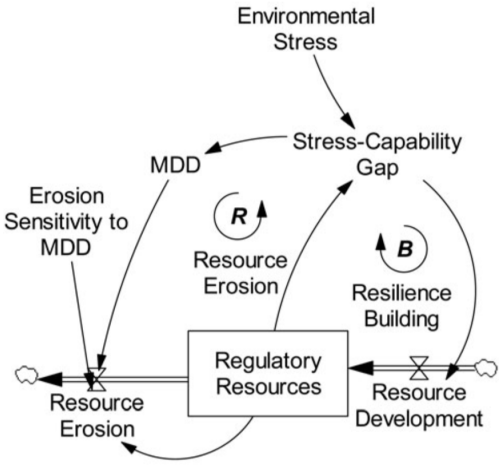

Figure 2.7: Causal loop diagram of cognitive, social, environmental, and biological dimensions for an adult population, by Wittenborn et al., 2016

the possible reinforcement or erosion through feedback loops. This demonstrates that a predictor can either be positive (i.e. become a buffer or build resources) or negative (i.e. become resource eroding).

This loop model was calculated based on an adult population of 1000 individuals being subject to normal 'environmental stress', their 'regulatory resources', and a reported depression after a 10-month period. In the full diagram below, two different versions of the model have been calculated: (a) without feedback loop (or normal flow) in grey, and (b) with an active feedback loop in black[9]. The complexity of multifactorial models such as depression illustrates why, when conducting research in these areas, the entire concept needs to be taken into account during research design and when interpreting the data, even if only one (feedback) loop is being investigated. This also underlines why research and/or preventative strategies that are based on a one-dimensional approach are highly likely to fall short over time. This is particularly pertinent in pain research in musicians (see paragraph 2.2.10 p. 44 and paragraph 2.3, p. 63).

In conclusion, the multifactorial model of depression introduced here illustrates the three main components of the model – neuro-biological, psychological and social

[9]Wittenborn et al.'s paper has an extensive appendix (B) with all equations, instructions and guidelines, and is available online

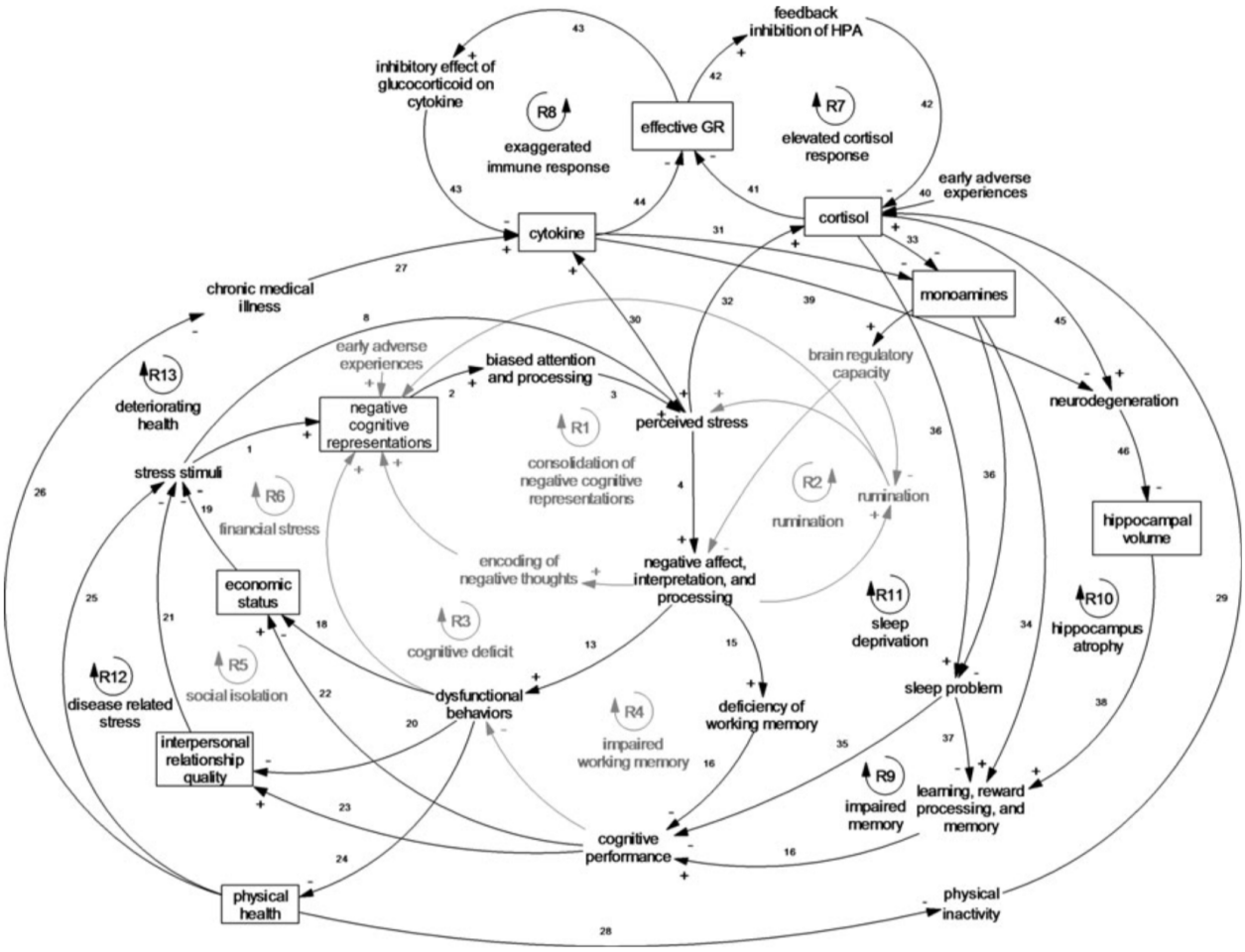

Figure 2.8: Causal loop diagram of cognitive, social, environmental, and biological dimensions for an adult population, by Wittenborn et al. (2016)

factors – as well as the intricate inter-relations between the variables and their feedback loops. A basic understanding of multifactorial models is key to approaching depression research, interpreting the data, and developing prevention strategies.

2.2.8 Means to measure

In order to measure an illness, it first needs to be identified as an illness with a specific pathology. Therefore, the preceding paragraphs identified depression as an absence-of-health-condition, noting the symptoms that make up the condition. Using an international classification such as the ICD (World Health Organization, 1992) ensures comparability: the same groupings of symptoms underlying this study have been recognised in other individuals, thus establishing the condition

Table 2.4: Quantitative depression questionnaires

Test	Reference	Assessment of	With musicians
HAM-D	Hamilton Depression Rate Scaling (Hamilton, 1960)	Depression in co-occurrence with other medical conditions (Parkinson's, cancer, Alzheimer's)	-
SCL90	Symptom-Checklist 90 (Derogatis, Lipman & Covi, 1973)	Clinical practice	-
BSI	Brief-Symptom Inventory (Derogatis, 1993)	Clinical practice	-
BDI	Beck-Depression Inventory (Beck, Ward, Mendelson, Mock & Erbaugh, 1961)	Clinical and primary care	yes
HADS	Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983)	Primary care	yes
GHQ	General Health Questionnaire (Goldberg, 1972)	Primary care	yes
MDI	Major Depression Inventory (Bech, Rasmussen, Olsen, Noerholm & Abildgaard, 2001)	Clinical and primary care	-

as a syndrome or illness known as depression. Based on this it is then possible to construct objective instruments to measure the illness, for example in the form of questionnaires, (structural) interviews or other medical tests. For this thesis, the means of measuring depression concentrate on questionnaires developed for quantitative research as well as some instruments for qualitative investigations, such as structured interviews.

Based on the definitions and symptoms set out above (see paragraph 2.2.4, Fig. 2.1 and 2.2.6, Tab. 2.1), several questionnaires to assess depression have been developed since the 1950s for use in quantitative research. For a brief overview see 2.2.8. These questionnaires can be divided into to two types: a) those used mainly for clinical research and b) those used mainly in primary care settings. Regardless of whether questionnaires belong to the first or second of these categories, they can either be completed by the patient (self-rated) or by a scientist observing the symptoms in the patient. For the purpose of this thesis, I focussed on self-rated questionnaires. The following introduces some frequently used depression questionnaires, starting with one of the first to be conceived for this purpose the Hamilton Depression Rate (Hamilton, 1960).

The Hamilton-Scale (HAM-D) (Hamilton, 1960) measures the efficacy of an anti-depressant rather than the presence or absence of a depression. It is a multiple-choice questionnaire for adults, rating the severity of symptoms observed in depression (low mood, insomnia, agitation, anxiety and weight loss), and it has to be completed by the researcher observing the patients' symptoms. The original scale comprised 17 questions with 3-5 possible answers per question. A score of 0-7 is considered normal and scores of 20 and above suggest a severe depression. Today there are about 20 versions of the HAM-D, however, the 17-item questionnaire remains the most widely used (Bagby, Ryder, Schuller & Marshall, 2004). The HAM-D has been validated and translated into several languages (G. A. Fava, Kellner, Murani & Pavan, 1982) and its validity has been repeatedly reviewed in clinical research (validity $\alpha = .46 - .92$; Chronbach's $\alpha = .65 - .98$) (Bagby et al., 2004). However, the results are not constant. Olden, Rosenfeld, Pessin and Breitbart (2008) found for example, an abnormally low internal consistency in samples. The HAM-D is one of the most frequently used questionnaires in clinical research and is especially used for researching depression as a co-morbidity with other illnesses, such as old age, Parkinson's disease stroke, Alzheimer's disease and/or chronic obstructive pulmonary disease (Leentjens, Verhey, Lousberg, Spitsbergen & Wilmink, 2000; Naarding, Leentjens, van Kooten & Verhey, 2002; Stage, Middelboe, Stage & Sørensen, 2006).

The Symptom-Checklist 90 (SCL-90) (Derogatis, Lipman & Covi, 1973) is a multi-dimensional 90-item self-report questionnaire for psychological stress. Derogatis, Lipman and Covi suggest nine or ten clinical subscales (somatisation, obsessive-compulsive, interpersonally sensitive, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychotism and sleep difficulties). Since first being introduced, the SCL-90 has been incorporated in many clinical depression studies for classification or evaluation purposes, for instance the Cognitive Deficit Subscale (O'Donnel, de Soto & Reynolds, 1984), the Cognitive Deficit Subscale prediction in first episode schizophrenics (Wegner, Rabiner & Kane, 1985), or the Obsessive-Compulsive Subscale (Frost, Sher & Geen, 1986). Many studies have been conducted to assess SCL's validity (validity and reliability: $\alpha = .97$ (global scale); $\alpha = .69$ (somatic

depression);. $\alpha = .91$ (cognitive depression)). Derogatis and Cleary revisited their scale in 1994 (SCL-90-R) for a better adaptation. The SCL-90 generally seems to divide the scientific world into two groups: those who are for the scale, assessing it as a prefect fit, for instance Arrindell, Boomsma and Stewart (2004), Arrindell, Barelds, Janssen, Buwalda and Ende (2006) and those who are against its use, looking for a better fit or reducing the multidimensionality of the scale such as Hafkenscheid (2004), Hafkenscheid, Maassen and Veeniga (2007), Paap, Meijer, Van Bebber et al. (2011). Paap, Meijer, Cohen-Kettenis et al. (2012) suggest that the conflicts in regards to this multidimensional structure arise from the level of self-reported stress or from a difference in self-reported stress between the different sexes, but additional studies are needed to further analyse this problem.

The Brief Symptom Inventory (BSI) is derived from the SCL-90 (Derogatis, 1993). It is a 53-Item list that analyses nine symptoms: somatisation, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism (validity and reliability are the same as for the SCL-90). Based on a factor analysis of the SCL-90 (Derogatis, 1993), the highest (loading) scores were selected to form the BSI. However, apart from the authors' own use of BSI, the questionnaire has not often been implemented in other research.

A popular measuring tool for depression in adolescents and adults is the Beck Depression Inventory (BDI-IA)(Beck, Ward, Mendelson, Mock & Erbaugh, 1961), and its successor, the Beck Depression Inventory Second Edition (BDI-II) (Beck, Steer, R. Ball & WF, 1996). The BDI-IA/BDI-II records the (depressive) mood on the day of the test (Sacco, 1981). The scale provides a stable measurement that can be used in diverse cultural environments (Nuevo et al., 2009) and has been used in more than 2000 studies conducted in various languages all over the world. It consists of a 21-item list analysing various aspects of depression: (a) mood, (b) pessimism, (c) sense of failure, (d) lack of satisfaction, (e) guilt feelings, (f) sense of punishment, (g) self-dislike, (h) self-accusation suicidal wishes, (i) crying, (j) irritability, (k) social withdrawal, (l) indecisiveness, (m) distortion of body image,

(n) work inhibition, (o) sleep disturbance, (p) fatiguability, (q) loss of appetite, (r) weight loss, (s) somatic preoccupation, (t) loss of libido (validity and reliability: α =.88 for psychiatric sample; α =.92 for a non-psychiatric sample).

In addition to its applicability in diverse cultural settings and languages and the fact that it has been used in over 2000 studies worldwide, further arguments for the use of this scale are the international propagation in psychiatric and non-psychiatric samples, high content validity and sensitivity to change (P. Richter, Werner, Heerlein, Kraus & Sauer, 1998), as well as high internal consistency and high convergent validity in the depression rating scale (Beck, Steer & Brown, 2001). On the other hand, arguments against using this scale are a high item difficulty, lack of representative norm – leading to doubt in the objectivity of interpretation, controversial factor validity, instability of scores over short intervals of time, and poor discriminant validity against anxiety (P. Richter et al., 1998).

The Major Depression Inventory (MDI) (Bech, Rasmussen, Olsen, Noerholm & Abildgaard, 2001) is a 12-item, self-reporting questionnaire developed by the World Health Organisation (WHO) (validity and reliability: α = .89 for the total score and α =.86 for individual scales). It assesses the mood two weeks prior to the answering of the questionnaire and includes all symptoms for depression set out in the ICD-I0 and the DSM-IV. The symptoms are rated on a six-point scale. This allows one to evaluate the severity of the depression (sum of all scores from 0-50) as well as to asses the presence of a depression according to the guidelines of DSM-IV and ICD-I0. This two-way analysis is one of the strongest points of this questionnaire (Cuijpers, Dekker, Noteboom, Smits & Peen, 2007). As a suitable instrument for the WHO, the MDI has been translated and validated in many languages. Cuijpers et al. also describe the MDI as a reliable tool even to assess depression in psychiatric outpatients. Since it is a relatively new scale, comparatively few studies have used the MDI as an instrument for measuring depression.

The final scale to introduce in this context is the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983). This 14-item, self-reported scale was developed for screening purposes in non-psychiatric hospital clinics, assessing the feelings during the week prior to the answering of the questionnaire. It has been validated in more than 10 different languages and used extensively. The scale comprises of two sub-scales: a depression sub-scale and an anxiety sub-scale. In order to avoid confusion with other symptoms, physical problems such as vertigo, headache, insomnia, anergia and fatigue have been deliberately excluded (Zigmond & Snaith, 1983). Despite its brevity, the HADS has emerged as a comprehensive instrument to measure depression (Bjelland, Dahl, Haug & Neckelmann, 2002).It provided a medium to high correlation of depression and anxiety when compared to other scales such as the BDI, the SCl-90 and the GHQ (Bjelland et al., 2002).

All questionnaires introduced in the preceding paragraphs are a suitable choice to investigate depression in a quantitative setting as laid out in the relevant literature (World Health Organization, 1992) and the paragraphs above. The optimal choice depends on the goal of the study and questions asked. The optimal choice of instrument(s) then depends on the goal of the study and research questions asked. Looking now at qualitative investigation of depression, various means to investigate depression on a qualitative basis are used every day by clinical psychologists and psychiatrists in diagnosis settings. While some researchers such J. W. J. Williams et al. (1999) advise the use of a simple sentence in the diagnosis of depression (e.g. 'Have you felt depressed or sad during the last year?' yes/no response), others criticised this approach (Zimmerman & Mattia, 1999; Sperry, Brill, Howard & Grissom, 2013). Moreover, taking into account the high occurrence of comorbidity of depression with other illnesses, which can lead to a false positive response, this approach appears to be only of limited value and meaning for solid research. If the purpose of the investigation should be to meet standardised diagnostic criteria and not simply collect information on wellbeing, the choice of qualitative instruments is more limited. The gold standard for standardised interviews on depression is the SKCID (structured clinical interview, H.-U. Wittchen, Zaudig et al. (1990))

and the DIAX/CIDI (H.-U. Wittchen & Pfister, 2007). However, the SKID was developed with the DSM-III in mind, which is slightly out of data and has seen two publications since. Therefore, the DIAX/CIDI is probably the best option. The interview lasts for about one hour and has demonstrated 95% sensitivity in screening for depression, 96% sensitivity in screening for anxiety, both with a specificity of 84% and 82% respectively. The test-re-test reliability lies between $r = .81$ (for depression) and $r = .\ 84$ for anxiety. for anxiety. The modular construction of the interview allows for the combination of aspects that are of interest to the researcher without disturbing the validity or reliability of the interview.

To summarise, this section reviewed the illness depression, introducing the nosology, epidemiology, symptoms and progression of depression, as well as the aetiology as it is currently understood in the literature (World Health Organization, 1992). Moreover, specific beliefs of musicians, such as bipolarity and the 'creative mystique', are reviewed in the appropriate places. A separate paragraph on the 'creative mystique' (see paragraph 2.3.1, p. 71), will summarise these points only, but refer back to where they are discussed in more detail.

2.2.9 Risk factors, predictors and comorbidities

The previous section described how depression is classified, its phenotypic expressions, and some methods of assessment. Despite wide ranging prejudice (see paragraph 2.2.2), depression can affect anyone regardless of age or sex. While there are little grounds to believe that depression is an illness on the rise, the development of beliefs through the generations means that we talk about mental health more often now than has been the case previously, and thus research of depression has come more to the forefront (Jacobi, 2009)[10].

Figure 2.9 shows the interconnectivity of risk factors in depression. Contrary to the Wittenborn et al. model, this diagram only assumes negative influences, of which some are discussed in this paragraph, and does not take possible positive resources into account.

[10]This paragraph forms the basis for the selection of variables seen in the overarching research question two, with the exception of sleep, which has already been discussed on p.29.

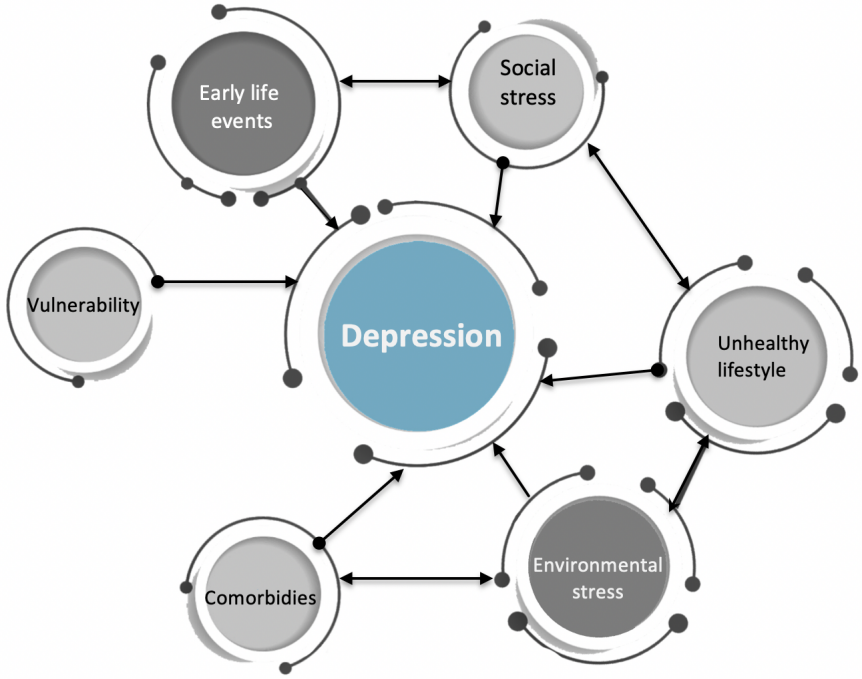

Figure 2.9: Schematic diagram documenting the main risk factors in depression and their interconnectivities, modified after O. P. Almeida (2014)

Causes of depression are highly complex and are presently still not fully understood. The limited understanding of its aetiology is further reflected in the existing lists of risk factors or predictors that include stressful life events (see Fig. 2.9, paragraph 2.2.7 and 2.2.7), endocrine abnormalities (hypothyroidism, hypercortisolism, see paragraph2.2.7), cancer or tumours, but also side effects from drugs (e.g. α-interferon for hepatitis C or β-blocker) (Nestler et al., 2002). β-blockers are important tools in fighting (performance) anxiety in professionals who experience high pressure, such as surgeons and musicians, and a high dose can artificially induce a depression as described in paragraph 1.1 (Patston, Loughlan et al., 2014; Mahkorn & Starostzik, 2014; Fargen, Turner & Spiotta, 2016). Lahme et al. (2000) claim that one in two musicians takes betablockers, whilst more conservative estimates are between 8% (Langendörfer et al., 2006) and 31% (Kenny & Ackermann, 2013). Spahn (2010) on the other hand, remarks that the actual numbers might be higher than these estimates, due to nondisclosure and stigma attached to mental health, as well as substance abuse. It is also worth noting that

the use of β-blocker has already been observed by emergency medicine outside of musician specific research (Luedi, Ittner, Albrecht & Koppenberg, 2011).

Statistically significant comorbidities with depression such as endocrine abnormalities or substance use and abuse are general depression risk factors, and thus also have to be taken into account for musicians. However, they are not musician specific. Risk factors such as anxiety related diseases, pain, and personality disorders (here: depersonalisation-derealisation syndrome) might shed more light on musicians and depression (H.-U. Wittchen, Jacobi, Klose et al., 2010). Anxiety, depersonalisation-derealisation syndrome, and pain are reviewed in the following paragraphs.

Anxiety

The close relationship between anxiety and depression makes anxiety both a symptoms and a predictor. Roughly 80% of depression patients also show anxiety symptoms (Lieb & Frauenknecht, 2012). On the other hand, living in a high anxiety environment increases the risk of a depressive episode, especially for young adults or adolescents (H.-U. Wittchen, Kessler, Pfister, Höfler & Lieb, 2000; Bittner et al., 2004). H.-U. Wittchen, Kessler et al. (2000) assessed this risk to be two to three time higher than living in less stressed environment.

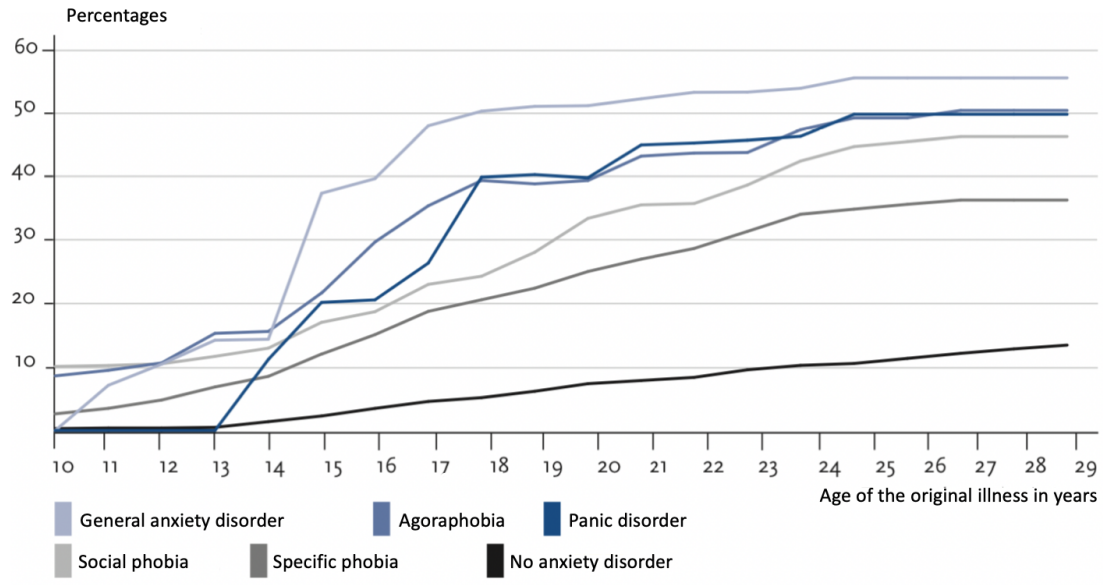

Figure 2.10: Cumulative risk of a depression episode with a history of anxiety disorder, amended version by H.-U. Wittchen, Jacobi, Klose et al. (2010)

One difficulty in diagnosing depression in children and adolescents is, among others, that anxiety diseases often go together with depression, impeding the diagnostic process (Seiffge-Krenke, 2007). Anxiety is thus not only one of the most common symptoms in depression, but also a solid predictor for the (course of) future depression(s).

Depersonalisation-derealisation

Psychological pressure and stress have been found to have a highly significant comorbidity with depression (see paragraph 2.2.7 and 2.2.7). The most robust studies on neurological deficits in these areas highlight problems in acquiring new information (Koenen et al., 2001; Jelinek et al., 2006), heightened sensitivity to interference (learning and memory tasks) (Marx, Doron-Lamarca, Proctor & Vasterling, 2009; Vasterling et al., 2002), as well as deficits in working memory and inhibition of attention (Gilbertson et al., 2007). The studies were conducted with extreme cases such as veterans, but less dramatic cases can also be found, for example by looking at how psychological pressure on students leads to emotional fatigue (burnout), poor personal performance and depersonalisation (Trueman, 1984; Hunter, Sierra & David, 2004). Depersonalisation-derealisation disorder is marked by emotional regulation difficulties: a feeling of incompleteness, a sense of detachment from oneself, and the experience of one's own actions as 'not-feeling-quite-right'. Correlations of depersonalisation with anxiety, depression, and burnout symptoms suggest a comorbidity or, at least, common neurobiological denominators between these symptoms (Hunter et al., 2004). Clinically observed phenomena, such as the activation of prefrontal attentional brain systems, present compelling evidence that links depersonalisation and anxiety as co-morbid disorders (Sierra, Medford, Wyatt & David, 2012). For the purpose of this thesis, the depersonalisation-derealisation syndrome is defined by the literature (World Health Organization, 1992) that specifies that in case of a combination of depersonalisation-derealisation with depression, depression is understood to be the main condition. Moreover,

for the purpose of this thesis, the depersonalisation-derealisation syndrome will be referred to as depersonalisation henceforth.

2.2.10 Pain

Depression and pain present with a lot of similarities: both are based on a complex multifactorial model and they share biological pathways and neurotransmitters (Bair, Robinson, Katon & Kroenke, 2003). Although it is generally understood that both, pain and depression, are comorbid, Bair et al. (2003) point out that a combination of both conditions is costlier (in terms of health insurance, early retirement, etc.) and more disabling than previously thought.

This section on pain is designed to be slightly more detailed than customary since pain is a crucial supporting variable to investigate depression in this thesis. Basic pain perception and pain processing are vital variables in examining depression critically from an additional perspective. This data gleaned in this regard can either re-affirm or contradict results found in the general depression data. Therefore, understanding the concept of acute and chronic pain is vital. Moreover, the literature review for musicians, pain and depression shows that the practice of defining chronic pain differently from current medical knowledge, found in some research publications, not only makes data interpretation difficult, but also limits the scope and usefulness of practical suggestions for prevention and treatment.[11] In order to ensure the validity, the definition of pain is also based on the current medical knowledge.

The International Association for the Study of Pain (2020) (IASP) defines pain as follows:

> 'An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.'

Pain thus defined, has both a sensory and an emotional component, highlighting the subjectivity in rating pain perception on its own. The complexity of pain and how components such as biographical or ethnological data play a role within the

[11] This concept is reflected in the overarching research question two.

multifactorial pain model need to be taken into account in research, treatment and/or prevention strategies.

Acute and chronic pain

Acute and chronic pain are at the centre of this section. Starting from what distinguishes both, the section then focuses in turn on the burden of chronic pain, significant predictors of chronic pain, how depression influences acute and chronic pain, and on why it is important to differentiate between severe and mild depression in acute and chronic pain.

The subjective experience of pain can be disturbing and debilitating. However, pain is a vital sensation, as it constitutes an important warning mechanism for survival. Acute pain acts as vital alert mechanism e.g. for distinguishing the extend of an injury or detecting infections after surgery (see Tab. 2.5 for symptoms). When the external irritation, malfunction and/or disorder is fading, the pain should also subside. However, what happens if pain persists past normal healing time? What is the definition of a normal healing time frame?

Chronic pain is defined as pain that persists past normal healing time i.e. pain that is perceived even after the wound has closed. Chronic pain is not the prolongation of acute pain, but rather a complex state of mind and body that has distinct characteristics separating it from acute pain (see tab. 2.5). It therefore has lost any warning function that can be attributed to acute pain (Bonica, 1954). Endogenous mechanisms such as endorphins, GABA, or monoaminergic pathways and systems, operate as preventative measures for acute pain, and help prevent acute pain from transforming into chronic pain. When these mechanisms fail, chronic pain develops.

The 'normal' time frame for acute pain as defined by the International Association for the Study of Pain (IASP) is between three and six months past normal healing time (Merskey & Bogduk, 1994). Anecdotal evidence from patients and patients' advocacy groups, however, shows that this time frame seems to apply more to research than practical experience. These groups state that in practice most patients

with chronic pain wait much longer for a diagnosis and subsequent treatment of chronic pain.

Table 2.5: Characteristics of acute and chronic pain, modified after Krohne (2010)

	Acute Pain	**Chronic Pain**
Duration	Short duration	Long duration or recurrent
Cause	Known cause and possibility of treatment (e.g. injury, infection)	Unknown or complex cause (e.g. non-specific back pain) or known cause, but no treatment possible (e.g. polyneuropathy)
Function	Warning function	No warning function
Intervention	Rest, treatment of cause of pain (limited time period), analgesics	Reduction of pain supporting factors e.g. controlling of trigger factors, change of catastrophising behaviour, reduction of fear of movement
Goals	Freedom from pain	Reducing pain to a tolerable level, better pain management, minimising of pain-related conditions)
Psychological consequences	Hope of a successful therapy, positive locus of control	Resignation, hopelessness, helplessness

Somatic causes are often seen as the reason for (chronic) pain. However, they are clearly insufficient as an explanation for the significant rise in illness behaviour and patterns in this area over the last 20 years. In their meta-analysis of studies dating from 1990 to 2013 Fayaz, Croft, Langford, Donaldson and Jones (2016) concluded that one third to one half of the UK population is affected by chronic pain (using the 2013 population statistic as reference). This part of the population corresponds to about 28 million UK adults, and is likely to increase further, especially in view of the ageing society. The authors applied rigorous terms, for instance excluding all papers with non-IAPS pain definitions, and defined chronic pain as consistent pain for three months (past healing time). The authors' intention was to inform about the need for prevention of chronic pain and how this should help to update and shape UK healthcare decisions. While their findings indicate a very large number,

this is in line with findings of other UK studies: 55 million in the UK have reported chronic pain leading to an average of 30 days of inability to work, per patient (Weishaupt, Zanetti, Hodler & Boos, 1998; Boos et al., 2000), as well as studies from other countries (Breivik, Collett, Ventafridda, Cohen & Gallacher, 2006).

In acute pain situations, perceived pain can inform a medical assessment of injury damage, but the assessment is not exclusively based only on the perceived pain as it is widely acknowledged that most often there is no proportional relationship between the two. This rule applies to an even higher degree to chronic pain. In chronic pain, the pain-related damage is only marginally defined by diagnosable physical damage. In chronic pain, pain transforms from a symptom to the illness itself.

Cognitive, emotional, and behavioural aspects enabling pain processing and pain coping are of large significance for the perception of chronic pain (Hasenbring, Hallner & Klasen, 2001; Pfingsten et al., 2001). Over the last 15 years, in an attempt to understand the aetiology and the pathogenesis (development and process) of chronic pain, research has become interdisciplinary with the main question focusing on how chronification develops. Chronification here is defined as the transition period from acute to chronic pain (Turk, 1996). Empirical research has concentrated on two points: (a) mechanisms of chronification and (b) risk factors (Hasenbring, 1998; Pincus, Burton, Vogel & Field, 2002). The mechanisms of chronification include biological, psychological, social, and socio-economic processes, while risk research tries to identify obvious risk factors (emotions, cognition, behaviour, family, workplace and diagnose/treatment) and classify them as yellow flags (see Tab. 2.6 below).

How individuals have dealt with pain in preceding episodes is the best predictor for chronisticity. Based on this idea, Kendall (1997) pooled the above listed predictors and developed the concept of yellow flags (see Tab. 2.6). Yellow flags emerged empirically, and are based on emotional, cognitive and behavioural characteristics that have negatively influenced the development of back pain (Hasenbring, 1998; Pincus et al., 2002). Yellow flags are the core element to diagnose chronic pain, its severity (based on the number of flags) and treatment options.

Table 2.6: Yellow flags for chronisticity, modified after Kendall (1997)

Cognitions/belief	Conviction that movement is harmful, conviction that pain has to disappear completely before activity, catastrophising, conviction that pain is controllable, fixed concept about treatment plans
Emotion	Extreme fear of pain and being impaired, mild depression, heightened perception for physical symptoms, helplessness/ hopelessness/resignation
Behaviour	Strong attitude towards resting, withdrawal from day-to-day life activities, strong attitude towards avoidance, extreme pain sensitivity (and intensity), sleep disturbances, misuse of medication
Family	Overprotective Partner, previous history of dependencies on (medication or alcohol, member of the family is a pain patients, grave problems/conflicts within a family
Workplace	Conviction that working activity is harmful for the body, little to no support at the workplace, little or no interest from colleagues and/or superiors, work dissatisfaction, motivation/ possibility to leave work (early retirement options)
Diagnostic/treatment	Attitude towards rest is reinforced, several diagnoses, which partly contradict each other, fear of a malignant illness, prescription of passive treatments, conviction that only a somatic approach (surgery, medication, etc,) will be effective, disappointment /dissatisfaction of previous treatment(s)

Yellow flags are an integral part of the existing medical health care guides. Health care guides, in turn, are evidence based medical guidelines aimed to promote structural medical support for the population. Even though these guidelines are agreed internationally, every country has their own version: for the UK, for instance, these can be found in the British Occupational Health Guidelines for the Management of Low Back pain. Yellow flags here are understood to be psychosocial factors that aggravate pain, unlike red flags, where pain points towards other illnesses such as fever, rapid weight loss or early stage cancer. Even though they were primarily designed for back pain, they have since established themselves as applicable to other areas of pain as well, including migraine and abdominal pain

(IBS) and have also been applied in palliative pain care.

Applying yellow flags to a practical example from the yellow flags that will be investigated later in this thesis will flesh out this concept: catastrophising is a passive maladaptive coping strategy, a combination of rumination, magnification of pain, and the feeling of being helplessly exposed to pain. Beliefs such as catastrophising are possibly of high significance for the course of a chronic pain (Pfingsten, 2001). They are independent of the actual (physical) pathology and are shaped mostly by the patients. It is important to underline that beliefs such as catastrophising are not conscious choices people make. Individuals with a high level of catastrophising will for instance have been introduced by their parents to dysfunctional concepts such as that the appropriate response to pain is to ruminate, magnify it and feel powerless in the face of it (Goubert, Eccleston, Vervoort, Jordan & Crombez, 2006).

At various points this belief will have been reinforced by family, friends or doctors as the appropriate response to pain. This results in those individuals learning that high levels of catastrophising is the only way to react to a strain. Individuals with a high level of catastrophising feel responsible for the situation, are engulfed in thoughts about how terrible their situation is, and unable to free themselves mentally from the situation. The occupation with the strain is so intense that it become impossible to talk about another topic. However, this talk is not leading to a therapeutic result in the form of giving relief from a burden and helping to move on, but instead helps to propel individuals deeper into their despair. Individuals with high levels of catastrophising are extremely difficult to reach out to for chronic pain therapy. It is therefore not surprising that measuring the level of catastrophising has emerged as a reliable predictor e.g. of how likely individuals are to return to work and when they should receive therapy. As this is a belief that multiplies disproportionally with age due to its enforcement process, it is critical to reach out to individuals with already seemingly low catastrophising levels (see measuring catastrophising in the next section, p. 51).

Applying this knowledge to the question of how depression affects musicians, an investigation of catastrophising serves a dual purpose: it measures the extent to which a person is willing to deal with a strain and how much this affects the possibility to suffer from depression. An investigation into this area, using depression as a basis, found that depression patients with high catastrophising levels were more vulnerable to pain (e.g. Vaccarino, Sills, Evans and Kalali, 2009). The reverse has also been found to be true: pain research showed that patients' high catastrophising levels lead to a higher likelihood of depression (e.g. Demyttenaere et al., 2007). Figure 2.11 shows how various forms of pain increase with severe depression. This study took a cross section of a random sample EU-population (UK, Germany, Italy, Portugal and Spain) with a total number of 18.980 subjects. Depression here was associated with at least one main symptom present, and therefore qualified as severe depression.

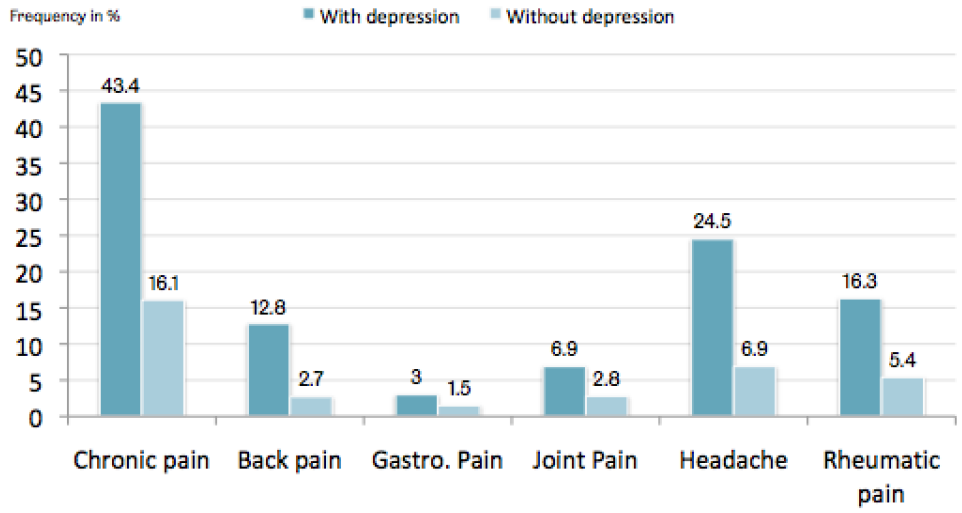

Figure 2.11: Pain increase with and without depression, modified after Ohayon and Schatzberg (2003)

This section reviewed chronic pain and the widespread worldwide problem it has become, leading to lower quality of life, missing work or even early retirement. Extracting one example from the psychosocial aspect of pain, yellow flags have emerged as reliable predictors that are important in researching both chronic pain and depression. This paragraph also highlights that pain research in musicians

cannot be conducted by only looking at pain perception, but needs to take into account the full medical understanding of pain, namely chronic and acute pain concepts. The next paragraph will discuss predictors of chronisticity, tying together the various levels of the multifactorial model.

2.2.11 Measuring chronification

The previous paragraph explained the theory behind chronic pain. The following paragraphs will focus on how the various predictors in chronic pain can be measured. Four main factors are currently known in pain chronification: (1) physical (neurological) changes, (2) emotions, (3) pain related cognitions, and (4) (behavioural) cognitions. For ease of reference, the latter two factors will be discussed together in one point. All of these factors, except for physical (neurological) changes, are also reflected in the yellow flags (see Tab. 2.6).

1. **Physical neurological changes:** Pain is a (physically) adaptive process that entails various physical changes. While this seems obvious, it is nevertheless important to remember that research in chronic pain has established numerous physical changes. This not only bolsters the multifactorial model, but also counteracts the general idea of chronic pain being 'only in your head'. Chronic pain can be distinguished from acute pain tangibly by imaging techniques and their pre-cursors, such as PET, MRI and fMRI, DTI, EEG, MEG and TMS. Imaging techniques have evolved from being solely used as diagnostic tools to assess physical damage (or the lack thereof) in chronic pain, to being utilised to find numerous areas in chronic pain sufferers that differ from individuals who suffer from non-chronic pain. The different strengths of these techniques are used to highlight various aspects of pain-related changes that take place within the brain. Thus, PET for instance shows changes in glucose metabolism or receptor density, especially relevant in pain-related opioid research (Tölle & Flor, 2006). MRI and fMRI illustrate structural brain and spine changes in chronic pain. Their location depends on the pain perceived: for instance, research on frequent migraines and lower back pain found cingulate cortex

decrease (Faymonville et al., 2000), and research on IBS found thalamus decrease. The thalamus decrease was found in MRI and confirmed in DIT studies, the so-called 'fibre tracking' (the accurate representation of nerves; K. D. Davis et al., 2000). EEG and MEG for brain mapping have been used as a pre-cursor for later MRI and fMRI studies. TMS, a stimulation rather than imaging technique, is however relevant as it was used to test hypotheses for specific brain areas, going beyond simple correlation by disabling specific areas for a brief moment of time.

What all of these techniques have demonstrated is that chronic pain involves a wide variety of brain structures (thalamus, limbic system and cortical structures). This is contrary to the previously dominant theory of one single pain brain centre. Instead, it indicates the involvement of a complex network of different brain areas (Farmer, Baliki & Apkarian, 2012). Changes in brain substrates also were not permanent once chronic pain was successfully treated. Despite a large number of studies, imaging technique studies are still in their infancy, considering their full potential. For instance, more longitudinal studies could find an answer to the question if changes in the brain are to be seen as a vulnerability factor for chronic pain or as the consequence of chronic pain.

2. **Emotions,** such as depression or anxiety, can significantly influence chronisticity. The following points illustrate why the literature on musicians with pain and depression, which uses a mono-causal approach as discussed in paragraph 2.3, falls short of adequately defining the problem, and data remains difficult to interpret. 80% of patients experiencing both depressive moods and back pain, develop chronic back pain if only treated with surgery (Kröner-Herwig, 2014). This has been shown in different studies using various methods to determine a depressive mood (Hasenbring, Marienfeld, Kuhlendahl & Soyka, 1994; Jarvik et al., 2005). It is imperative to note - especially in regards to the following

literature review of musicians and pain - that depression in these cases has been established to be mild and for a short duration, likely experienced around the time of the surgery (Hasenbring, 1993). Beck's Depressive Inventory (BDI), which was used in most studies to determine depression, specifically asks for 'the mood of the day'. Moreover, a mild depression only appears to make a difference in the development of chronic pain at the onset of (back) pain, and not when the (pain) problem is well established (Von Korff, Le Resche & Dworkin, 1993; Estlander, Takala & Viikari-Juntura, 1998).

The depression symptoms discussed, such as anhedonia and the resulting physical withdrawal from daily life (activities) (see Fig. 2.1, p. 16), also apply for depression in combination with pain - albeit with a few additions. This physical inactivity, brought on by depression, has to be taken into account in pain research, because it physically weakens muscle groups, sometimes up to muscle atrophy. In this case, the weakened muscles are not brought on by being physically restrained, e.g. by being on bed rest after surgery or by immobility, e.g. from having to wear a plaster cast for several weeks, but by depression's key symptoms. While the effect might appear to be the same if regarded from the outside, namely physical immobility, the results are decidedly different. The effect of (longtime) immobility is that moving becomes painful. This happens even without any previous physical (muscular) damage, simply because previously unused, and therefore weakened, muscles are now being used again. This is similar to a person's experience at the start of a gym membership, when they target muscle groups they have not previously used very much. This is, however, where the difference in results begins: a person starting a workout regime at the gym, or a pain patient without depression, will likely expect this type of discomfort and keep going. A person who suffers from depression and pain, will likely give up the effort when they experience similar muscle pain. The reason for this change in

behaviour is the change in pain/depression related cognition.

Pfingsten (2016) showed that when depression is predominantly based on work-related or private stressors, it is associated with higher muscular activity, especially in the lower back area. This in itself can already lead to the development of back pain due to muscular pressure on the spine caused by spinal movement, leading to lumbago disc syndromes and eventually damaging spinal nerves (Kröner-Herwig, Frettlöh, Klinger & Nilges, 2011). It is obvious that treatment for back pain needs to distinguish if a depression is present or not. So far, the results in pain, depression and anxiety related research are mostly based on the surgical success rate, while proper longitudinal studies (e.g. over a minimum of 12-24 months) are far and few between. Systematic review of lumbar surgeries, using the multifactorial model, found both anxiety and (mild) depression to be reliable predictors for chronic pain, showing an 80% treatment failure rate when back problems were only treated with surgery while depression/anxiety problems remained unaddressed (J. J. den Boer, Oostendorp, Beems, Munneke, Oerlemans & Evers, 2006; Krohne, 2017). Furthermore, this example shows that a diagnosis for depression, anxiety and pain is not easy to make, and that research looking at this subject using a mono-causal approach for pain will fall short. While we can say that 80% of back pain patients are likely to get chronic back pain, probably due to minor depression or a mood disorder on or around the day of surgery, we cannot draw the reverse conclusion that says 'the more severe the depressive symptoms, the more likely the patient is going to develop chronic pain', as done in a mono-causal pain and depression approaches for musicians (e.g. Kenny and Ackermann, 2013). Medical science has not shown any evidence to support such a reverse conclusion. On the contrary, as mentioned above, it has shown that depression only makes a difference at the onset of pain, not when pain is already chronic (Pfingsten et al., 2001; Pfingsten, 2016).

3. **Pain related cognitions and behaviours**

These are time-related, pain-related inner monologues based on emotions as explained above, or meta-cognitions that spread across time (as described earlier) that lead to a modified behaviour: for instance parents as role models for pain processing that lead changes in behaviour (Hasenbring, Hallner & Klasen, 2001). Pain catastrophising, which is going to be investigated more closely in this thesis (see example above p. 49), and feeling helplessness/hopelessness form part of the time-related monologues, while fear-avoidance beliefs form part of meta-cognitions (behaviour)(Waddell, Newton, Henderson, Somerville & Main, 1993).

(a) **Fear avoidance beliefs,** such as 'movement is detrimental for recovery', are independent of the physical pathology. These convictions might grow stronger or change based on (life) experience and outside re-enforcement. The general rule is that the earlier patients' fear avoidance beliefs are addressed, meaning within the first six months of pain, the better the recovery, and the lower the potential for chronisticity. Beliefs can become so engrained in a thought process that they lead to total disability, up to the point of inability to perform day-to-day work. These convictions are not the result of conscious decisions, but based on ideas, concepts and convictions people have been taught or have observed in others since early childhood. This mechanism is extremely resistant to being reversed or being erased from a person's thought processes (Kröner-Herwig, 2014). It is nearly impossible for patients with a high degree of fear-avoidance of movement to experience that there is not necessarily a connection between pain and movement, because they avoid movement altogether. The problem is that prolonged avoidance of movement leads to physical de-conditioning, malposture and muscle atrophy. This in turn (re-) confirms the existing fear-avoidance beliefs and thus a vicious circle is formed. Using a recent example: Champagne et al. (2018) demonstrated

in their 12-month follow-up study that only an intensive (i.e. in hospital) multifactorial approach and a multifactorial outpatient strategy had an effect on the sick days of individuals with chronic lumbar pain, and not a simple mono-causal strategy approach (control group). In effect this empirically demonstrated the strengths of the multifactorial model through treatment approach.

(b) **Time related monologues**, such as pain acceptance and pain catastrophising, are methods aimed at coping with chronic pain. Pain acceptance is understood as the active willingness to accept pain and all experiences relating to it, without trying to control or avoid it. Individuals with higher pain acceptance are far more likely to keep working towards their (life) goals and maintain a better life quality compared to those with lower pain acceptance (McCracken & Eccleston, 2005). Catastrophising pain, as explained, has emerged as a strong predictor of disability in chronic pain (Pincus et al., 2002). Catastrophising is, in essence, a cognitive pain-related-stress model that is divided into three aspects: (a) mental/intellectual occupation with pain (b) extreme worries (catastrophising), and (c) helplessness in reference to the situation and the pain one has been trapped in. Individuals with high catastrophising tendencies are characterised by highly dysfunctional stress coping strategies (the stress is in this case pain), leading to even more stress. This applies to adults as well as to adolescents (Eccleston, Crombez, Scotford, Clinch & Connell, 2004). Measuring the level of pain catastrophising has been established as a reliable predictor of how individuals cope with chronic pain, how likely they are to return to work, or if they will likely be disabled and retire prematurely. Measuring maladaptive coping strategies is not about putting blame on patients, for instance for not wanting to improve their condition. There is, however, sufficient anecdotal evidence that unfortunately such blame attribution does happen in practice. Measuring

> the level of maladaptive strategies, such as catastrophising, provides a good overview over a person's emotions, beliefs and cognitions at a given point in time. It is a useful tool to learn about each patient and how best to conventionalise their part of the treatment plan. Chronic pain remains a difficult area in terms of treatment and there is no simple cure (Champagne et al., 2018). Psychological factors in pain processing, fear avoidance and time related monologues, have shown their importance in optimising chronic pain treatment repeatedly in longitudinal studies. This not only further confirms that pain should be investigated in a multifactorial way, but clearly shows that mono-causal approaches fall short and rarely show success in the long run, if at all.

In summary, depression as defined by the literature (World Health Organization, 1992), is less researched compared to physical illnesses, which clearly shows in the lack of (staging) models and understanding of its aetiology. Depression has, however, a clear set of symptoms (see Tab. 2.1) and means of diagnosis (see Tab. 2.2) in order to differentiate between a depression on its own, and a depression as a comorbidity for instance based on a tumour or endocrine malfunction(s). The latter is not understood as a *true depression* since its origins are purely somatic. Based on the evolutionary origins of depression, the illness has been recorded since the beginning of medical literature in ca. 1550 BC (Ebers, 1875). Through history, depression has been understood as having purely biological or psychological or social causes. While today there is an international agreement to regard the illness based on a multifactorial model comprising neurobiological, psychological and social factors, there are some debates around which one of these factors carries the most weight. Prejudice and stigma that have been built up over centuries not only impede public education and prevention strategies in general, but have more specifically shaped beliefs that impact how artists/musicians perceive themselves in this regard, and are perceived in the general public.

2.3 Depression and musicians

This section will review the specialist literature on musicians and depression and on depression predictors that apply particularly to musicians. It will also investigate some beliefs that impact the diagnosis and treatment of depression in musicians, such as the 'creative mystique' and review existing prevention strategies. The understanding of depression in the literature, as laid out in paragraph 2.2 forms the basis for the specialist literature selection. This section of my literature review finishes with a discussion of relevant studies. Since this research is being conducted in a non-medical environment this historical/empirical approach offers the most logical basis for my arguments.

The intersection of music and medicine has been approached with questions and even suspicion by both musicians and scientists. It has been stated that musicians mistrust the exactitude of natural science, preferring to believe in the gifted and genius category (Meister, 2001). On the other hand, it is also not in the nature of science to accept categories of 'giftedness' and 'inspiration' without questioning these concepts critically. In order to achieve research that impacts both approaches – that of the artist and that of the scientist – to this intersection positively, it is necessary to find common ground.

Historical records about illnesses that are specific to musicians can be found as early as 1486 in the form of Savonarola's tract about possible causes of hernias in trumpeters and flute players. These wind players were, according to him, a most vulnerable occupational group for hernias, probably due to the high air pressure required to play these historical instruments (Spahn, 2015). More comprehensive works followed, such as Ramazzini's *De Morbis Artificum Diatriba* (1700), Karl Sundelin's *Aertzlicher Rathgeber für Musiktreibende* (Medical Advisor for Musicians, 1832), and Julius Flesch's monograph (1926). All these historical works describe illnesses that are particular to musicians, as well as health prevention methods and therapies (Hildebrandt, 2002). However, these works have remained largely unnoticed, and awareness surrounding the medical needs of musicians developed

only much later. One of the reasons for this might be that they are written in Latin and/or German, and only a few translations into English exists, if at all. In recent years, steps have been taken to uncover musicians' physical troubles and communicate findings around possible treatments, such as Botox treatment for focal dystonia, specialised surgeons for hand surgeries (instrumentalists) and throat surgeries for instance removal of for nodules or cysts (singers).This growing awareness has been fostered by a growing body of domain specific publications, such as Medical Problems of the Instrumentalist Musician (Tubiana & Amadio, 2000) or Textbook of Performing Arts Medicine (Sataloff, Brandfonbrener & Lederman, 1991).

In contrast to the research of physical illnesses, research on the mental problems of musicians is even more recent. However, despite this, there has been a solid build-up of (medical) literature in areas relevant to the investigation of depression in musicians. Studies investigated symptoms such as (chronic) pain (Spahn, Strukely & Lehmann, 2004; Williamon & S. Thompson, 2006), health and fitness (Kreutz, Ginsborg & Williamon, 2008; Williamon & S. Thompson, 2006), psycho-social stress (Hildebrandt, 2002; Langendörfer et al., 2006), movement quality while playing (Spahn, B. Richter & Zschocke, 2002; Voltmer, Schauer, Schroder & Spahn, 2008), performance anxiety (Spahn, Hildebrandt & Seidenglanz, 2001; Jabusch & Altenmüller, 2004), attitudes to discomfort and illness (Spahn, Burger, Hildebrandt & Seidenglanz, 2005; Zander, Voltmer & Spahn, 2010), coping strategies (Gutzwiller, 2008), and work identity (Voltmer, Schauer et al., 2008; Vitale, 2009). Results from these studies show a high congruence with depression symptoms (see paragraph 2.2.6, and Tab. 2.1). It is therefore reasonable to take a closer look at depression as one potential cause behind the physical problems highlighted in these studies.

Turning to studies that do investigate depression in musicians, the use of standardised test for depression has only recently found its way into musicians and depression research. Studies using such standardised tests found milder forms of depression in musicians, but a higher percentage of anxiety compared to the norm (H. S. Akiskal & K. K. Akiskal, 1994; Hasselhorn, Altenmüller, Hasselhorn & Hasselhorn, 2012; Hildebrandt, 2002; Johnson et al., 2012). Since predictors such

as anxiety, stress or chronic pain, are specific to the musicians' environments, there has been a tendency to assume that they carry more predictive weight compared to more general factors such as for instance depersonalisation (Michal, Heidenreich et al., 2006), burnout (Frank, Nixdorf & Beckmann, 2017) or dysfunctional coping strategies (Prinz, 2012). Furthermore, all depression predictors, whether specific to musicians or not, have to date only been analysed on their own and not in larger models to consider their accumulative weight in predicting depression in a musicians' environment[12].

Two larger studies that investigated musicians and depression using standardised tests, and have generated interesting insights relevant for my thesis: Kenny and Ackermann (2013) looked into the health of Australian orchestra musicians, using their own standardised tests, while Voltmer, Schauer et al. (2008) investigated German orchestra musicians, using a medical standardised test. The two studies came to different conclusions: Kenny's cluster analysis found that up to 50% of musicians were judged to be affected by depression, fulfilling the study's criteria for depression, social phobia and/or post-traumatic stress disorder. The more pain was reported by participants, the more pronounced the depression was reported - and vice-versa. Musicians who scored high on the pain questions, but not on the depression questions, were attributed an undetected depression by the researchers. This study has been discussed controversially. Altenmüller (2013) suggests that the findings of this study might be a result of both questionnaires and analysis being too sensitive, and/or a low statistical threshold, leading to false positives. One might reasonably argue that in light of Kenny's use of her questionnaires, instead of the use of validated medical depression questionnaires, Altenmüller's arguments do carry some weight. In addition, Kenny's use of their own questionnaires makes it difficult to compare the study's findings to previous studies in the field or to studies focusing on depression in other professions. However, this study has motivated my interest in studying pain alongside depression. It has also driven my choice of standardised

[12]These concepts are reflected in the overarching research questions two and three, and most notably in Studies I and II.

instruments over self-created questionnaires, to avoid possible pitfalls attached to the use of self-made questionnaires in this area and ensure internal and external validity.

Voltmer, Kötter and Spahn compared physical and mental health of German orchestra musicians to that of the general population, and also to that of two other professions working in high-stress environments: medical doctors and aircraft engineers. While musicians scored higher than the normal population on the depression scale, they scored equally high in anxiety and depression as the samples of doctors and aircraft engineers. Interestingly, despite poorer mental health scores, musicians reported better physical health than the reference sample of the normal population. While it might not be surprising that medical doctors and musicians scored similarly on the mental health scale (similarity of task characteristics and stress factors), the high score of aircraft engineers was unexpected. Another unexpected finding was that the longer a musician stayed with an orchestra, the lower the depression score became[13]. As Voltmer, Schauer et al. was one of the first studies carried out in this field across professions, it remains to be seen if these results can be replicated; this thesis is a step towards achieving that goal.

These two studies illustrate in different ways the advantages, disadvantages and problems encountered when using standardised tests in depression research. It must be said however, that these are not unique to the research of depression and musicians, having already been noted in other (medical) research (H.-U. Wittchen & von Zerssen, 1988). At present, standardised tests remain the best design for determining how depression varies across different populations. Hence, it will be the main research design employed in my thesis.

Little research using standardised depression questionnaires with music students has been published to date. On such study is by Spahn, Strukely and Lehmann (2004), who investigated music students at the Hochschule Freiburg, and compared them to students of psychology, medicine, and sports on three variables: wellbeing,

[13] As Voltmer, Kötter and Spahn used the Hospital Anxiety and Depression Scale (HADS) a low depression score means fewer depressive symptoms.

depression, and anxiety. Looking at depression prevalence[14], Spahn, Strukely and Lehmann found no significant difference between psychology, medical, and music students, with all students groups reporting 8% depression prevalence. The exception were sport students who showed a significant difference to all other groups with a depression prevalence of 1.5%. Music students reported a significantly higher anxiety prevalence of 33.5%, compared to medical and sports students, but not from psychology students. Music students further differed in relation to noticing unspecific and specific playing related pain and discomfort when compared to sports, medical and psychology students. Music students demonstrated a significantly higher motivation and enthusiasm for their studies compared to all other groups. In addition to noting the difference between groups, Spahn, Strukely and Lehmann also discussed these results in terms of possible prevention strategies. They concluded that, given the high motivation for studying, music students would best be approached as a group. Additionally the goal for preventative strategies should be music-specifically orientated: 'how can I change my health for better playing?'. Furthermore, the authors stressed that prevention strategies should be offered early to ensure long-term health for these students during their (professional) lifetimes.

The inconsistencies in musicians' depression research that have been identified above, are mirrored in sports psychology research, particularly in the area of elite college athletes (Nixdorf, Frank & Hautzinger, 2013). While some studies see college athletes as more at risk of depression due to their intensive investment into sports, others did not find such a significant difference in depression levels between college athletes and non-athletes (Proctor & Boan-Lenzo, 2010; Armstrong & Oomen-Early, 2010). These latter studies identified financial stress and change in lifestyle as students from high school to university/college life, to be a sufficient explanation for a higher than normal depression prevalence in both groups. While some studies such as Frank, Nixdorf and Beckmann (2013) have cited the added pressure for athletes to perform/compete at the highest level and stress caused by their relationships

[14]Spahn, Strukely and Lehmann (2004) used a cut-off point of 8 to separate clinically significant depression and anxiety from not clinically significant.

with coaches/trainers as reasons for this increase in students depression and anxiety prevalence, the students athletes' stress levels were not consistently found to be significantly different from those experienced by non-athletes (Armstrong & Oomen-Early, 2010). It is conceivable that the same reasoning might apply to music students or student musicians, but research into music students' wellbeing is still catching up with sports psychology in this regard.

Depression and pain in musicians

As explained in paragraph 2.2.10, pain is a complex topic. The multifactorial pain model was established in the 1970s and has since been the gold standard model for understanding pain (International Association for the Study of Pain, 2020), and whilst it is possible to investigate individual aspects of the model in detail, these have to fit within the overall multifactorial concept of pain. At its core is a principle that moves away from the straight (or simple) mono-causal somatic approach, as well as from the classic psychosomatic approach, in favour of a bio-psycho-social model. Using this holistic approach and vanquishing barriers between individual disciplines such as neurology, anaesthesiology and psychology - just to name a few - this model has demonstrated its effectiveness in research as well as in practice/treatment.

In this context, it is important to ask at this point whether approaching the research of mental health in musicians through the lens of the multifactorial model makes a difference to the outcomes of the research in this thesis. To begin to answer this question, here a simple example: within the multifactorial model, pain perception is not merely a correlation between the cause of pain and its perception. Following this logic, and looking at a common musicians' wellbeing issue, a simple equation of the overuse of muscle groups with the perception of pain by the musician is then at the very least incomplete. Other aspects influence how this pain is perceived, including a subjective evaluation by the individual who experiences the pain, physiological processes, and the individual's beliefs and coping strategies (see paragraph 2.2.10 for details on pain). It is the sum of these variables that determines how an individual perceives their pain. If individuals feel in control

of the situation and are able to actively influence it, they will be more likely to perceive the same objective pain stimulus as harmless than if they feel threatened and helplessly exposed to it. In practice, this could mean that while musicians might perceive a lot of pain, they might not perceive that pain as debilitating. In this case, their experience of pain will not lead them to take decisions such as early retirement. Hence, recording basic pain perception in musicians without taking into account the other aspects within the multifactorial model only returns limited information and risks missing critical causes contributing to current mental state (see paragraph 2.2.10, p. 44 for details about pain and paragraph 2.2.11, p. 51 for more details on measuring pain).

To review existing pain research comprehensively in the context of depression, and in the area of musicians' health and wellbeing, is not without challenge. Most studies in this area are focussed on musculoskeletal pain, while other (key) aspects of the multifactorial pain model, such as depression and anxiety, have only been reviewed recently - and sometimes not in combination with pain. Some studies on musicians' musculoskeletal pain take the multifactorial model into account such as Steinmetz, Ridder and Reichelt (2005) and Linari-Melfi et al. (2011), but this does not seem to be the case for most studies that investigate both pain and mental health. Here pain is largely evaluated using a mono-causal approach. Looking at the existing research in this area, I will therefore first illustrate the complexity of combining pain research with depression and anxiety research in musicians' health and wellbeing and separate the mono-causal and multifactorial approach for clarity. I will subsequently review studies that explore musculoskeletal pain, focusing on those based on the holistic (multifactorial) pain model.

Mono-causal approach for depression and pain in musicians' health and wellbeing research

Depression and anxiety are significant variables in predicting pain or chronisticity of pain, and as such have been added to recent musicians' health and wellbeing research. One study in particular found a surprisingly high rate of pain and mental health difficulties in performing musicians. In Kenny and Ackermann, 2013's cluster analysis 50% of Australian musicians were found to suffer from pain, and 25% from constant pain, while a third were attributed with depression, anxiety and social phobia. Critically, the study stated that the more severe the depression, the more pronounced the pain perception, and vice-versa. Individuals with low or no depression score were typically attributed a somatoform depression: someone not being aware of having a depression. Unsurprisingly, this study has been discussed intensively and has provoked editorial papers, most prominently by Altenmüller (2013). In his response, he highlights three main points that in his view contribute to the unusual results of the study: (a) by opting for their own research questionnaires, Kenny and Ackermann's instruments were too sensitive and might have lead to involuntary bias. This can most strikingly be demonstrated in the study's sub-section on PTSD (post-traumatic stress syndrome), where a PTSD diagnosis was delivered on the basis of one single self-assessment question, while questionnaires in the medical field have on average 25 questions (Ouimette, Wade, Prins & Schohn, 2008). Similarly to depression questionnaires, PTSD questionnaires usually provide the basis for a diagnosis, however, for a proper diagnosis, the additional interaction with an experienced mental health practitioner is still required. (b) The sensitivity of the chosen instruments was not only problematic in regards to the concept of the study itself, but also for the statistical analysis of the data, and the conclusions drawn from the study overall. (c) The negative return (ca. 30% returned low or no depression symptoms) could come from musicians who felt fine and were not suffering from a somatoform depression.

Expanding on Altenmüller's arguments, Kenny and Ackermann's study did not investigate the difference between acute and chronic pain. There is, however, a significant difference between acute and chronic pain in combination with depression. In acute pain, only a mild depression has significance. Anything beyond a mild depression has not been found to have any correlation with, or impact on, pain (see paragraph 2.2.10, p. 44, and paragraph 2.2.10, p. 45 for more details on pain and chronisticity). In contrast, in chronic pain both moderate and severe depression are significant, mainly because depression's key symptom, anhedonia, leads to psycho-motor slowdown and withdrawal, weakening the muscular structure (see paragraph 2.2.6, p. 20, and Tab. 2.1 for a list of depression symptoms). Since all musicians in the Kenny and Ackermann study were physically performing and practicing their instruments, there is little evidence of a weakening of muscles due to psycho-motor slowdown or withdrawal.

The other factor, that has not been considered in Kenny and Ackermann's study, but that has been reliably identified in medical literature as significant in general depression and (chronic) pain research, is that constant strain and heightened muscular tone create stress (or pressure) in the lumbar area, thus causing lower back pain without the presence of diagnosable lumbar dysfunctions (see paragraph 2.2.11, p. 51 for more details). This factor would apply to musicians in the study who were suffering from lower back pain only, but not those who experienced pain in any other areas of the body.

However, an interesting possibility arises from the findings and descriptions in this study, which has not yet been further explored: on the basis of the described aches and pains, musicians could be suffering from a similar form of muscular fatigue that is known within the athletic world as acquired training intolerance or ATI (Derman et al., 1997; Grobler et al., 2004). To elaborate, Derman et al. (1997) noticed that athletes were suffering from exercise-associated fatigue, intolerance to exercise, and abnormalities within their skeletal muscles. These athletes had a history of high training volume and suffered from inability to do endurance training.

More recent studies, such as Gibson et al. (2006), found that that ATI athletes, when compared to control athletes, had the same level of isometric and aerobic capacity. However, their depression scores on the BDI (short version) differed. It is possible that a form of ATI could also affect musicians. While ATI is not investigated further in this thesis since it would require a medically based approach and clinical setup to investigate the physical (skeletal) abnormalities, it might be a good avenue to pursue further if this thesis can demonstrate that musicians, or in this case music students, are indeed experiencing a higher prevalence of depression and pain processing compared to non-musicians.

A similar lack of differentiation as described above in reference to the study by Kenny and Ackermann frequently occurs when anxiety, or anxiety in combination with pain, is added as a variable to depression studies in musicians (Williamon & S. Thompson, 2006; Kreutz et al., 2008; Kenny & Ackermann, 2013). It is necessary here to differentiate between acute and chronic pain. In acute pain, anxiety is a reliable predictor for the success or failure of an intervention, for instance surgery (Kröner-Herwig, Frettlöh et al., 2011). In chronic pain on the other hand, anxiety forms part of the meta-cognitions and time-related monologues that cause individuals to either adapt to pain or render them disabled (see paragraph 3, p. 55 for details on pain meta-cognitions and time related monologues). None of these studies Williamon and S. Thompson (2006), Kreutz et al. (2008) or Kenny and Ackermann (2013) differentiated between acute and chronic pain, and it remains questionable how, for instance, performance anxiety fits into multifactorial concepts of either depression or pain for musicians.

Problems with a mono-causal approach to pain research in musicians

As laid out in section 2.2.10, (musculoskeletal) pain has been found to be a solid predictor for depression. Its evaluation in musicians' health and wellbeing research is likely to provide valuable information on how to assess this variable within the

context of this thesis, and provide some ideas for the choice of pain questionnaire. So, how is musculoskeletal pain researched and evaluated in musicians?

Lahme et al. (2000), Williamon and S. Thompson (2006) and Kenny and Ackermann (2015) have researched musculoskeletal pain in musicians, especially playing-related musculoskeletal pain. However, these studies did not investigate pain in relation to the multifactorial model, but asked only for pain perception (at the point of completing the questionnaire) and its duration. They did not investigate any other variables that could have provided information on how the perceived pain was processed, such as coping strategies, emotional state or any other yellow flag items (see Tab. 2.6). However, a considerable number of studies agree that a large number of musicians do suffer from pain for long periods of time, suggesting that the pain perceived by musicians would have to be considered chronic rather than acute. The conclusions drawn from these studies, which state that musicians suffer significantly more from pain than the norm, are however a little more problematic. First, pain research in the general population has already shown that (chronic) pain is a pertinent and ever growing problem (see paragraph 2.2.11 for details on chronisticity). It is also reasonable to expect to find an elevated pain level amongst musicians for simple, mono-causal reasons, such as the presence of repetitive movement or particularly stressful environments. However, to establish the musical profession as a true at-risk profession, one should be able to establish a sense of proportion by making it possible to compare the risks for musicians with those encountered in other professions[15]. This was also reported by Gembris, Heye and Seifert (2018), who went even further in a quest to develop a first tool - in cooperation with medical expertise on staff - to be used in addition to other questionnaires, on how to close this gap (Fernholz et al., 2018; Schellberg, Krettenauer & Heye, 2019).

Contrasting a mono-causal and multi-modal approach to musculoskeletal pain

The issue with investigating musculoskeletal dysfunction in musicians in isolation is that this type of (muscle) strain does not per se cause pain, and it remains unclear

[15]This concept is reflected in the overarching research question one.

which variables need to coincide in order to lead from a pain-free dysfunction to a painful one. When investigating musculoskeletal dysfunction, one should also differentiate between acute (e.g. bacterial arthritis, tissue proliferation/tumour) and chronic musculoskeletal pain. When investigating this problem, Paap, Meijer, Van Bebber et al. (2011) found a noticeable discrepancy between the musculoskeletal pain felt by professional orchestra musicians and the actual identifiable physical dysfunctions found by doctors and physiotherapists in these musicians. One possible reason for this discrepancy might be that the quantity of the perceived impairment weighed heavier than the quality (Steinmetz, 2015). Eijsden-Besseling, Kuijers, Kap, Stam and Terpstra-Lindeman (1993) pointed out a difference in malposture between medical and music students. 30% of medical and music students suffer from malposture, noted with great attention to physical detail (e.g. head and shoulder posture, thorax and hip). In musicians, or rather music students from the conservatoire Rotterdam, this percentage, however, spiked up to 54% at the moment they picked up their instruments. These results reflect the influence of physically playing an instrument on the development of musculoskeletal pain. Ramella, Fronte and Converti (2014) noted that out of 184 music students, two thirds had a suboptimal posture while not playing, and 73% while playing. Already present dysfunctions, such as scoliosis or hyperlordosis, were emphasised while playing.

Based on medical research in chronic pain, there are reasonable grounds to assume that musicians' pain could be chronic. In chronic musculoskeletal pain, imaging techniques revealed substantial cortical plasticity alterations that could be viewed as 'pain memories', influencing painful and non-painful processing in the somato-sensory system (Flor, 2003). The changes were, however, reversible if the pain was adequately treated, using the multi-modal pain model as a guideline (May, 2008). However, studies employing this level of detail, or brain imaging techniques, to document alterations similar to those for instance described by Flor (2003) or May (2008) to back up the claim of chronic pain, do not yet exist for musicians. For musicians, the evidence of chronic pain in this area is – for now - more subtle, as shown for instance in studies by Steinmetz and Jull (2013) and Linari-Melfi et al.

(2011). Both investigated deep tissue hypersensitivity to pressure and thermal pain thresholds (hot/cold) in musicians with neck pain (violinists and pianists). Both found a lower pain threshold compared to musicians not suffering from neck pain, which is congruent to findings in the general population. However, both studies worked with modest samples of 23 and 22 participants respectively for each group.

Reviewing the existing literature on musicians that uses depression and/or pain as variables is challenging, since the majority of studies in this area is based on outdated depression and/or pain models. The use of such outdated or non-medical models in the approach to medical problems aggravates the issues faced in practice - both in prevention and treatment - as it artificially widens the gap between research and practice. It thus reinforces existing prejudice and beliefs, such as the belief in the 'creative mystique' (see paragraph 2.3.1, p. 71 below for more details), and strengthens unhelpful attitudes in musicians in relation to their instrumental practice, such as 'no-pain - no-gain', which might further reduce the efficacy of prevention strategies and treatment compliance.

Studies based on the bio-psycho-socio model of pain in musicians can be found less often, and - compared to purely medical papers in this area - there is a lack of studies putting neurological findings to the test or, in other words, putting the 'bio' into the bio-psycho-socio pain model. This is understandable, since studies using imaging techniques are costly and perhaps not easily feasible for smaller populations, such as musicians. Researching yellow flag items such as coping strategies or pain catastrophising would provide a good basis for investigating how pain is processed in musicians. Given the fact that musicians perform for long periods of time while experiencing pain, rather than retire early due to pain as expected within the norm population, there is reasonable ground to investigate whether there could be a preventative mechanism in musicians that could benefit the wider population if identified.

2.3.1 Depression: beliefs of musicians - the 'creative mystique'

The idea that musicians, creativity and depression are intertwined is not only entrenched in musicians' minds (Pryal, 2011) but also in science, where studies see the need to point it out specifically if they find only a deviation from this assumption (Chen, Snyder, Magner et al., 2010). This concept is referred to as the 'creative mystique' or the 'creative myth'. The 'creative mystique' implies that musicians are more prone to bipolar depression and that the phases of mania within bipolarity increase creativity and thus musical accomplishment and career success. In depression research, prevention and treatment, it is necessary to understand existing beliefs to aid understanding of the behavioural patters of a particular group, such as musicians. This paragraph reviews some possible historical causes for the continued existence of the belief in 'creative mystique', the probability of bipolarity in musicians based on general depression research, and some of the consequences that this belief has for musicians.

The notion that a profession should foster a mental illness in order to achieve superior creativity, and thus success, expresses the duality of our thinking in regards to mental and physical health (Jacobi, 2009). No one would wish for a tumour or an endocrine malfunction to foster success, but a mental illness can be deemed to be acceptable, if not necessary, for artists and musicians to be truly successful. What are the origins for such a belief system?

The answer is partly rooted in history. As established in paragraph 2.2.1, depression has evolutionary roots (M. C. Keller & Nesse, 2006). To briefly summarise this paragraph, depression is seen as a reaction to, or a consequence of, an avoidable threat, and symptoms such as loss of motivation, slower thinking-processes and a psyscho-motor slowdown are then a healthy, albeit retrograde, reaction (Bader et al., 1999; Böker & Hell, 2002; Marneros, 2004). The evolutionary roots hypothesis is firstly based on depressive behaviour not being unique to humans, but also existing in many mammals. Secondly, it is supported by the close link between

stress factors, the frequency of depression, and the continuous metabolic changes during ongoing stress and depression. Thirdly, it is documented by the analogous depressive behaviour of mammals (Kendler, Karkowski & Prescott, 1999; Kendler, Gardner & Prescott, 2002; Van Praag et al., 2004). Since depressive behaviour follows a regular pattern and appears with a relatively high frequency in humans and other mammals, it is therefore reasonable to expect behavioural maladaptations as well as functional disturbances, or in other words the illness depression. It follows that depression has been affecting individuals for centuries (Ebers, 1875). Its first name, melancholia, was coined by Aristotle in the Corpus Hippocraticum - a collection of medical texts dating back to the period from the 5th century BC to the 2nd century AC (see for example Flashar (1962)).

Humorism in the Corpus Hippocraticum classically divided all illness into four humours or bodily fluids: blood, yellow bile, black bile and phlegm, where black bile was associated with depression like symptoms, as were mania and epilepsy Flashar, 1962, see Fig. 2.12 for a schematic diagram). It is therefore important to understand that black bile or melancholia did not describe a uniform pathology of depression as we understand it today.

The first positive interpretation of Melancholia can be found in the *Problemata Physica* by Aristotle, where he writes that under some circumstances individuals distinguish themselves from the normal population:

> '... thus all melancholics are exceptional, not for reasons of illness, but based on their natural disposition...' (Flashar (1962), p. 250)

This text had a significant impact on the interpretation and understanding of melancholia as previously laid on in paragraph 2.2.1 (p. 11). In this context, it is important to remember that humorism stayed in place as a medical guidance concept until the late 17th century. However, the positive concept of melancholia only took root in humoural medicine in the Western World, while medical concepts such as Eastern or Islamic-Arabic ones, regarded melancholia differently (i.e. as an imbalance or illness, Ansari, 2013). It is well documented that at that time Islamic-Arabic medicine was more progressive than its Western Medieval Monasterial

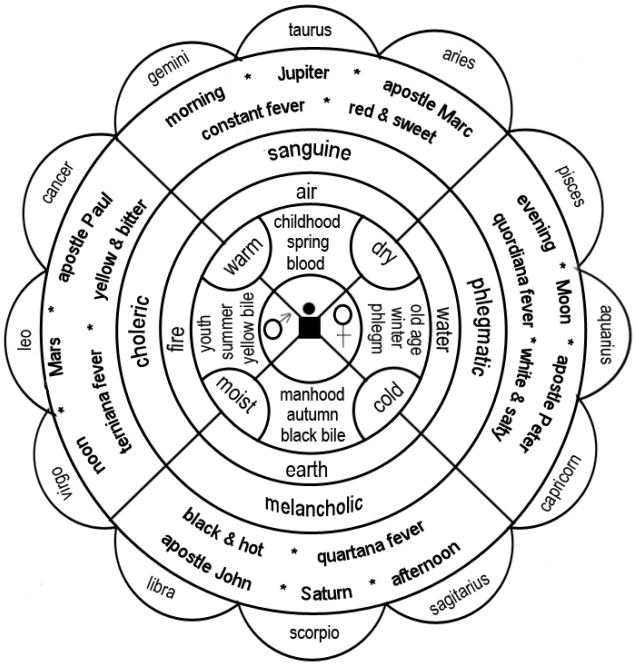

Figure 2.12: Extended schematic diagram representing the four humours (blood, phlegm, black bile and yellow bile) at the centre and their qualities and relationships with the elements. Based on this interpretation of humorism, even individuals born under the constellation of Saturn were believed to be melancholics by birth, modified after Jurk (2005)

counterpart. Incidentally, the Persian physician Abū Ali al-Husain ibn Abd Allāh ibn Sīnā (980-1037), known in Western World under his Latin name Avicenna, was one of the first physicians to prescribe an early version of music therapy for his melancholic patients, identifying different 'health inducing tonalities' (Dalfardi, Yarmohammadi & Ghanizadeh, 2014; Thaut, 2015).

However, even though Islamic-Arabic medicine had a negative view of melancholia, it did not go as far as Medieval Europe, where melancholia became one of the seven deadly sins (i.e. acedia or lethargy). This is analysed in detail by Thomas D'Aquinius (1225 – 1274) in the second part of his book *Summa Theologica*:

> '... Quod quidem est et de bono divino, cui gaudio opponitur acedia ... Unde primo considerandum est de acedia. ... Primo, utrum acedia sit pecatum. Secondo, utrum sit speciale vitium. Tertio, utrum sit mortale peccatum. Quarto, utrum sit vitium capitale.'[16], D'Aquinius (1485), quesitio 53 p. 465.

[16]Where this divine godness is concerned, this godness is opposed by lethargy. ... Therefore we

The 'demon acedia' forms a very important part of medieval psychology with its ultimate expression in suicide. Lethargy - or the depression symptom of lack of motivation as shown in table 2.1 - was thus perceived as a mortal sin. The extended humorous system, as shown in figure 2.12, goes as far as to declare people to be melancholics if they are born under the constellation of Saturn, thus declaring them to be sinners based on their dates of birth.

However, a second philosophical appreciation started during the early renaissance, exemplified for instance in works by the scholastic philosopher Henry of Gent (1217-1293). In his *Quodlibeta*[17] he found that melancholics made the best mathematicians (Ribi, 2011). In art, Gent's idea is reflected in Dürer's Melancholia I (1415). Dürer's engraving is characterised by iconography and symbols. At its centre the engraving shows a winged figure, holding in its lap a circle and a closed book. Next to the figure is a boy, or genius, and in the background on the wall of a house hangs a magic square with mathematical and geometrical symbols. Dürer's work, already popular during his lifetime, can thus be interpreted as a contemporary illustration of melancholia (Ansari, 2013). Furthermore, Dürer's Melancholia I is noteworthy, because it confronts the negative attitude towards melancholia (as acedia) with the renewed positive 'genie cult' (Eichhorn et al., 2006). Within this thinking, the Aristotelian opinion that all melancholics were great men transformed into *melancolia significa ingenio* - melancholia means genius (Panofsky & Möller, 1977). Ansari (2013) points out that individuals with social ambition at this time strove to 'learn how to be melancholic' in order to be successful, independently of their profession.

The Romantic period added further powerful arguments to the conviction that a 'sick melancholia' was responsible for creativity by drawing conclusions from early psychological and phrenological findings. Becker (2001) suggests that the political and social changes after the Napoleonic wars could have been a reason for artists to try to distinguish themselves from the so-called 'normal' person. In

should first look into lethargy. ... Firstly, if lethargy is a sin. Secondly if it is a particular vice. Thirdly, if it is a mortal sin. Fourthly, if it is a capital vice.

[17] ed. J. Badius. Paris 1518, repr. Leuven 1961

times when money was scarce and patrons were far and few between, this might have been a way to create a distinctive group. The move towards grouping together 'sick melancholia' with creativity and 'being special' also coincided with the rise of psychological findings. Artists backed up their belief in being different from the rest of the population with the findings of phrenologists, who compared skulls of artists, the mentally ill, and criminals (murderers), finding striking similarities such as bumps over the ears or in the back of their skulls (Lombroso, 1877)[18]. In this combination of Aristotelian thinking and early psychology, the idea was that one would be able to predict (criminal) behaviour or artistic success ahead of time, thus making it more appealing to potential patrons to support an artist. Moreover, Angst (2002) notes that the movement to unify melancholia with what is today called bipolar depression was not only driven by artists, but also by the medical profession (Esquirol, 1805; Falret, 1851). Throughout history, melancholia has gone through an astonishing transformation from a 'normal illness' to a cult of genius, to the force of the devil and the notion that individuals were to blame themselves for having voluntarily accepted the disease, to an internationally agreed-upon complex concept of unipolar and bipolar depression (Korte & J. V. Williamson, 2015; World Health Organization, 1992).

In summary, on the question of the origins of the 'creative mystique' or 'genius cult', history offers either negative ('force of the devil') or positive ('creative mystique') interpretations of depression, depending on the era. Combining the wish to predict a certain behaviour on the medical side, and creative success on the artists'/musicians' side, created the notion on both sides that artists and thus musicians were by nature more vulnerable to depression. Moreover, based on the era and the different predominant interpretations of melancholia, prejudices and stigma around the illness have developed both ways (positive and negative), depending on profession (see paragraph 2.2.1).

[18]The bump on the back of the head has survived in German language, being colloquially called *der musikalische Hinterkopf* (the musical back of the head).

However, if we approach the 'creative mystique', the notion that musicians are by nature bipolar, meaning genetically predisposed to be bipolar, from a scientific viewpoint and based on our current understanding of (bipolar) depression, how much validity does the belief carry?

The answer is that, based on today's knowledge of bipolar depression, the 'creative mystique' has little support. As explained under neurobiological factors of depression in paragraph 2.2.7 (p. 26), while there is a greater than 50% chance to inherit bipolar depression, the overall prevalence of bipolar depression is currently estimated to be at 1-2% worldwide (Lieb & Frauenknecht, 2012). Furthermore, manic phases in a bipolar depression occur only 6% of the time, while for the rest of the time individuals are either asymptomatic (i.e. show neither depressive nor manic phases) or are depressed (Lieb & Frauenknecht, 2012). While unipolar depression is fairly common (see details in paragraph 2.2.5), it is almost impossible to determine if a unipolar depression will turn into a bipolar one. Being affected pre-puberty by depression in its most severe form (that means both major and all minor criteria are experienced for more than two weeks (see Fig. 2.3 for more details)) and with a pronounced psycho-motor inhibition (i.e. bed-bound) is currently seen as a circumstance that points towards a depression being bipolar and not unipolar (Katja Beesdo-Baum et al., 2009; Karin Beesdo-Baum & H.-U. Wittchen, 2011). Studies of adolescents who were formally diagnosed with bipolar depression found that aggression, severe mood instability, temper tantrums, anxiety symptoms, and sleep disturbances were found up to three years prior to the formal diagnosis, and the majority of cases were formally diagnosed by the age of 8 (Hernandez, Marangoni, C Grant, Estrada & L Faedda, 2017).

In answer to the belief that musicians are likely to 'become bipolar', it is helpful to consider Angst et al. (2005)' 50-year follow-up study, which found that the change from uni- to bipolar depression shows a constant conversion rate of 1.25% over a individual's lifetime, or in other words, if patients with unipolar depression live long enough, they will become bipolar at some point in their lives.

Summarising general depression literature, the risk of being bipolar is currently estimated at 1-2%. Patients would need to be affected early in life (pre-puberty) and by the most severe form of depression. Moreover, based on the heritability of bipolarity, it is highly likely that a close relative is also affected by the disease. Considering the likelihood of 'becoming bipolar' at any point in life, it is currently estimated at 1.25% over the course of a lifetime. This means that it is possible to 'become bipolar' if one lives long enough.

Nevertheless the concept of bipolarity and creativity, and thus career success as an artists, prevails and continues to divide researchers into two camps, the ones finding arguments for it, and those who find those arguments to be invalid, based on general depression research and lack of operationalising of key terms such as creativity and statistical models by the former group.

Pro-'creative mystique' studies are generally studies with large populations taken from either death certificates (suicides) and/or census data, looking at lists of individuals from what they define as creative professions or creatively successful individuals. However, studies such as by Kyaga et al. (2011) over-complicate the issue by grouping schizophrenia and schizophrenic disorders together with bipolar. Next to none of these studies with large populations have used power calculation to safeguard against over-powering their studies, that is finding a small effect because the investigation was run in a large population (Ellis, 2010). An example for this is Ludwig's (1992) study on comparing creative achievements and psychopathology. His conclusions that what he understood to be creative success with psychopathology, was based on a correlation between the two. Based on the large sample size, one could expect to find a small effect. Ludwig did not provide any power analysis to safeguard his study against over-powering as should be expected in a correlation study. Moreover, the correlation between what Ludwig defines to be a creative achievement and (bipolar) depression is weak ($r^2 = .04$).

Lastly, when considering beliefs attached to the creative mystique, it is important to also briefly consider the concept of creativity, which is not viewed homogeneously. Creativity should be a loosely defined concept, because it can be applied to almost

any aspect in life. Creativity can for instance be artistic or scientific and within those domains further distinctions apply, for instance creativity used in creating or composing a piece of music versus interpreting or performing a piece of music (or in science a distinction between 'hard' and 'soft' sciences). This component makes it difficult to reliably measure and compare different studies as almost every study defines creativity in its own way that at least slightly differs from others. Furthermore, the fact that a person works in a creative profession should not automatically be equated to actually being creative (Dietrich, 2014; Simonton, 2019). Further compounding the problematic of creativity is a lack of qualitative studies - either on their own or as follow-up studies to existing large population studies.

In the few studies where the concept of creativity has been defined by the Torrence test of creative thinking, patients with severe manic symptoms rated last on the test, followed by those with mild symptoms and healthy controls (Chávez-Eakle, 2006). While patients with mild symptoms of mania were able to achieve good test results, their overall results were not significantly better than those of the healthy controls. Chávez-Eakle found it necessary to point out these results specifically, since the creative mystique is so entrenched.

In conclusion, it is clear when reviewing the literature on the creative mystique that researchers are divided into two camps, one arguing for and one against it. While it is not the purpose of this thesis to answer who is right on this issue, there is an important need to understand this belief, and the historic reasons why it could become entrenched in people's minds, especially when pursuing any qualitative analysis in this area. The creative mystique is called a belief, not a 'hard science'. It is entrenched in people's minds, musicians' and scientists alike, and has had centuries of diverse interpretation, stigma and prejudice to feed on. A qualitative investigation into the subject should, at the very least, be aware of a minimum of history on this topic as well as some of the key pro and counter arguments represented in studies that address the creative mystique.

Primary health illness prevention for musicians

Having established the need for depression prevention, education, and improvement for musicians in the preceding section, what should prevention strategies for music students look like? Prevention strategies are separated into primary, secondary, and tertiary aspects, depending on when they are implemented in the course of a lifetime (Temper, 2009). Figure 2.13 shows what such an implementation could look like for music students and musicians.

Prevention strategies by youth and education institutions are categorised as primary prevention. H.-U. Wittchen and Jacobi (2005) showed that younger generations are more open to talk about depression and mental health in general. Furthermore, Nanke and Rief (2003) demonstrated that younger generations are not only more open to talk about depression than older ones, but also more inclined to make use of prevention (strategies). This should provide a strong incentive for primary level prevention providers to attempt to reach out before a crisis occurs. Doing this will ensure that individuals in need not only know whom to talk to, but can build up networks early on to benefit from peer support during a crisis (Hass & Petzold, 1999; Leitner, 2011).

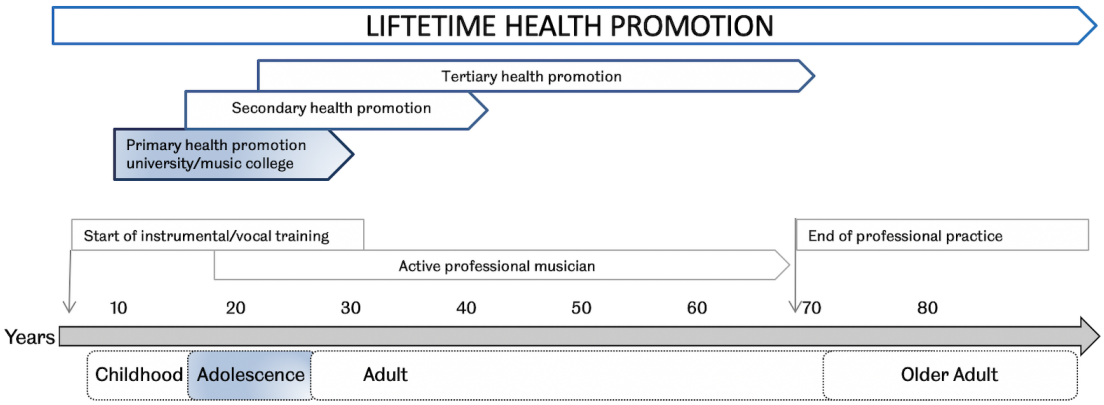

Figure 2.13: Model for musicians' health illness prevention over the course of a lifetime, based on and modified after Temper (2009)

Peer support in depression should not be underestimated, especially in view of the small percentage of patients who follow the minimum treatment time (Fig.

2.13. Furthermore, H.-U. Wittchen and Jacobi (2005) demonstrated that peer support can shorten the time between realising the need for help and finding appropriate medical help[19].

Prevention strategies can be (a) general strategies, e.g. targeting the entire (music) student population and (b) selective or targeted strategies (Lösel, Beelmann, Stemmler & Jaursch, 2006; Hahlweg & Bodenmann, 2003). Such targeted strategies could select one aspect such as pre-audition/performance nerves or performance anxiety, or they could focus on a particular group such as singers or high string players, excluding other groups of musicians. Both types of strategies are necessary in order to include all students who do not necessarily belong to a single specialist group, yet are in need of depression prevention. General strategies are mostly offered across all study subjects in an education setting, for instance connecting students with peers if they feel isolated, for instance projects such as Get Connected UK or Nightlines. However, when a target population has been identified, selective strategies have been shown to be more effective (Calear, Christensen, Mackinnon, Griffiths & O'Kearney, 2009; Horowitz & Garber, 2006).

Moreover, since depression is multifactorial, selective prevention strategies should be built upon this knowledge. That means that in order to be successful, strategies should target at least two out of three aspects of the multifactorial model, for instance one strategy could target cognitive and social aspects (Pössel, Horn & Hautzinger, 2003; Holsboer, 2011). To apply this to a practical example for primary strategies targeting the music student, strategies could for instance aim to replace dysfunctional ideas, such as being paralysed by performance anxiety or pre-audition nerves, with a positive approach, such as finding positive feedback from peers and learning to re-evaluate their own performance in that light. Prevention strategies respecting a multifactorial approach, and focusing on active intervention instead of passivity, have been found to double the power of their results (Durlak & Wells, 1997; Martin Hautzinger, 2002).

[19]The following concepts are reflected in the overarching research question three, most notably in Study III.

Spahn, Walther and Nusseck (2016) showed the design of a multifactorial prevention strategy for music performance anxiety in an exploratory study, with two groups of music students, 13 students in an intervention group and 8 in a control group. Specialist music performance anxiety training was offered to the intervention group, and included video feedback on various levels such as breathing, body awareness, and musical background of orchestral pieces for a solo player. It also included invited speakers on the topic, performance training on stage, social group support, and recognising success - here again by the means of video feedback. This design not only respects the multifactorial construct, but also includes active participation from students and increase in social peer support. Each guest speaker also taught the group new ideas. After fourteen weeks, the elements in performance anxiety that improved significantly, were (1) diminishing of feeling alienated by anxiety, (2) trembling of hands, (3) perceived anxiety while playing, and (4) an improvement of students' own performance. Before the intervention, the selected student group suffered more from performance anxiety than the control group, albeit not significantly so. However, after the intervention, the target student group following the course showed a significant reduction in performance anxiety, not only compared to before the start of the intervention, but also compared to the control group. However, as Spahn, Walther and Nusseck (2016) noted, this does not show if a multifactorial model is de facto more effective for music students compared to a one-dimensional approach, as there was no group following the latter.

In summary, this section about depression and musicians demonstrated that there is scope for science and practice to improve in terms of both general education and specialised (stigma) knowledge about depression (mental health). Since physical and mental health is essential for musicians to build and maintain their careers, it is necessary for music students to learn the basics of physical and mental health, especially in view of the general mental health, and thus depression, gap in medical education. The fictitious story in the motivation section of this thesis (see p. 3) showed how easily one could be affected, and/or caught between the chairs due to a lack of knowledge, and become (medically) dependent. This thesis attempts to

close this gap by investigating the subject from a medical perspective and offering practical suggestions for improvement.

2.4 Research questions guiding this thesis

Despite general research showing that there are risk factors for music students to suffer more from depression compared to other student groups (see paragraph 2.2.5, 2.2.9, and 2.3), depression prevalence in musicians at university or music college has not been satisfactorily investigated, particularly in comparison to students who are not musicians (see paragraph 2.3).

A quantitative approach allows to collect a comparatively large set of data in a fairly short amount of time. This, in turn, allows to see if and how depression is distributed throughout this population. While an altogether qualitative approach is also a conceivable way to answer the research questions, especially from an anthropological point of view, a quantitative approach promises a time-effective and inclusive solution (in terms of number of participants). Moreover, a repeat-design as proposed for Studies I and II (see below) allows for an increase in reliability and external validity of the research, whilst also allowing for a possible customisation of depression predicting variables in Study II on the basis of the results from Study I. Since my thesis challenges some existing beliefs in the area of depression and pain processing in musicians' health and wellbeing research, it was vital to choose a design that would allow me to robustly examine the relationship between these two factors. Including a rather large number of depression variables in a quantitative study had three key benefits. Firstly, it allowed for an individual analysis of all variables. Secondly, choosing depression variables that had already been firmly established within the (medical) literature, including the relationship between variables, added external validity to the studies, for instance: high scores in depression had to be congruent with high scores in anxiety and/or high scores in pain processing. Thirdly, it allowed for further statistical tests, such as regression and tree models, to further confirm or reject a specific hypothesis. This also explains the larger number of hypotheses for the variables in the individual studies.

Therefore, the goal for this thesis is to research depression in musicians within a higher education environment, starting with student musicians at university and non-musicians at university, followed by researching depression in a music college environment, both times using a quantitive approach (see chapter 3 and chapter 4). The last study (Study III) will be looking into professional musicians who had at one point formally been diagnosed with a depression, but who have sufficiently recovered from the illness (see Study III, chapter 5).

As previously explained, quantitative depression questionnaires, such as those used in Studies I and II, generally have limits (see paragraph 2.2.4, p.15). They help to identify a target group, give an overview of the number of individuals affected by depression and/or the severity of the disease in a population, but they give no information about how the individual de facto experiences depression. This is due to the nature of depression, which remains essentially an illness that is diagnosed verbally in a dialogue between patient and physician/psychologist. However, it is vital to understand how individuals from within a specific group (professional or age group) perceive depression, because this provides insights that can help shape future prevention strategies. Such insights can only be gained through a qualitative investigation. In order to achieve meaningful results with this qualitative investigation, there were three main reasons to choose professional musicians as target population, rather than musicians who were still engaged in completing their higher education. Firstly, the literature on students in higher education showed that interviews with this particular population would be rather difficult. Participants from this group have been found to withdraw from such studies based on merely perceived risks to their career/academic studies (Gold, Andrew, Goldman & Schwenk, 2016). Secondly, the sampling process for participants in Study III had to be convenient – meaning readily available - and purposeful, selecting from the available sample those, who corresponded to the selection criteria. Participants had to be musicians and had to have been previously diagnosed with a depression. Thirdly, as this investigation was carried out without clinical supervision, participants had to have been in remission for a minimum of six months at the time of participating.

This thesis will be guided by the following overarching research questions:

1. Do more music students suffer from depression or depressive symptoms than students of other subjects and can therefore being a music student be a significant predictor for depression?

2. When looking at depression amongst music students, are there any recognisable patterns of symptoms, both in quality and quantity, that single them out from other students?

3. How does the life of a music student and how do the demands of the music discipline/profession impact depression in terms of the following selected factors: professional identification, practice time (daily time and amount of years), instrument played, pain catastrophising and, to some extent, anxiety (general and performance anxiety), depersonalisation, coping skills, burnout, sleep and/or stigma.

In this exploratory setting each study will break down the overarching research question with their own set of (sub-) questions derived from the thesis' overarching research questions above. Thus, each individual study contributes one building block to answering the overarching questions, which will then be reviewed based on the results of the individual studies at the end of the thesis in chapter 6.

I would like to briefly reiterate here that throughout the three studies in this thesis depression is defined according to the ICD-10 definition of depression, as laid out in paragraph 2.2.4. Furthermore, quantitive research cannot (a) diagnose depression; for instance most questionnaires do not take the two-week minimum timeframe into account, and (b) provide the information to specify if the experienced depressive symptoms qualify for a depressive episode, or are an indicator for a depressive syndrome. Therefore, the term depression is used in all three studies without further specification of this kind. Moreover, while quantitive depression research can show depression prevalence, it cannot determine how much the individual is de facto suffering from the symptoms. The severity (here: a higher depression

score) might give an indication, however. There is a wealth of literature on sub-clinical or sub-syndromal depression - that is depression that is not yet at the level of a clinical definition of a depressive syndrome or episode - that describes how severely an individual's life can be affected already at this sub-syndromal level (Judd, Rapaport, Paulus & Brown, 1994; Judd, H. S. Akiskal, Maser et al., 1998; Hetrick et al., 2008; Balázs et al., 2013). Depression questionnaires find clinically significant depression by using cut-off values, which represent the ICDs definition of a depression syndrome or, if the questionnaire is asking for a two-week period in which the symptoms were present, a depressive episode. This means, the longer the timeframe the questionnaire asks for, the more likely it will be able to assume a depressive episode. As with all questionnaires, this, of course, presumes that the individual responding to the questionnaire answers it truthfully.

One aspect that quantitive depression questionnaires do allow for, is the investigation of individual symptoms (depending on the questionnaire). As mentioned above, since depression is essentially a collection of symptoms, a population can be distinguished based on how these symptoms are weighted.

Resource building or eroding variables and assumptions at the start of this thesis

In addition to researching depression prevalence, a few variables will be taken into account that might either help to build resources for depression (i.e act as buffer) or erode resources (i.e. work to accelerate depression), as mentioned in the overarching research questions above. These are:

Anxiety: As described in detail in paragraph 2.2.9, p. 42, the majority of depression cases present with anxiety disorders. Anxiety is not only a symptom in depression, but also acts as a predictor. Going into Study I, the assumption is therefore to expect congruence between anxiety and depression scores.

Professional identity: This concept, used in sports psychology, refers to the degree of (athletic) identification (Brewer, Van Raalte & Linder, 1993).

Building on previous studies that used this standardised sports psychology questionnaire while changing 'athlete' to 'musician' (Vitale, 2009), this study will further investigate how professional identity influences the music students' depression scores. The initial assumption at the start of this thesis was that a high total professional identification score would equal a high depression score, as found by Brewer, Van Raalte and Linder (1993). However, should there be a close match between musicians' and athletes' professional identity scores, more recent sports psychology literature should be taken into account: here, a high overall identity score did not indicate a high depression score (Chen et al., 2010). Instead, the professional identity subscales had to be seen on an individual basis: a combination of high scores in the subscales negative affectivity and exclusivity, with low scores in the subscales social and self-identity would be reflected in high depression scores, while the inverse would result in low depression scores.[20]

Pain catastrophising: As described in more detail in paragraph 2.2.10 (p. 44), pain catastrophising allows for an opportunity to measure the impact of chronic pain on an individual. It has emerged as a strong predictor for depression and of disability in the area of chronic pain. Individuals with a high score of pain catastrophising are found to be trapped in constant mental occupation with pain, are extremely worried, for instance that their pain might increase, and feel helplessly trapped by chronic pain. A high level of catastrophising is generally associated with a high depression score and high pain perception. This is also the assumption for this variable going into Study I.

Depersonalisation: Depersonalisation disorder is marked by emotional regulation difficulties: a feeling of incompleteness, a sense of detachment from oneself, and the experience of one's own actions as 'not-feeling-quite-right' (see 2.2.9, p. 43 for more detail). Correlations of depersonalisation with anxiety, depression, and burnout symptoms suggest a comorbidity or, at

[20]Please see Burland (2005) for the development of a musical identity, unrelated to the scale by Brewer, Van Raalte and Linder (1993)

least, common neurobiological denominators between these symptoms (Hunter et al., 2004). Clinically observed phenomena, such as the activation of prefrontal attentional brain systems, present compelling evidence that links depersonalisation and anxiety as co-morbid disorders (Sierra & Berrios, 2000). Anecdotal evidence from musicians showed emotional distance during performance, similar to transient depersonalisation phases: performing on autopilot, with low emotional connection, and a high technical standard, while not retaining many details from that particular performance in memory. Looking at depersonalisation stress measurement studies, e.g. by Simeon, Guralnik, Knutelska, Yehuda and Schmeidler (2003), it is more likely that these transient depersonalisation phases are brought on by gradual stress increase, rather than selective high stress occurrence, such as performance anxiety. Two more arguments point towards transitional phases of depersonalisation: firstly, anxiety only correlated with a low level of depersonalisation. This was when depersonalisation tended to be more transient, rather than constantly present. Secondly, depersonalisation stress studies reported a consistently high noradrenalin baseline, as well as an inverse correlation to depersonalisation symptoms, with selective stress and anxiety. These results would also infer that it is less likely for depersonalisation to be used as a predictor for performance anxiety, or any other forms of anxiety diseases (e.g. social phobia) as previously suggested (Cox & Kenardy, 1993; Kenny, P. Davis & Oates, 2004). However, it is vital to point out that almost all investigations so far have been done with adult populations and do not include adolescents. University participants still (medically) qualify as adolescent (up to 25 years) (de Guyter, 2010). The first assumption for this variable therefore has to be that inferences can be drawn from an adult population and applied to an adolescent one. The second one is that depersonalisation phases occur in adolescents as part of puberty to (re-) learn emotion regulation, e.g. will be naturally high and transient, and low depersonalisation scores will be reflected in low anxiety scores (Michal, Heidenreich et al., 2006). The question that remains open, as it has not

previously been investigated, is: how does playing an instrument, and with it the level of professional identification, affect depersonalisation, if at all?

Coping skills: As coping skills are reflected in depression (e.g. low coping skills generally mean higher depression levels), these should help to interpret the depression data and/or serve as an additional argument in case the interpretation of the data does not appear obvious based on relevant literature. The assumption for coping strategies is that negative coping skills will be reflected in higher depression scores, as well as anxiety and burnout, and also professional identification.

Burnout is an interesting construct in the sense that it medically does not exist. This means a doctor can officially not diagnose burnout since there is no (ICD) coding for it. Practice has found ways around this problem by using supplementary code Z73.0[21]. It is important to note that this is not an F code, for affective disorders, such as for instance depression. However, practice has found that patients react better to a burnout diagnosis than to a depression diagnosis: they have burned out implies that they were so invested in work (or otherwise) that they 'burned out like a candle' (Spitzer, 2008). I have used this variable as a general stress variable to get a more defined view of depression: how do students perceive their workload at university? How is the stress in their relationships distributed? Are they more stressed by university staff and professors or their peers? The working hypothesis for burnout and depression was that high burnout scores would mean high depression scores.

Knowledge about mental health and stigma: Depression, like all mental illnesses, is affected by prejudice and stigma: rumours about the illness and a possible (artificially) fostered need for depression to increase one's creativity in the artistic world are common, and perhaps even expected by the general public (see paragraph 2.3.1, p. 71 for musician specific prejudices). The

[21] Z73- refers to problems related to life management difficulty, but excluding problems related to socioeconomic and psychosocial circumstances. Z73.0 refers to burnout/vital exhaustion.

willingness to disclose one's mental illness and seek help is associated with good medical knowledge. Stigma and lack of knowledge act as a barrier to prevention and treatment. The assumption going into Study I was therefore that high levels of knowledge about stigma or stigma knowledge would indicate being more open to prevention strategies. It should, however, not be reflected in the depression score, as it is simply a means for being able to assume openness and acceptance for help and treatment.

3

Quantitative depression research comparing university musicians and university non-musicians, Study I

Contents

3.1 Introduction

The international exhibition *Genius and Madness in the Arts* by Eichhorn et al. (2006) showcased works conceived while the artists were believed to have suffered from a phase of melancholia. Eichhorn et al.'s ambition, however, went beyond presenting art only. They also intended to scientifically underpin their concept

of melancholia as an intellectual state of mind that motivates a creator to peak performances. Therefore, the exhibition additionally presented a science room with works by Lombroso (1877) and Kraepelin (1921) next to Dürer's Melancholia I (1514) and the illustration of the melancholic skeleton in Versalius's book (see paragraph 2.3.1 for a more detailed description of melancholia I and depression). However, the attempt by the exhibition organisers to connect the historical term melancholia to the contemporary diagnosis of depression was done with little regard for consistency or current medical perspective. Nonetheless, when the science room was critically reviewed, the clinical psychologist Brückner (2006) highlighted terminological inconsistencies as well as a lack of scientific approach, but refrained from a critique, because he believed that a scientific review would detract from the art in the exhibition. This raises the question whether a concept of wanting to scientifically underpin an idea in an arts exhibit should not be subjected to the same critical analysis that is generally applied to other scientific displays and publications.

While I would argue that this question should be answered in the affirmative, practice has shown that the belief in the genius or 'creative mystique' is so entrenched that scientists such as Brückner avoid criticism altogether. However, the belief that artists suffer disproportionally more from depression compared to the rest of the population, something that is believed to also make them more creative than the rest of the population, can be scrutinised, even if concepts of genius and creativity remain scientifically elusive (see paragraph 2.3.1, p. 71).

First, it is necessary to establish the current overall burden of depression to then be able to determine if musicians truly constitute an at-risk group. The cumulative burden of depression, substance abuse and dependencies in Europe is around 58% (H.-U. Wittchen & Jacobi, 2005; Angst et al., 2005; H.-U. Wittchen, Jacobi, Rehm et al., 2011). Since depression peaks during different life stages, some age groups, for instance adolescents, will be disproportionally represented in this overall number (H.-U. Wittchen, Jacobi, Klose et al., 2010; Bertha & Balázs, 2013) (see Fig. 2.2 for details on age and depression). In other words, if one was to follow the creative mystique belief, the 58% of Europeans affected by depression should be mostly

artists in the high-risk age groups. While larger studies, such as H.-U. Wittchen, Jacobi, Rehm et al. or Bertha and Balázs have documented the age component in depression, profiling by profession has not yielded similar results. Woodward, Lipari and Eaton (2017) found that artists, and specifically musicians, were among the ten professions that were most affected by depression. However, other studies did not find musicians to be more depressed compared to other professionals or non-music students (Spahn, Strukely & Lehmann, 2004; Voltmer, Schauer et al., 2008; Voltmer, Kötter & Spahn, 2012; Prinz, 2012). These studies concluded that the high-stress environment that individuals were subjected to, either during their studies or professionally, led to a higher depression prevalence independently of the profession or study subject. These different strands of evidence suggest that musicians in training would be more subject to depression than the norm. The questions remains, however, if they constitute a true at-risk group (i.e. when not compared to the norm) and what factors differentiate them from the norm and/or from other at-risk groups. This study will investigate depression prevalence and depression predictors, as identified by the literature (World Health Organization, 1992), in university music and non-music students. Depression prevalence will be evaluated quantitatively using a depression questionnaire. The depression predictors investigated in this study will be anxiety (see paragraph 2.2.9, p. 42 for details on anxiety and depression), depersonalisation (see paragraph 2.2.9, p. 43 for details on depersonalisation and depression), pain catastrophising (see 2.2.10, p. 44 for details on pain and depression), burnout, coping skills and stigma and mental health knowledge. The latter three variables (burnout, coping skills and stigma and mental health knowledge) are here essentially seen as specific stress reactions to depression. Furthermore, the variable identification with being a musician will shed light on the question if music students have specific attitudes that will additionally make them more vulnerable to depression. In answering these questions, this study will determine which of these known depression variables influence music and non-music students, if variables differ between groups, and if the level of professional identity can be considered a predictor variable for depression. The choice of depression

factors within the study reflects previously identified and well evidenced depression predictors – general and music-specific ones – such as anxiety, pain perception and pain catastrophising, professional identity, depersonalisation, burnout, coping styles and stigma and mental health knowledge (World Health Organization, 1992). The outcomes of this study will provide evidence on how we may better identify music students who are at risk of depression during their training years.

Research questions

The overarching research questions from the introduction will be broken down into three specific questions that this study will investigate:

1. Is there a difference in depression prevalence between university musicians and university non-musicians? This question refers to the first overarching question in the introduction paragraph 2.4.

2. What is the role, if any, of more general depression predictors (depersonalisation, pain catastrophising, burnout, coping skills and stigma knowledge) in predicting depression across student groups (university students of music versus university non-music students) as a single predictor and cumulatively? This question refers to the second and third overarching research questions in the introduction paragraph 2.4.

3. What role, if any, does professional identification with the profession of a musician play to predict depression prevalence in a musicians' environment at university as a single predictor and cumulatively with the above mentioned predictors? This question refers to the second and third overarching questions in the introduction paragraph 2.4.

Research hypothesis

Based on the existing literature and its critical review in the thesis introduction, the hypotheses for Study I are:

1. Student musicians will show a higher depression and anxiety prevalence compared to students with a different main subject and for whom music is generally not as important. This hypothesis addresses the first research question of Study I.

2. Results of high depression prevalence in both groups will independently show and be congruent with high scores of:

   (a) professional identity

   (b) depersonalisation

   (c) pain perception and pain catastrophising

   (d) burnout and

   (e) dysfunctional coping strategies

   This will underscore the validity of the results as explained in the literature review (see paragraph 2.2), allowing for a meaningful interpretation of the data in response to the second research question of Study I.

3. High depression prevalence will be congruent with low scores of:

   (a) active and functional coping strategies

   (b) stigma and mental health knowledge.

   This will ensure the validity of the results as presented in the literature review (see section 2.2, allowing for a meaningful interpretation of the data in response to the second research question of Study I.

4. High levels of professional identity will reflect the work that musicians have invested into music, similar to athletes. That means high levels of identity will be congruent with:

   (a) high levels of daily practice

   (b) high levels of years practiced altogether

(c) high number of years of formal lessons (instrumental or vocal)

(d) high number of years of formal music theory lessons

(e) demonstrating that music plays an important role in daily life for instance by attending concerts as member of the audience or attentively listening to music on a daily basis

This will demonstrate the validity of the results for professional identity, as presented in section 2.4 (p. 85), and allow for a meaningful interpretation of the data in response to my third research question in Study I.

5. Moreover, the scores on the professional identity scale/its subscales, will be indicators for both depression resource eroding variables in the case of negative subscales (negative affectivity and exclusivity) and for resource building variables in the case of positive subscales (social and self identity).

   This hypothesis refers to my third Study I research question, while also providing independent confirmation of hypothesis one above. It also helps to ensure the validity of the data as presented in section 2.2.

3.2 Method

The design and methodology are all described in the following subsections. In short, this quantitative study followed a correlational and predictive design, observing the change in variables between groups as well as predicting which combination of variables would most likely determine a high depression prevalence in both groups. Data was obtained online and without encountering any participants.

3.2.1 Design considerations

It has been established that students worry about the possibility of being identified as having a mental disorder, believing this might expose them to (academic) disadvantages due to the stigma attached to such a condition. This fear alone, whether perceived or based on experience of such disadvantages, can already dissuade

individuals from participating in studies of mental health (Storrie, Ahern & Tuckett, 2010; Gebauer, 2014; Hall, 2018). Paramount for the design of this study was therefore to respect the anonymity of participants. I prioritised online survey options with servers based in Europe that respected at least EU privacy laws. This not only ensured a high standard of anonymity, but also data storage safety. I selected an option that had automatic privacy settings to prevent the collection of personal information during the process of filling out the questionnaire, such as cookies, as well as preventing a later consolidation of data with personal information. No information from participants' computers or IP addresses were requested or stored at any point. This choice also meant that I was not able to track any individual scores, and data from this survey was erased irrevocably from the provider's online storage in November 2016.

3.2.2 Participants

Participants were recruited exclusively online from The University of Sheffield, using the student volunteer mail-out (students-volunteer[at] lists.shef.ac.uk), and via social media. Participants were informed about the measures of anonymity in the introduction text. The expectation when launching Study I was to be able to clearly identify and compare two groups of students: university musicians (music students or musicians from other faculties) and university non-musicians (see Appendix A.1.2). Contrary to what one may expect, the grouping of participants in Study I was not neatly along the lines of university degree, where musicians studied music and non-musicians did not. Instead, the grouping based on MIMS and Gold MSI grouped active musicians together irrespective of university course. This might have been due to the academic emphasis of the particular music degree and/or a high engagement with music by students who chose to study a different main subject. As a result of running the MIMS and GOLD-MSI questionnaires and following a post-hoc grouping protocol (see Appendix A.1.2), two groups could be identified: members of one group clearly identified themselves as musicians via the MIMS, and subsequently showed high scores in the GOLD-MSI (e.g. practicing an instrument,

listening to music on a daily basis, going to concerts). Members of the other group were non-musicians with a void MIMS questionnaire, who did not see themselves as musicians, and for whom music also did not play a large role in their lives.

67 students from The University of Sheffield, including both music (31) and non-music students (36), were selected for Study I. For a definition of groups, please refer to the preceding paragraph and the Appendix A.1.2. For ease of reference, the two groups will from now on be referred to as university musicians and university non-musicians[1]. Both groups were evenly distributed in age (university musicians (mean): 21.67, SD = 3.44; university non-musicians (mean) = 23.57, SD = 7.81), education level (38 undergraduate, 29 post-graduate students), and relationship or family status (see table 3.1). In view of the age mean and based on the medically accepted definition of adolescence being a physical and psychological developmental process until the age of 25 years, participants of both groups will be referred to as *adolescents*(de Guyter, 2010)[2].

3.2.3 Material

The questionnaire was composed of eight individual standardised questionnaires and additional questions to collect demographic data.

1. **Demographic data**: Demographic data was collected using a combination of the GOLD-MSI (Müllensiefen, Gingras, Musil & Stewart, 2014) and a demographic questionnaire (EPI), adapted from the Spahn research group at the University of Freiburg (Spahn, Hildebrandt & Seidenglanz, 2001). The latter had been previously used for similar studies asking for age, university department, relationship status and professional degrees, as well as for more general information about health and wellbeing (engaging in sport,

[1]While the names of the groups differ from previous literature, in essence the definitions of participants reflect those used in the studies reviewed in the literature review in paragraph 2.3, starting. 58

[2]As a reminder and for more details regarding the difficulties in the diagnosis of depression in adolescents, and more details regarding the definition of adolescence, see p.18, p.19, and p.42.

affected by pain while playing, etc., see details A.1.1). Please note that no differentiation was made in regards to training (e.g. Western classical) or genre for participants in the musicians' group, as these terms have not been operationalised within depression research (for comparison of general education styles and depression see for instance Uhlendorff (2001)). While one could speculate that participants were primarily educated in a Western classical style, it is impossible to say so with a degree of certainty since no data was collected to underpin this assumption. Moreover, there is no comparative educational category for the non-musician group, which would have complicated a comparison between groups of how (style of) education might influence depression.

2. **Musical Sophistication Index**: The GOLD-MSI (Müllensiefen et al., 2014) is a self-reported test assessing the ability of individuals to engage with music. It is modelled on a multidimensional construct of musical sophistication, and assumes that musical skills and approach to music are not only acquired through instrumental lessons, but also by actively engaging with music in all its facets. I used two of the subscales: active engagement and musical training. With Chronbach's $\alpha = .914$ and $\alpha = .693$ respectively, these subscales are suitable instruments (Müllensiefen et al., 2014).

3. **Depression and anxiety questionnaire**: The Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983) is a well-validated and routinely used questionnaire. As a primary care screening tool (non-psychiatric hospital clinics), it is short (14 items, 2 subscales = 5 min), which was important since there were a number of questionnaires in this study, and time was of the essence. Each question in the HADS covers one symptom of depression as defined by the ICD (World Health Organization, 1994).

   It provides medium to high correlation, similarly to other standard questionnaires such as the Beck's Depression Inventory (Beck, Ward et al., 1961), Symptom-Checklist-90 (Derogatis & Cleary, 1977; Derogatis & Unger,

2010), or the General Health Questionnaire (Goldberg, 1972). It is, however, more straight forward to interpret than the above listed questionnaires (see paragraph 2.2.8, p. 34 for a detailed description of all the above mentioned questionnaires). Furthermore, the HADS asks for the mood of the previous week and not for that of the day, such as Beck's Depression Inventory or the Hamilton Scale (Hamilton, 1960). This helps to avoid classifying students with a mood disorder on the day, also known as 'feeling blue', as 'depressed'. As reminder, mood disorders are healthy reactions to disappointments or stress, even though they have the same symptomatology as a depressive episode. The recommended minimum of Chronbach's α =.6 was achieved in numerous papers, and for various HADS translations (e.g. Dutch, Spanish, Turkish, Iranian, etc.) (Bjelland et al., 2002). Moreover, the HADS discriminates well between anxiety, including panic attacks, and depression (Löwe et al., 2003). Contrary to all other depression questionnaires mentioned above, it is a good fit to the Rasch Model with the exception of question 11, which was rated to measure both anxiety and depression. A good fit to the Rasch model (Bjelland et al., 2002) indicates that the questionnaire is stable across professions and less vulnerable to cultural bias.

Lastly, the fact that the HADS had been the standardised questionnaire of choice when depression was investigated in a student population in general, and in a musicians' environment specifically, was the decisive argument to use this questionnaire for this particular study, as it not only allowed for the validity of depression results, but also to put my results into perspective by comparison (Spahn, Strukely & Lehmann, 2004; Voltmer, Schauer et al., 2008; Vitale, 2009). For this study, I used a cut-off value of $\geq$ 9 for both the depression and the anxiety subscales. This means that for this project clinically significant depression (= the amount of symptoms that would in practice reach a depressive syndrome or episode diagnosis) is reached at $\geq$ 9 (Sadek & Bona, 2000). I want to stress again, that the HADS is not constructed to diagnose depression, but as a reference tool for primary care

physicians who should refer patients over this cut-off point to a specialist. While this is not the originally requested cut-off by Zigmond and Snaith, who set the cut-off at ≥ 11, with 33 years of the HADS's existence, there is sufficient evidence to acknowledge a more progressive cut-off value of 9. This is, however, still at the conservative end of cut-off values, as some studies are now advocating a cut-off point of ≥ 8 (Andrews & Wilding, 2004).

4. **Professional Identification**: The Athletic Identity Measurement Scale (AIMS; MIMS = Musicians Identity Measurement Scale for this study) (Brewer, Van Raalte & Linder, 1993) is a 10-item scale that assesses the strength and exclusivity of an athlete's identity. The higher the score, the more a candidate identifies with being an athlete (10-70, mean of 40, average score for athletes; Brewer, 1995). Injuries are often traumatic and create high emotional and psychological strain on the recovering athlete, based on the perception of loss of mobility, career opportunities and training units. As a result, recovering athletes are particularly vulnerable to anxiety, depression, fear, and low self-esteem. The stronger the identification with the role of an athlete and the more severe the injury, the more the athlete is at risk of developing a depression. With an internal consistency of $r = .93$ and a test-retest reliability of $r = .89$, it is a suitable instrument (Hale & Waalkes, 1994). This scale has been previously used to assess identity in musicians and dancers by changing the word athlete to musician or dancer (Vitale, 2009; Langdon & Petracca, 2010).

5. **The Cambridge Depersonalisation Scale**: The short version of the Cambridge Depersonalisation Scale (CD-9; Sierra and Berrios, 2000) covers the main symptoms of depersonalisation through nine questions. Even in its brief version this scale has shown adequate internal consistency and temporal stability ($\alpha = .92$, retest reliability 10-14 days: $r_{tt} = .86$). Scores are added up and can reach 0-90, with 0 indicating no depersonalisation, and with a cut-off at 19 indicating clinically significant depersonalisation (Michal, Sann et al., 2004). Depersonalisation is one facet of depression and manifests

itself as a response to negative situations and stress: disturbed/distorted perception of reality, emotional numbness, lack of motivation and sense of isolation. This relatively new instrument measures this phenomenon as it has been experienced within the past six months, and captures the frequency and duration of symptoms.

6. **Pain catastrophising**: The Örebro Musculoskeletal Pain Screening (Linton & Boersma, 2003) is a primary care tool to assess individuals with sub-acute and chronic (musculoskeletal) pain, measuring how this is affecting their performance at work. In 21 questions, it addresses yellow flags, including beliefs and expectations. The higher the final score, the less likely the individual is to return to work while remaining disabled by pain. Total scores of over 105 show a moderate risk of disability due to pain. The authors believe that these individuals would already benefit from seeing a psychologist or health care worker at this point. Total scores of over 130 indicate a high risk of being disabled by pain. Linton and Boersma specified that, using a six-month prediction, 71% of patients were correctly classified (sensitivity, 72%; specificity, 70%), with a high reliability (α = .97, p $\leq$ .05), a high criterion validity (Spearman's r =.97) and a high internal consistency (α = .87). A follow-up validation study by Maher and Grotle (2009), using the prediction for 12 months and comparing different cultures (Norway and Australasia), replicated these results. There was no statistical difference between both cultures on all levels, except for the disability prediction for 12 months, where the prediction was significantly stronger for Norway than for Australasia. This would be in line with the biographical/cultural identity within the multifactorial model. However, Maher and Grotle concluded that despite this issue on the cultural level, the Örebro questionnaire remains one the best choices to date to measure pain catastrophising.

7. **Stress coping**: The Brief COPE (Carver, Scheier & Weintraub, 1989) is a short version of the COPE questionnaire by the same authors. The 14 scales

from the original questionnaire were reduced to three via a factor analysis with varimax rotation, to provide a more practical approach: active functional coping (e.g. 'I actively did something'), functional cognitive (e.g. 'I try to find something positive in what happened.') and dysfunctional coping strategies (e.g. 'I used alcohol/other substances to help me through this situation'). This change allows for diverse testing of stress coping and correlation of findings. Internal consistency was found to be good for all subscales: emotion-focused, problem-focused, and dysfunctional subscales ($\alpha = 0.72, 0.84, 0.75$; Cooper, Katona and Livingston, 2008). The brief COPE measures emotional and social wellbeing manifesting in various areas of life that range from mood disturbances to perceived quality of life. While this questionnaire overlaps in part with the Burnout Scale (to follow), it also focuses on important information about coping strategies, the only scale to do so in the battery.

8. **Burnout scale**: The Copenhagen Burnout Inventory, (CBI; Borritz and T. S. Kristensen, 2015) was developed to improve on the critical points of the Maslash Burnout Inventory, the first tool available to measure burnout. The CBI consists of three main scales: personal burnout, work burnout, and client related burnout. 'Client' is replaced with a word suited for the environment in which the study is conducted. Borritz and T. S. Kristensen attested all three scales to have very high internal reliability ($\alpha = .$ 85 - 87). This study's design was modelled on the study by Campos, Carlotto and Marôco (2013). To reflect the dual 'client' burnout problem of students, the 'client' questions in this questionnaire were used twice, exchanging the word 'client' with 'fellow student' and 'teacher/professor' in turn.

9. **Mental Illness Knowledge**: The Mental Illness Knowledge Scale (MAKS; Evans-Lacko et al., 2010) is a brief instrument measuring and tracking stigma related to health-knowledge. It comprises of two scales with six questions each: scale 1 consists of questions about stigma-related mental health knowledge (e.g. 'Most people with mental health problems want to have paid employment.')

and scale 2 assesses what constitutes mental illness (e.g. 'Say whether you think each condition is a type of mental illness': depression, stress, grief', etc.). The total score ranges from 0-30. The higher the score, the better the knowledge about mental illness and related problems. MAKS has a test reliability of .71. It has demonstrated excellent content validity, 'fair' reliability and moderate overall internal consistency (Evans-Lacko et al., 2010; Pingani et al., 2019). However, Evans-Lacko et al. stress that MAKS was meant to interpret trends, rather than present a strict measuring scale.

3.2.4 Procedure

The anonymous online questionnaire was designed on Sosci-survey (Leiner, 2014) and available to participants on www.soscisurvey.com. Prior to the online launch, I collected feedback, or pre-test data, from 10 participants including music students, professional musicians, fellow psychology PhD students, my supervisor, the external medical advisor and (other) members of the Music and Wellbeing Team. Data from the pre-test was collected in the same anonymous way as described above, assigning random numbers to participants who left comments. Based on this pre-test feedback, the question of gender was omitted to prevent the involuntary tracking of participants[3]. This omission was particularly important in cases where there were few students pursuing studies of a particular instrument or vocal specialisation or *Fach*, who might otherwise have become recognisable. Fach differentiates voice categories, classifying them according to their size, range, weight or colour, etc. For a soprano this means, for instance, 'lyric soprano' or 'dramatic soprano'. Both repertoires will rarely overlap, if at all, even though both singers are sopranos[4]. After the input of the feedback from the pre-test, all data was erased, only then was the survey for Study I was launched.

[3]Note: based on American Psychological Association (2020), see Appendix for details
[4]for details please see Legge, 2001.

When questions were not mandatory and/or individual questions were not answered total scores were calculated using the individual guidelines of the questionnaires and/or general depression literature (World Health Organization, 1994). Again, and as a reminder, all questionnaires allowed for a certain number of questions not answered without compromising outcomes/results. The particular steps are described in the each questionnaire. All 67 participants answered the appropriate number of questions for a valid test result. Participants who did not meet these criteria were eliminated from the study. This statement does not refer to supplementing any answers or artificially inflating numbers, but to adherence to the rules set out by the individual standardised questionnaires. Questions from demographics were not projected.

The study was carried out in accordance with the recommendations of the University of Sheffield, department of Music. It was approved by the Ethics committee of the department of Music following the online application process on 15th November 2015 (see details A.1.1). Participants could only access the questionnaire confirming their informed consent, which was also tracked by the survey software. The survey was coded in a way that in case of no consent the actual questionnaire could not be accessed. Participants with no consent were therefore guided automatically to the last page thanking them for their time (see details for that page in A.1.1). Participation was voluntary, but in addition to completing the survey, students could participate in a price draw for five Amazon vouchers (1x50GBP, 2x20GBP, 1x10GBP). Students were also able to register their email address if they wished to receive a brief summary email outlining the results of this study. The survey for Study I ran from 15th January to 17th May 2016.

Statistical Analysis

The statistical analysis was performed using the software R 3.6.0 (R Core Team, 2017). All graphs were calculated using R's extra package ggplot2 (Wickham, 2016). For the list of all additional packages used for calculation in R, please see Appendix A.1.1 (p. 307).

When designing an experiment it is critical to determine the minimum number of participants required to achieve a relevant result. Therefore, an a priori calculation to determine the minimum sample size for a meaningful result was performed using the software G*Power 3.19.4 (Faul, Erdfelder, Lang & Buchner, 2007; Faul, Erdfelder, Buchner & Lang, 2009). A power of .8 was understood to be sufficient (Ellis, 2010) (for a priori results see the following paragraph 3.3 below). Pairwise comparison analysed group differences. Here, chi square tests were used to compare groups in terms of prevalence (for all questionnaires with a cut-off score). Parametric tests or their non-parametric equivalents, were used for other group comparisons, depending on the normal/not normal distribution (i.e. for questionnaires without a cut-off score). As these are not the norm, they are specifically highlighted within the text. Bonferroni corrections were applied to safeguard against multiple testing and Spearman's correlation was applied for correlations. Based on the research hypothesis (see section 3.1, p. 94) and in order to find answers to research questions two and three (see section 3.1, p. 94), and also in accordance with the literature on depression (World Health Organization, 1994), a simple group comparison would not have sufficed here. Therefore, I opted for a multiple linear regression to compare population variances. While pairwise comparison will provide an idea regarding group differences on individual variables, the comparison of the model will provide insight into how depression can be predicted within the groups. While depression variables seldom have a linear connection, a hypothetical approach to linear regression modelling can still be advantageous. The focus here was to compare the different regression models in order to understand how the relationship between variables within groups and the depression predictability between groups changed (Stephen & Anthony, 2002).

3.3 Results

The results section divides into four segments: (a) a priori power analyses (p.107), (b) overview table of results (see Tab. 3.3, p. 107) and correlation matrices for all variables and both participant groups (see Fig. 4.1 and Fig. 3.2, starting

from p. 176), (c) results for individual variables (tables and figures starting from p. 113), and (d) multiple linear regressions (see from p. 126). In addition to the mean and standard deviation (SD), I included the prevalence (percentage of individuals significantly affected by a condition) in places where this was deemed necessary (e.g. depression, anxiety). In figures, this is represented by the cut-off line(s) (the point from where an individual is strongly considered to have been affected). If not indicated otherwise in the material section (paragraph 3.2.3), I have used cut-off scores set by the authors of the relevant questionnaires. This allowed for data comparison with other studies that used the same material and worked with students as participants.

A priori power analyses

The a priori power test for pairwise comparison with an expectation of non-linear distribution, reported that 58 participants overall, or 29 participants per group, were required (α = .05, β =.9, d = .8, which reported an actual power of .09). An a priori test was also performed in order to determine the number of participants required to achieve a meaningful result with a linear regression. The parameters for the calculation were p^2 =.3 (small/moderate effect), α =.05, β =.9 (actual power), number of predictors = 14 (maximum number of different variables), the noncentrality parameter γ = 28.71, and a critical F value of $F(14, 52) = 1.88$. The resulting number of participants required was 67. In other words, Study I required 67 participants to find a significant effect with a small/moderate effect size.

Results overview

This section is composed of three tables to provide a quick overview of the data. Tables 3.1 and 3.2 give an overview of the results in the demographics section of the questionnaire, which included the EPI and the GOLD-MSI. The demographics table, Tab. 3.1, shows that both participant groups are evenly matched in age, relationship status and education level (undergraduate / postgraduate studies).

Table 3.1: Demographic data for university music and university non-music students including age, family status, and pain experienced while playing an instrument/singing, Study I

	University musicians	**University non-musicians**
Age (mean, SD)	21.67 (3.44)	23.57 (7.81)
Undergraduate	18	19
Postgraduate	16	13
Family status (single or non-stable relationship)	51%	52%
Family status (married or stable relationship)	49%	48%
Time to complete survey in minutes (mean, SD)	16.13 (4.34)	13.78 (5.66)
Pain while playing instrument/singing	5	NA
Pain origin judged to be physical	1	NA
Pain origin judged to be psychological	2	NA
Pain origin judged to be physical and psychological	3	NA
Time of pain (consistent pain)	1 less than 1 year, 4 several years	NA
Symptoms worse with stress	4 yes	NA
Severity of stress caused by pain while playing	2x somewhat, 1x stressed, 2x crucially stressed	NA
Pain has an impact on playing	4 yes, 1 no	NA
Stress relief, active (running, yoga, etc.)[1]	15%	87%
Stress relief, other (meditation, therapies, etc)	67%	7%

[1]Multiple choice option. Regular activities once a week; minimum period of two months

Table 3.2 shows the difference in importance of music for university musicians and university non-musicians. All university musicians played at least one instrument or had been singing for several years, had formal instrumental or singing lessons and several years of formal classes in music theory. In daily life, university musicians attentively listened to music for at least 30-60 minutes. This excluded passive listening to music, for instance while doing other chores. They attended on average three concerts as member of the audience. This excluded concerts in which university

musicians played themselves. University non-musicians did not play an instrument and had no formal instrumental, singing or music theory training. They attentively listened to music on average 0-15 minutes per day and had attended up to one concert as member of the audience in the previous year.

Table 3.2: GOLD-MSI results for university music and university non-music students, including regular practice time, daily practice, music theory lessons, formal training, attending concerts, and attentively listening to music, Study I

	University musicians	**University non-musicians**
Regular practice time[1] (in years)	4.25	0
Regular practice time (hours per day)	2.45	0
Music theory lessons (in years)	4.82	0
Formal instrumental/vocal training (in years)	4.74	0
Attending live concerts (member of audience, during past year)	3.22	1.05
Attentively listening to music (average per day)	30-60min	0-15min

[1]Note: GOLD-MSI gives a range not an exact number

Table 3.3 gives an overview of results for all participants and all individual variables. At first glance, the results for both groups appear to lie very closely together. Further analysis (see below) looked into the significant correlations between variables and compared variables individually, as well as using the cumulative weight of variables to predict which combination of variables would most likely result in high depression prevalence. This approach made it possible to subsequently evaluate if and how identity influenced depression prevalence.

Table 3.3: Overview table, all tests scores for university musicians and university non-musicians, by questionnaire, mean and standard deviation (SD) only, Study I

Test	University musicians		University non-musicians	
	mean	SD	mean	SD
HADS Anxiety	4.3	4.05	4.5	3.30
HADS Depression	8.4	3.26	5.2	3.38
MIMS (total score)	32.55	16.63	NA	NA
Depersonalisation (total score)	32.06	16.42	32.9	17.67
COPE Active-Functional	20.86	7.71	20.51	10.33
COPE Cognitive-Functional	17.31	7.49	15.93	7.69
COPE Dysfunctional	8.64	3.57	8.55	4.18
ÖREBRO (Pain)	70	32.79	79.12	41.45
CBI (Burnout) Personal	2.88	0.90	2.67	1.04
CBI Work	3.04	0.67	3.04	1.10
CBI Students	3.51	1.03	3.46	1.47
CBI Professors	3.75	5.52	4.93	5.15
MAKS (Stigma)	40.41	15.82	34.69	18.70

Correlation matrices

Correlation matrices were calculated using Spearman rho calculation to show the individual relationships between variables, as well as help with the step-wise approach for a linear regression. Since all variables used in Study I are known depression predictors according to the literature (World Health Organization, 1994), I assumed for variables that did not show correlations that a different or additional moderator/mediator that had not been included here, would have been needed for this particular sample in order to see a correlation.

The heat maps (Fig. 4.1 and Fig. 3.2 show all correlations between variables for musicians and non-musicians respectively. White squares represent non-significant correlations. Blue squares signify positive correlations and red squares negative correlations. The strength of relationships can be seen in the numbers within the squares. It is also represented by the intensity of colour: the darker the colour of the square, the stronger the relationship. The heat maps were used to gain an overview over all significant relationships within groups, and differences or similarities between groups, all of which was important in view of the exploratory nature of the study. While all significant relationships in the matrices were reported,

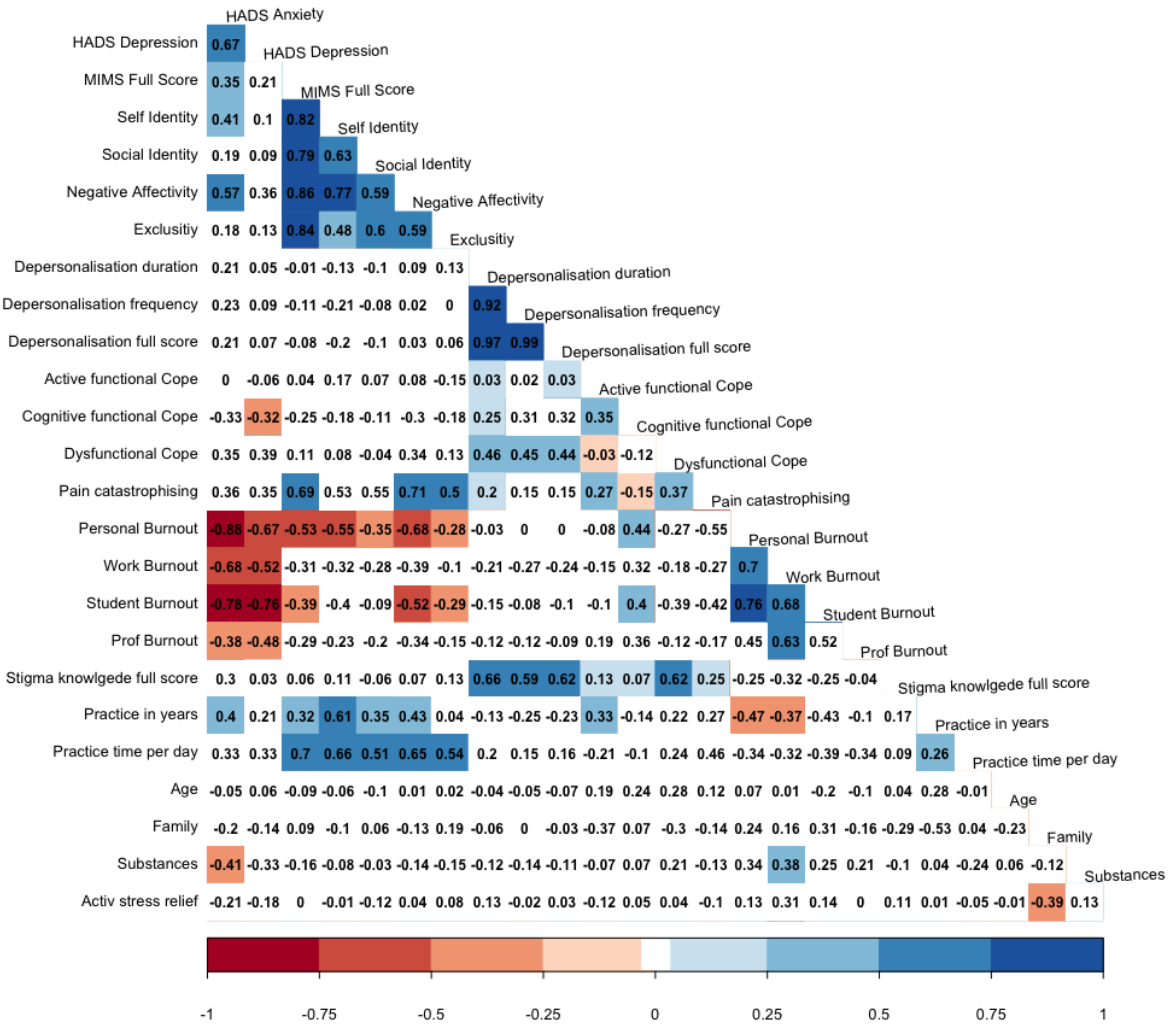

Figure 3.1: Correlation matrix for university musicians; all variables, significant correlation are coloured [blue: positive, red: negative], insignificant are white, Study I

only correlations from a moderate strength upwards (0.4 or 16% of the overall variance) were taken into account for the multiple linear regression. For instance, the Cambridge depersonalisation scale showed such a positive correlation with dysfunctional coping strategies, immediately made visible by a mid-blue square. Another example was a correlation between Personal Burnout and Self-Identity, which showed a medium-red square for a negative correlation.

Comparing the matrices for both groups more closely, the first impression of musicians being indistinguishable from non-musicians was not confirmed. Correlations in the musicians' group were generally stronger compared to the non-musicians'

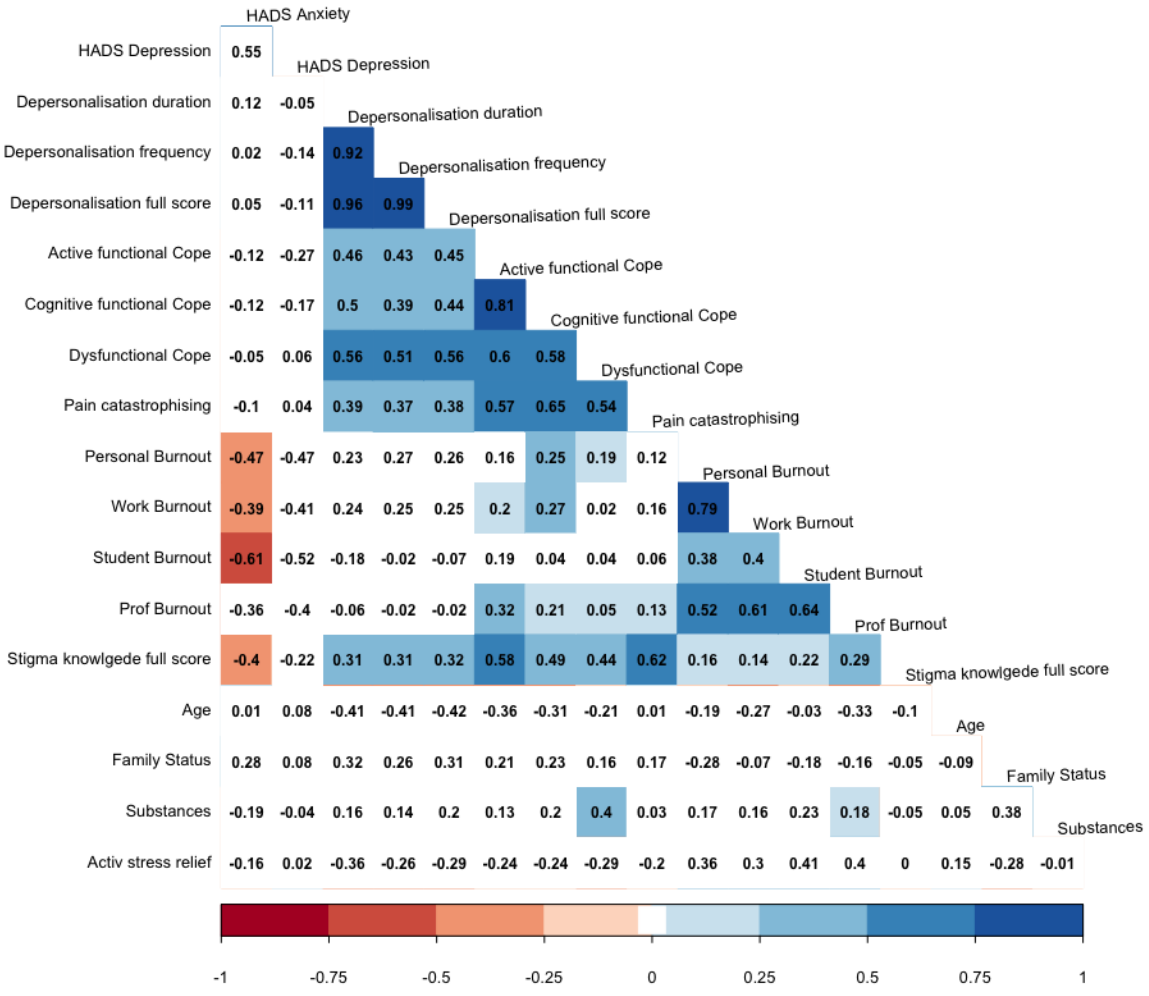

Figure 3.2: Correlation matrix for university non-musicians; all variables, significant correlation are coloured [blue: positive, red: negative], insignificant are white, Study I

group (as represented by the stronger colour) and also more widely spread out from negative to positive correlations (ranging from dark red to medium blue).

Correlations with (HADS) depression were of particular interest for this study. Already at this stage, these could give a first indication of how depression is processed/approached in the different groups. In both groups, most correlations with depression were clustered around burnout measurements. These were positive for non-musicians. For musicians they were, however, negative. This might be because the overall group was relatively small, or because their approach to depression differed. Whatever the reason, this gave a first indication that the two groups

were not as similar as the first numbers in table 3.3 seemed to suggest. I will now focus on the individual variables in more detail to look for more similarities and dissimilarities between groups, starting with the HADS.

Depression and anxiety

The HADS measures both anxiety and depression symptoms with its subscales. As a reminder, an individual with a high anxiety and low depression score suffers more from an anxiety based depression than an individual with the reverse score, who would suffer more from depression based symptoms than anxiety, as described in the literature (World Health Organization, 1994).

Table 3.4: Hospital Anxiety and Depression questionnaire (HADS, results for university musicians and university non-musicians, mean, standard deviation (SD) and prevalence

HADS	**University musicians**			**University non-musicians**		
	mean	SD	prevalence	mean	SD	prevalence
Subscale anxiety	4.3	4.05	40.6%	4.5	3.30	55.5%
Subscale depression	8.4	3.26	9.3%	5.2	3.38	19.4%

Note: Higher means indicate more depression/anxiety symptoms.

The cut-off points for depression and anxiety were set at ≥ 9 as explained above (see section3.2.3), meaning that a person with a score of 9 or higher is highly likely to suffer from anxiety/depression symptoms (Sadek & Bona, 2000). To reiterate, depression is in essence a collection of symptoms (see paragraph 2.2.6, p. 20).

While in medical practice there would need to be a differential diagnosis to classify those symptoms as a depressive syndrome or depressive episode, depending on the length of time the patient reported having the symptoms, quantitative questionnaires cannot diagnose depression. They can only detect with some certainty that an individual is significantly affected by depressive symptoms.

Returning to the first research question in Study I, namely: 'is there a difference in depression prevalence between groups (see p. 94)?', the hypothesis was that university musicians would be more affected by both anxiety and depression compared to university non-musicians. However, despite the university non-musicians' group showing a depression prevalence that was 10.1% higher compared

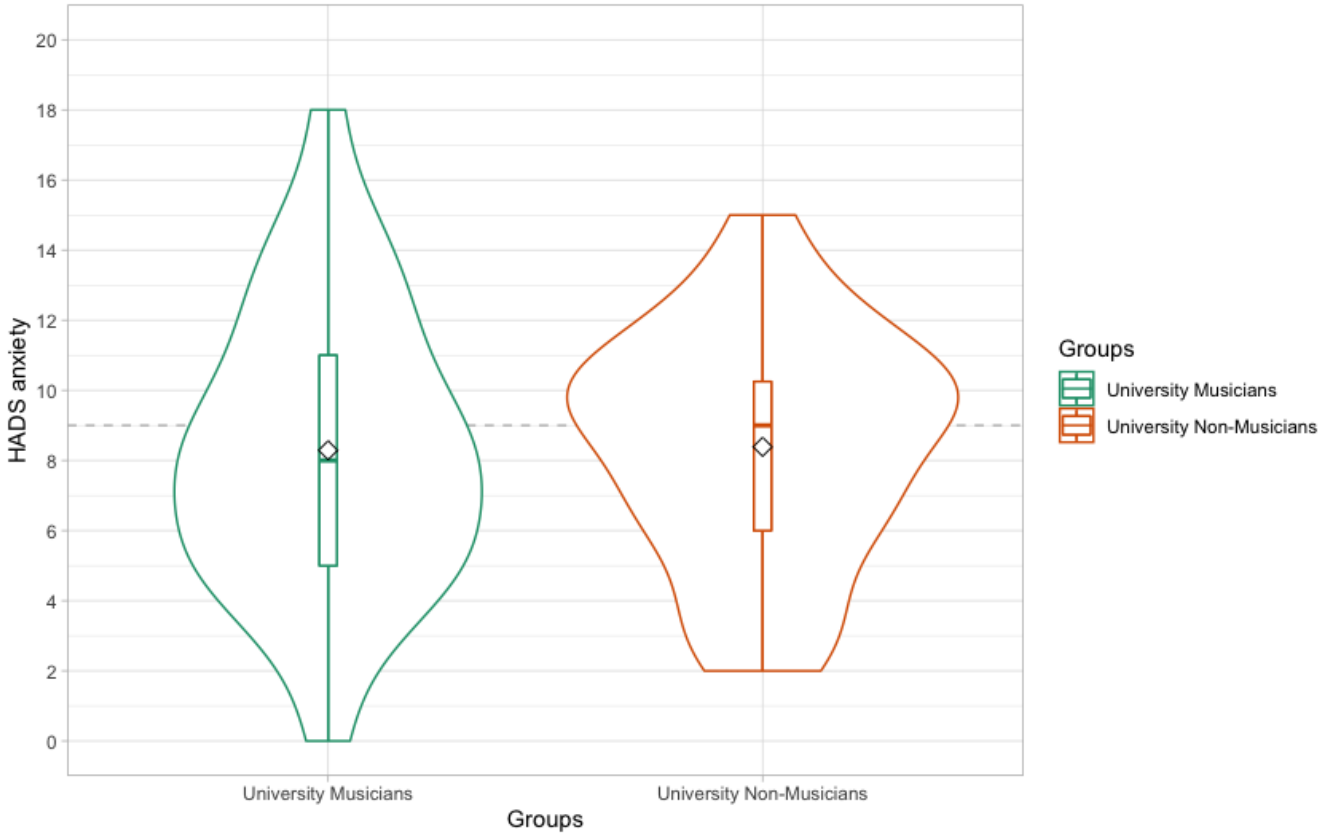

Figure 3.3: Violin plot for anxiety, representing the group distribution for university musicians and university non-musicians, including box plot, mean points [diamond shape] and a dotted cut-off line indicating significant anxiety at 9, Study I

to the depression prevalence in the university musicians' group, this difference was not significant ($p = .5$). Both groups showed a significantly higher propensity towards anxiety than towards depression (see table 3.4): university musicians $z =$ -3.41, $p = .0006$ and university non-musicians $z = 3.16$, $p = .001$.

This distribution can also be seen in figures 3.3 and 3.4. Mean raw scores for anxiety were 8.3 for university musicians and 8.4 for university non-musicians, both below the cut-off point. University non-musicians (5.2) ranked higher on the depression scale compared to university musicians (4.5), although this result was not statistically significant (anxiety: $p = .79$; depression: $p = .25$). This comparison, especially in view of the mean score being below 9, provides limited information regarding depression prevalence. For anxiety, the prevalence - in this case the percentage of students over the ≤ 9 cut-off - ranged from 40.6% (university

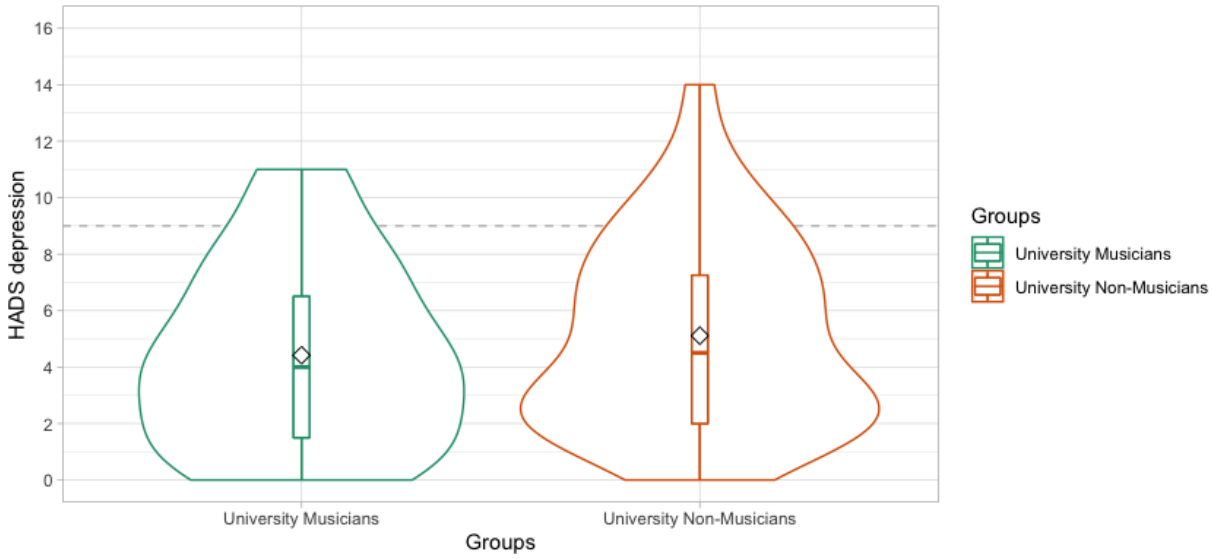

Figure 3.4: Violin plot for depression representing the group distribution for university musicians and university non-musicians, including box plot, mean points [diamond shape] and a dotted cut-off line for significant depression at 9, Study I

musicians) to 55.5% (university non-musicians). For depression, it ranged from 9.3% (university musicians) to 19.4% (university non-musicians), as shown in figures 3.3 and 3.4. However, there was no statistical difference between groups in anxiety prevalence ($p = .2$) or depression prevalence ($p = .17$).

In order to visually represent the data for both groups, I chose violin graphs: a cross between box plots and kernel density plots, these very clearly and accurately show both the peaks in the data and the actual group distribution. The visual information from the violin plots shows that non-musicians were more affected than musicians, because the bulk of the figure visualising the non-musicians' data is above the cut-off point. Looking in turn at the numbers, these of course also reflect that non-musicians were more affected by anxiety (14.9%), and also more by depression (10.1%). For a more traditional visual representation, I also added box plots, mirroring the same data from Study I including the mean, which is here represented by a red diamond shape. The dotted line in the graph shows the cut-off.

In summary, these results show that anxiety and depression are intertwined with each other, thus reflecting the findings established in general depression literature (World Health Organization, 1992), as shown in the introduction. While there

was a difference of 10.1% in depression prevalence between groups, it was not statistically significant. Both groups reported significantly more anxiety symptoms than depression symptoms. Also, on a more granular level, the relationships that anxiety and depression formed in both groups seem to point towards depression being processed or expressed differently by the groups. While it would be tempting to draw further conclusions at this point about how anxiety and depression processing differ between the groups, the data from the HADS does not allow to further define these differences.

Professional identity

Professional identity (MIMS) measures the level of identification with a profession - in this case that of a musician -, and was consequently only investigated for musicians. This questionnaire only opened after a positive answer to the question if participants perceived themselves as musicians. In case of a negative answer to this question, MIMS was skipped. The MIMS full score is calculated using four individual scores: self-identity, social identity, negative affectivity, and exclusivity. The individual components relate to the degree of influence of the musician's perception (evaluation and interpretation) of the role, as well as to how much (other) social support/input and how many social relationships they have in their lives. A breakdown of all scores can be found in table 3.5. The mean for the total score was 32.5 points, with a possible maximum total of 70. As mentioned in paragraph 4, MIMS is essentially the Athletic Identity Measurement Scale (AIMS), where the word 'athlete' has been exchanged for 'musician'. To put the total MIMS scores into context, professional college athletes have been found to have an average AIMS total score of 40 (Brewer, Van Raalte & Linder, 1993).

Table 3.5: Musicians Identification Measurement Scale (MIMS), mean and standard deviation (SD) of the full score and all subscales (self identity, social identity, negative affectivity and exclusivity) university musicians only, Study I

MIMS	**mean**	**SD**
Total score	32.5	16.63
Self identity	7.22	4.20
Social identity	5.9	3.37
Negative affectivity	6.8	4.59
Exclusivity	9.08	4.97

Note: Higher means indicate a stronger identification with the role of a musician.

The interesting observations to point out from the correlation heat maps 4.1 above are that professional identity appears to (a) work as a buffer, especially against burnout (work burnout and burnout with fellow students; negative correlation) and (b) increase the negative tendency to catastrophise pain (positive correlation). However, this only becomes apparent in the subscales that are more closely associated with negativity (i.e.negative affectivity) - most probably with anxiety acting as a mediator/moderator. Looking back at the working hypothesis, it becomes clear that musicians' identification with their profession is similar to that of athletes. However, since this is the first study investigating this variable in this context, further conclusions need to be postponed until this study can be replicated in Study II.

Depersonalisation

The Cambridge Depersonalisation scale (CD-9) measures depersonalisation. It provides a way to measure emotion processing, since the key symptom of depersonalisation is described as feeling emotionally distant, for instance 'feeling as if being a robot/someone else' (see paragraph 2.2.9, p. 2.2.9 for more details). The majority of participants experienced depersonalisation over the first cut-off point of 20, with means of 32.06 (musicians) and 32.9 (non-musicians). This translates into episodes of feeling distant from their own emotions, which are low in frequency and short in duration, and appear mostly in close relation with anxiety attacks as also indicated by the literature (World Health Organization, 1992); (see table 3.6 and figure 3.5).

There was no statistically significant difference in depersonalisation prevalence between groups, neither at the lower cut-off point of 19 or the higher cut-off point of 35 ($\geq$ 19 (p =.08) or $\geq$ 35 (p = .6)[5] Depersonalisation also showed positive correlations with anxiety, dysfunctional coping strategies and stigma knowledge for both groups, as well as pain catastrophising for university musicians. For university musicians, a trend was observed that linked increased depersonalisation and the amount of daily practice reported, but not years of practice. (see App. A.1.3)

Table 3.6: Cambridge Depersonalisation scale (CD-9), measuring depersonalisation for university musicians and university non-musicians (mean, standard deviation (SD) and prevalence at $\geq$ 19 and $\geq$ 35), Study I

CD-9	**University musicians**			**University non-musicians**		
	mean	SD	prevalence	mean	SD	prevalence
Full score	32.06	16.42	-	32.9	17.67	-
Duration	14.61	6.00	-	15.03	7.56	-
Frequency	17.9	10.73	-	17.86	10.29	-
Prevalence $\geq$ 19	-	-	100%	-	-	90%
Prevalence $\geq$ 35	-	-	43.48%	-	-	40%

Note: Higher means indicate more depersonalisation symptoms.

In summary, depersonalisation showed a close relationship with anxiety and coping strategies (see heat maps Fig. 4.1 and Fig. 3.2). The age variable only showed a significant correlation with depersonalisation in the non-musicians' group, which could be due to the fact that this group was most diverse in age: depersonalisation has been found to be processed differently in adolescents compared to adults. In terms of the research question regarding the role of depression predictors, depersonalisation scores helped to interpret depression findings. Specifically, depersonalisation scores supported the presence of transient anxiety-based problems, and thus depression. Participants did not show a trend towards pathological depersonalisation. The levels of depersonalisation scores in university musicians increased with the number of reported hours of daily music practice, but not with higher levels of longer term training (years of practice); this new finding is indicative

[5]As a reminder from paragraph 3.2.4, the norm comparison for group difference when scales require a cut-off (prevalence) is done by using chi square tests. When parametric tests or their non-parametric equivalents are used, this is noted within the text.

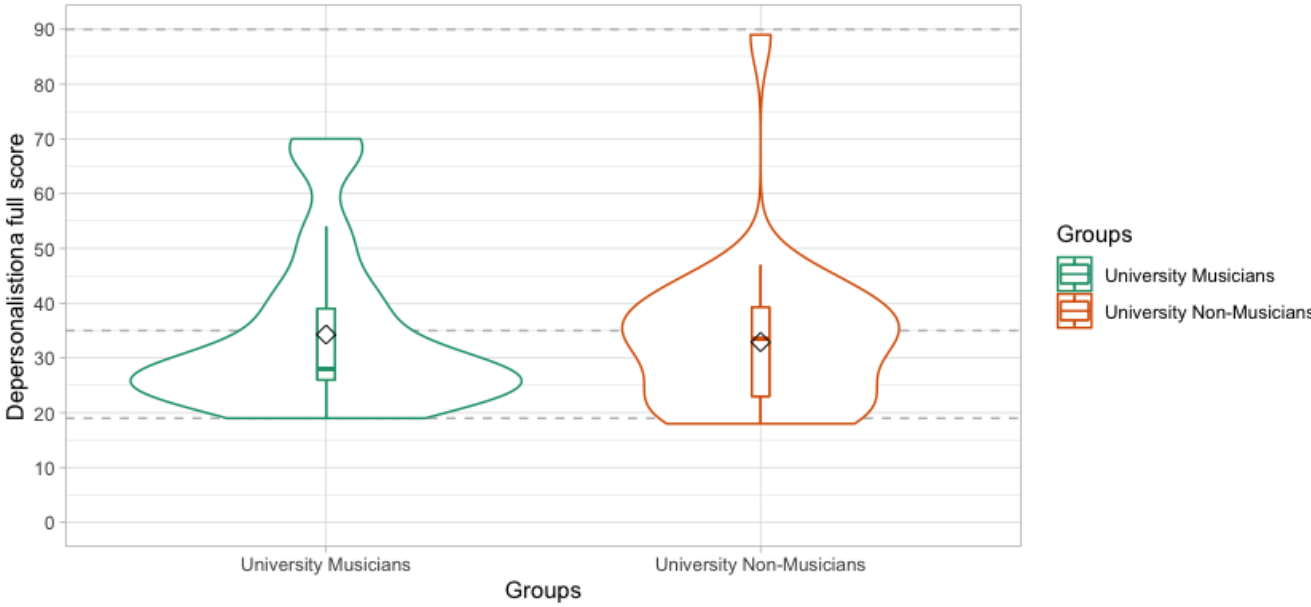

Figure 3.5: Violin plot for depersonalisation representing the group distribution for university musicians and university non-musicians, including box plot, mean points [diamond shape] and a dotted cut-off line for significant depersonalisation phases at 19, 35 and 90, Study I

of a risk towards increased or enhanced transient depersonalisation episodes that aligns with certain training practices, and requires further investigation.

Coping Strategies

The Brief Cope measures coping strategies, dividing them into three categories: active-functional, cognitive-functional and dysfunctional coping strategies. A look at coping strategies is useful in association with other variables (e.g. anxiety, pain catastrophising) to investigate how an individual reacts (copes) in a certain situation. As table 3.7 shows, at a superficial level there is not a great difference between groups. While the university non-musicians scored lower in all three categories, a Mann-Whitney U test established that this difference in scores was statistically not significant (active coping: $p = .3$, cognitive functional: $p = .5$ and dysfunctional coping: $p = .7$.)

Table 3.7: Brief Cope measuring coping strategies (active functional, cognitive functional and dysfunctional) in university musicians and university non-musicians (mean and standard deviation (SD)), Study I

Brief Cope	University musicians		University non-musicians	
	mean	SD	mean	SD
Active-functional	21.55	4.32	20.54	7.11
Cognitive-functional	17.24	5.60	15.96	4.88
Dysfunctional	8.65	2.53	8.53	2.72

Note: Higher means indicate better coping for active and functional coping, while they indicate worse coping for dysfunctional coping.

As mentioned in the CD-9 results above, depersonalisation triggers a wide range of responses in terms of coping strategies, which was demonstrated by the CD-9 results and has been described in the literature (see paragraph 2.2.9). Looking directly at coping strategies, it is possible to add yet another layer: substance use/misuse has been observed in adolescents coping with phases of emotional depletion, possibly as a mediator/moderator to help cope with a lack of emotions (Michal, Duven et al., 2015). The expectation for this variable was borne out in the results: non-musicians' dysfunctional coping strategy scores were found to be higher (meaning worse) compared to those of musicians, and non-musicians also performed worse in both active functional and cognitive coping strategies, making depression more likely in this group.

Pain catastrophising

The Örebro questionnaire (Linton & Boersma, 2003) reflects current medical knowledge of multifactorial pain concepts and measures pain catastrophising. The low cut-off score for fear/work-inability due to pain catastrophising is set at $\geq$ 105 (low risk), as requested by Linton and Boersma. As a reminder *work* is here defined as *following the study course/attending classes.* Moderate risk reaches from 105-130, and high risk of pain catastrophising starts at $\geq$ 130. Linton and Boersma recommend that, when using this tool as primary care tool, individuals with a score of $\geq$ 105 are referred to a psychologist/psychiatrist for further analysis. This underscores the gravity of catastrophising within (chronic) pain.

Even though the Örebro is not intended for descriptive pain perception, the first questions of the questionnaire can give a first impression of how long pain is being/has been perceived. I have looked at this first section of the questionnaire separately for three reasons: (a) to gain an overview over perceived pain for both groups, (b) to get an idea of the duration of pain and (c) to gain a first impression of how pain was experienced. Table 3.8 shows that both groups mostly perceived pain in the upper and lower back. The main findings from that table are that musicians perceived pain for longer periods (12 months or more), but also rated the individual episodes as less painful and shorter compared to non-musicians. This tendency amongst non-musicians to dramatise pain is also evident in the Örerbro full score as noted below (see tab 3.9 and fig. 3.6).

Table 3.8: Descriptive pain perception (Örebro sub-score), multiple choices were possible for each question, as an individual might have pain in several body parts at the same time, Study I

	University musicians	**University non-musicians**
Neck	19.35%	16.66%
Shoulders	22.58%	16.66%
Arms	6.45%	5.55%
Upper back	22.58%	22.22%
Lower back	25.80%	25%
Legs	16.12%	22.22%
Other	16.12%	5.55%
No pain	48.38%	17.77%
Duration past week rated 5+[1]	12.90%	25%
Duration past 3 months	19.35%	30.55%
3 months pain rated 5+	16.12%	30.55%
Duration of pain beyond 3 months	32.25%[2]	27.77%[3]

[1]Pain rated from 1-10; 10 being as bad as can be.
[2]32.25% pain for 12 month and above.
[3]22% pain for 12 months and above, 2% pain for 3-6 months, 2% pain for 9-12 weeks.

However, similar to the HADS and the CD-9, prevalence is also key in pain catastrophising. However, there was no statistical difference between groups for moderate ($p = .3$) or high pain catastrophising ($p = .3$)[6].

[6]As a reminder from paragraph 3.2.4, the norm comparison for group difference when scales

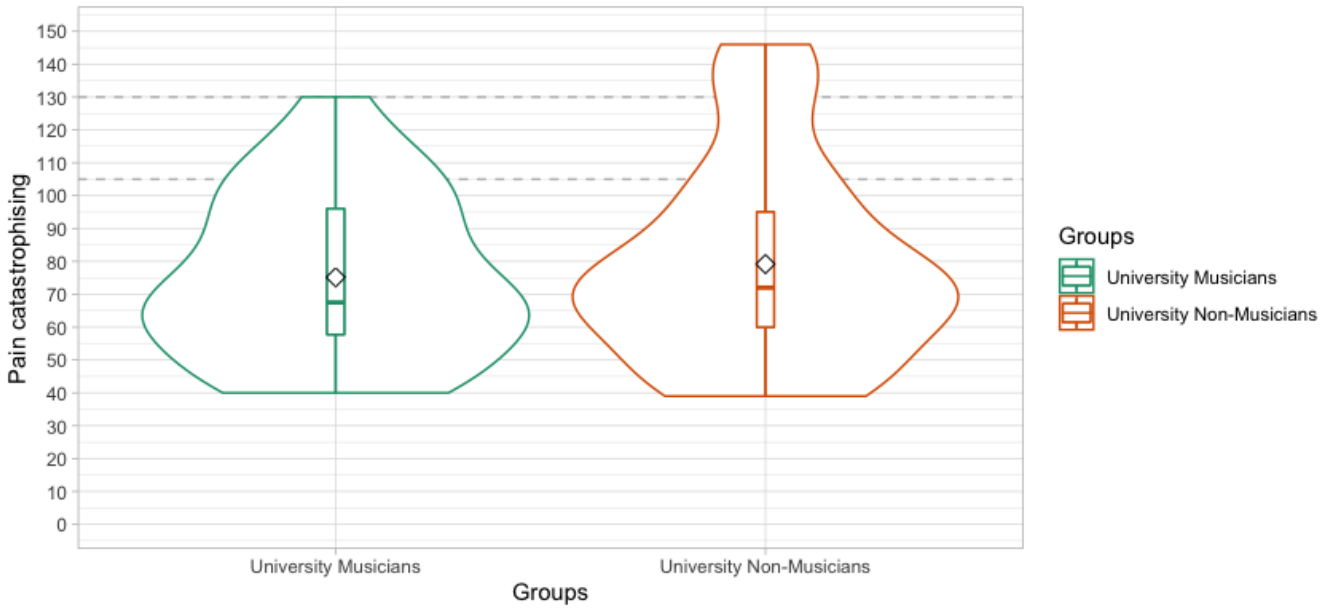

Figure 3.6: Violin plot for pain catastrophising representing the group distribution for university musicians and university non-musicians, including box plot, mean points [diamond shape] and a dotted cut-off line for significant pain catastrophising at 105 (moderate risk) and 130 (high risk), Study I

Table 3.9: Pain catastrophising scores Örebro scores for university musicians and university non-musicians, mean, standard deviation (SD) and prevalence for moderate($\geq$ 105) and high ($\geq$ 130) pain catastrophising, Study I

Örebro	**University musicians**			**University non-musicians**		
	mean	SD	prevalence	mean	SD	prevalence
Full score	73.97	25.41	-	80.54	30.27	-
Prevalence $\geq$ 105	-	-	13.79%	-	-	24.13%
Prevalence $\geq$ 130	-	-	3.4%	-	-	10.34%

Note: Higher means indicate more dysfunctional coping with pain or worse pain catastrophising.

Nevertheless, with a 10.3% higher prevalence for moderate and 6.9% higher prevalence for high pain catastrophising, and a higher pain perception, university non-musicians were more likely to perceive their pain as chronic, and to disproportionally magnify suffering from pain, both emotionally and physically.

Experiencing pain; university musicians only:

require a cut-off (prevalence) is done by using chi square tests. When parametric tests or their non-parametric equivalents are used, this is noted within the text.

Only 15.62% of university musicians reported to experience/have experienced pain while playing their instruments within the last seven days. From this group, 3.1% showed a moderate risk of chronification in the Örebro total score. 80% reported having been affected for several years, and 20% for several days. 60% reported having been affected by the pain both physically and psychologically while 20% said they had been affected only psychologically and 20% only physically. 20% reported that their playing was not being affected by the pain at all, 60% reported that playing was slightly affected, and 20% that playing was strongly affected by the pain.

Substances, all participants:

In the demographics section of the questionnaire, one question addressed regular substance intake. The selection of multiple options was possible. As can be seen in table 3.10 below, musicians reported taking fewer substances compared to non-musicians. Note that the question about substance intake has previously proven to be a sensitive one for musicians in (written) questionnaires (Spahn, 2010) (compare Tab. 3.10).

Table 3.10: Disclosure of regular substances use for university musicians and university non-musicians (in percentage, Study I)

Substances	University musicians	University non-musicians
Not taking anything	87.5%	68.57%
Alcohol	-	27.71%
Analgesics	-	2.85%
Other psychiatric drugs	12.5%	8.53
Non disclosed drugs	-	31.42%

Table 3.11: Actively relieving stress, options practiced regularly (that means at least once a week) for the past two months for university musicians and university non-musicians, Study I

Stress relief option	University musicians	University non-musicians
Sport, yoga or similar	14.28%	85.7%
Meditation/prayer	67.85%	7.14%
Alexander technique or similar	95%	95%
Reached out to prof. help	85.7%	92%
No activities	21%	60%

University non-musicians preferred active sports, while musicians adopted more internally focussed options. Overall, university musicians were more actively countering stress with almost 40% more of them taking part in more than one option (see no activity in Tab. 3.11). In summary, the results showed that university musicians perceived pain for longer (longer than three months), but they rated their pain lower. University non-musicians on the other hand perceived pain for a shorter amount of time (up to three months). Moreover, they perceived the pain to be worse compared to university musicians during the same period of time. Consequently, university non-musicians also showed higher results in moderate and high pain catastrophising compared to university musicians. In terms of the research question how general depression predictors, in this case pain catastrophising, influence depression, results show that university non-musicians are more subject to pain catastrophising, and therefore more at risk of depression, compared to university musicians. While this reflects the general pain literature, where a larger amount of perceived pain equals higher pain catastrophising scores, it was nevertheless a surprising result.

Burnout

The Copenhagen Burnout Inventory (CBI) was chosen to measure where students felt most stressed/burned out in their daily lives. The CBI consists of three main scales: personal, work and client burnout. The word *client* can be adjusted to the situation as long as this change reflects the (professional) day-to-day relationships for the group investigated. For students, the client section was split into two groups: their fellow students and their professors/teachers at the university.

Both groups' results were close together (see tab 3.12), with higher levels of burnout from university teaching staff being felt, followed by burnout from fellow students and finally work burnout and personal burnout. Consequently, there was no statistical difference between groups for any of the scales (personal burnout $p = .2$; work burnout $p = .8$; fellow student burnout $p = .9$; teacher/professor burnout $p = .7$)

Table 3.12: Copenhagen Burnout Inventory (CBI) measuring burnout for university musicians and university non-musicians in four different study related areas: personal burnout, work (general workload at university), burnout with fellow students and burnout with teachers/professors from university; mean and standard deviation (SD), Study I

CBI	**University musicians**		**University non-musicians**	
	mean	SD	mean	SD
Personal Burnout	2.89	0.89	2.57	0.88
Work Burnout	3.03	0.74	3.05	1.28
Student Burnout	3.56	1.05	3.42	1.14
Professor Burnout	3.76	0.98	3.81	0.98

Stigma knowledge and attitude

The Mental Health Knowledge Schedule (MAKS) questionnaire assesses different stigma-related subjects in two sub-scores: (a) knowledge about mental health and (b) attitude and behaviour. The authors claim that this questionnaire allows for better understanding of stigma in the future, and investigates how knowledge, attitudes, and behaviour interrelate in this area. The higher the score, the more accurate the knowledge about stigma related problems in mental health, and the smaller the prejudice. Despite a few outliers - where it seems possible that the questions were wrongly understood due to negative phrasing - musicians displayed on average a more accurate knowledge of mental illness stigma, and a less negative attitude, compared to non-musicians (see tab. 3.13).

Table 3.13: Mental Health Knowledge Schedule (MAKS) measuring stigma knowledge and stigma attitude for mental health conditions for university musicians and university non-musicians, mean, standard deviation (SD), Study I

MAKS	**University musicians**		**University non-musicians**	
	mean	SD	mean	SD
Subscale knowledge	26.32	12.10	20.22	14.39
Subscale attitude	17.17	6.90	14.22	7.68
Full score	40.41	15.82	34.69	18.70

Despite the difference in means between groups for the total score, the difference in total scores was not statistically significant ($p = .4$). However, there was a statistical difference in the subscale attitude towards mental health ($W(56) = 498$, $p =$

.04), suggesting that university musicians have a more appropriate attitude towards mental health compared to university non-musicians. When comparing results from Study I to the study by Evans-Lacko et al., who investigated a cross-section of the UK population, Study I participants' knowledge regarding mental health was better. This was most noticeable with questions about (unipolar) depression and bipolar (depression): 87% of Study I participants correctly identified (unipolar) depression and 90% bipolar (depression) as mental health conditions, compared to 46% and 66% respectively in the study by Evans-Lacko et al. MAKS' authors pointed out that an improvement in mental health literacy saw an improvement in access and help-seeking of evidence-based treatment. The higher score in mental health knowledge might explain why students also reached out for professional help (see Tab. 3.11).

This concludes the section looking at the individual variables' results. The next step is to analyse the cumulative weight of these variables, to predict which combination most likely results in depression and how these predictions differ between groups.

Multiple Linear regression

The comparison of individual variables in the previous paragraph showed differences between groups, while each variable contributed another layer to the understanding of the difference in depression prevalence between university musicians and non-musicians. However, as laid out in detail in the introduction, depression is a multifactorial illness with complex inter-individual interactions of variables (see paragraph 2.2.6). To understand how groups differ in this aspect, group comparisons need to go beyond the comparison of individual variables. Therefore, the following paragraph explores the cumulative weight and predictive aspect of a multiple linear regression to shed more light (see paragraph 3.2.4).

The objective is to find an answer to research questions two and three: what is the role of depression predictors - in this case when combined - and what role does professional identity play as a predictor in such a cumulative model.

The overall regression model, using the data from both groups (university musicians and university non-musicians), (HADS) depression as dependent/predictor variable, and all other variables as independent ones ([HADS] anxiety, depersonalisation [full score], active-functional coping strategies, cognitive functional coping strategies, dysfunctional coping strategies, pain catastrophising, personal burnout, work burnout, student and professorial burnout, stigma knowledge and attitude [MAKS full score], age, family status, and identifying oneself as a musician with a yes/no question) was significant: $F(14,\ 28) = 2.46$; $p = .002$, $R^2 = .55$, indicating that 14 predictors significantly predict depression (levels), as measured by the questionnaires discussed above. Figure 3.7 shows the model plot predicting depression for university musicians and university non-musicians, including the significance for all individual variables. This shows that while the overall model was significant, in this combination only the variables dysfunctional coping strategies ($b = .39$, $t(36) = 2.1$, $p = .04$, $pr^2 = .13$) and age ($b = -.27$, $t(36) = -2.4$, $p = .02$, $pr^2 = -.27$) were significant within the model.

Dysfunctional coping strategies account 13% or the variance and age 27%. This indicates that individuals with high scores in dysfunctional coping strategies (i.e. using a lot of dysfunctional coping mechanisms, such as drinking), and of a young age, are more likely to be subject to depression. In this combination dysfunctional coping strategies and age carry most of the weight, while the other variables act as moderator or mediator. However, how does the variable *musician* fit into the model? In the overall model this variable was not significant, but it did not render the model non-significant either. In the slope prediction for this model (see figure A.2, p. 315), predicting depression is hardly affected by the musician variable. Next, I calculated two different models, one for university musicians and one for university non-musicians, to investigate whether belonging to the musicians' group influenced the prediction of depression. However, when the groups were thus divided, neither model was significant when using all 14 variables as in the combined group before. In effect, in order to significantly predict depression in the individual groups, the two models needed to be modified. For this modification, I was guided by the slope

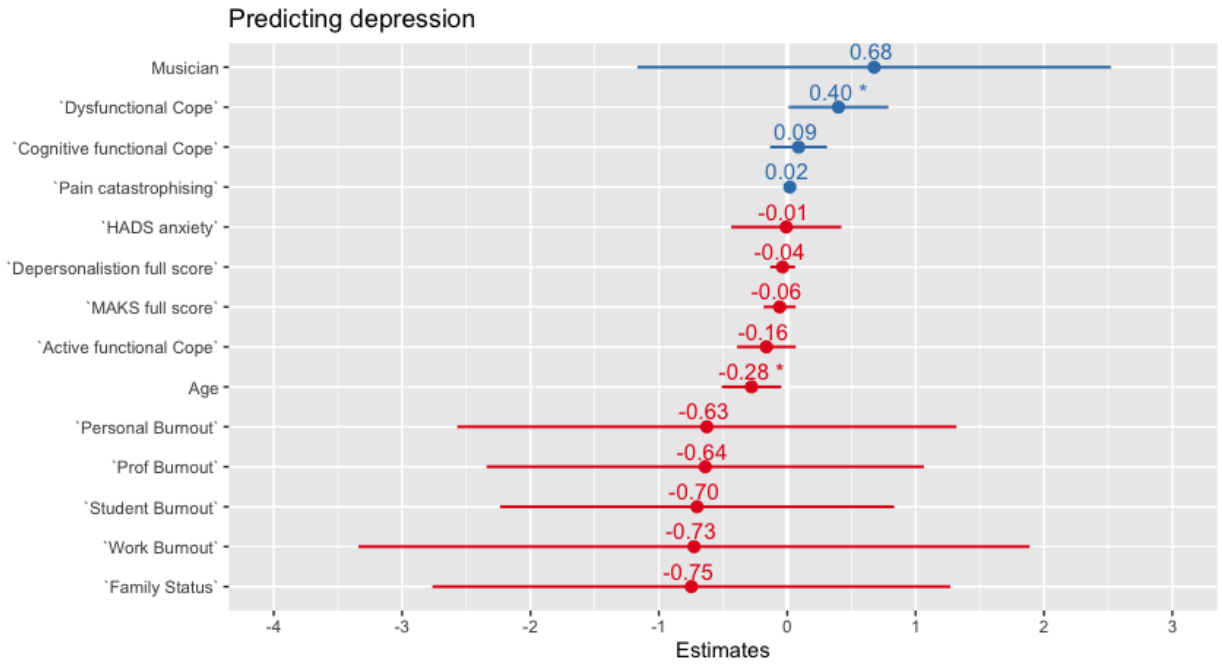

Figure 3.7: Prediction plot for depression based on the multiple linear regression analysis for both groups (university musicians and university non-musicians) for 14 variables ([HADS] anxiety, depersonalisation [full score], active-functional coping strategies, cognitive functional coping strategies, dysfunctional coping strategies, pain catastrophising, personal burnout, work burnout, student and professorial burnout, stigma knowledge and attitude [MAKS full score] age, family and identifying oneself as a musician), sorting coefficients by rank, with confidence interval and significance of the individual variables within the model. Negative relationships are shown in red, positive ones in blue and significant variables marked with an asterisk, Study I

Note: Tables and slope predictions for the individual variables are in the Appendix A.2

predictions from the first model and the variables identified by literature to carry more weight, such as anxiety and pain catastrophising.

For university musicians the model became significant when using the variables anxiety, depersonalisation, professional identity (full score), active and functional coping strategies, dysfunctional coping strategies, work burnout, personal burnout, student burnout and professor burnout ($F(9, 18) = 3.57$; $p = .001$, $R^2 = .64$). The significant variable in this model was student burnout (i.e. how stressed students are by the interaction with their fellow students): $b = -1.44$, $t(36) = -2.25$, $p = .03$, $pr^2 = -.19$). Student burnout carried 19% of the variance. In other words, this model predicted that participants from the university musicians' group would be subject to more depression with a low score in student burnout. Depression could not be

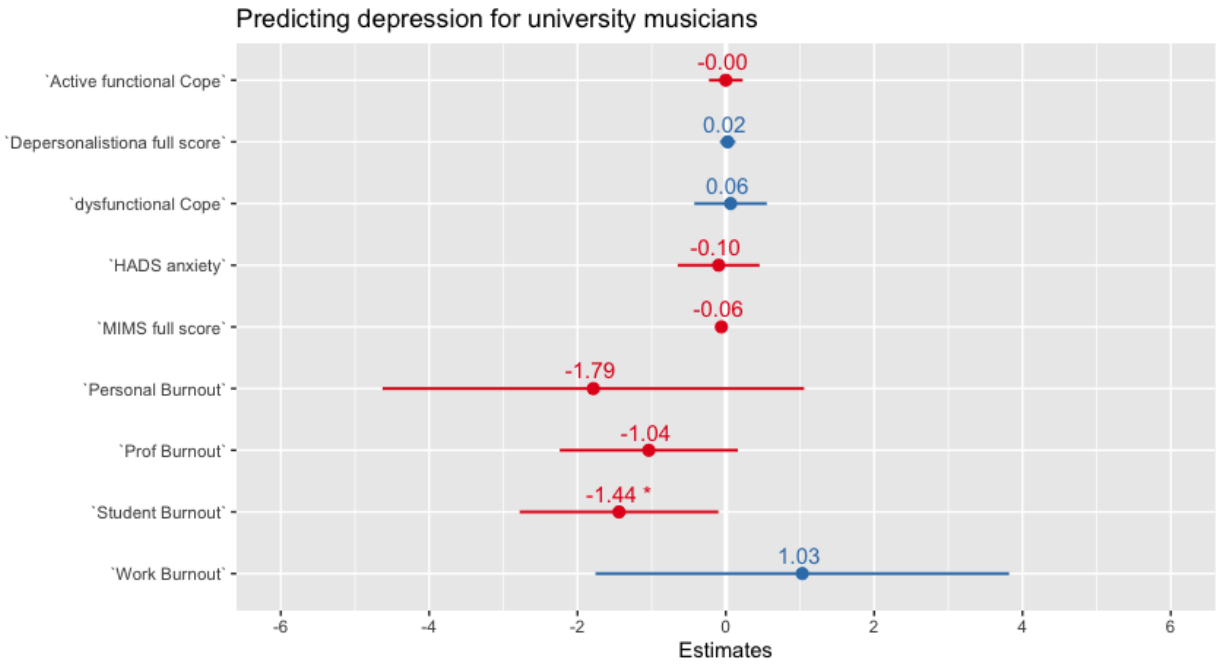

Figure 3.8: Prediction plot for depression based on the multiple linear regression for university musicians for 9 variables ([HADS] anxiety, depersonalisation [full score], active-functional coping strategies, dysfunctional coping strategies, personal burnout, work burnout, student and professorial burnout), sorting coefficients by rank, with confidence interval and significance of the individual variables. Negative relationships are in red, positive in blue and significant variables marked with an asterisk, Study I.

Note: For a prediction slope for the individuals variables please see fig.A.3, p. 316.

predicted for this group using professional identity subscales as single predictor (p = .13). The model was only significant when adding anxiety as a predictor ($F(5, 25) = 4.19$; $p = .007$, $R^2 = .45$). Anxiety was the only significant variable within the model: $b = .47$, $t(36) = 3.21$, $p = .004$, $pr^2 = .31$). Anxiety carried 31% of the variance in this model, suggesting that high anxiety scores predict depression. However, the model remained significant when only using anxiety as a predictor ($F(1, 29) = 17.24$; $p < .001$, $R^2 = .37$). This suggests a limited predictability for professional identity in depression in this context, if at all.

For university non-musicians, the depression prediction model looked different. Here, the only significant model to predict depression was a combination of four independent variables: pain catastrophising, age, personal and professorial burnout: $F(4, 19) = 2.91$; $p = .04$, $R^2 = .38$.

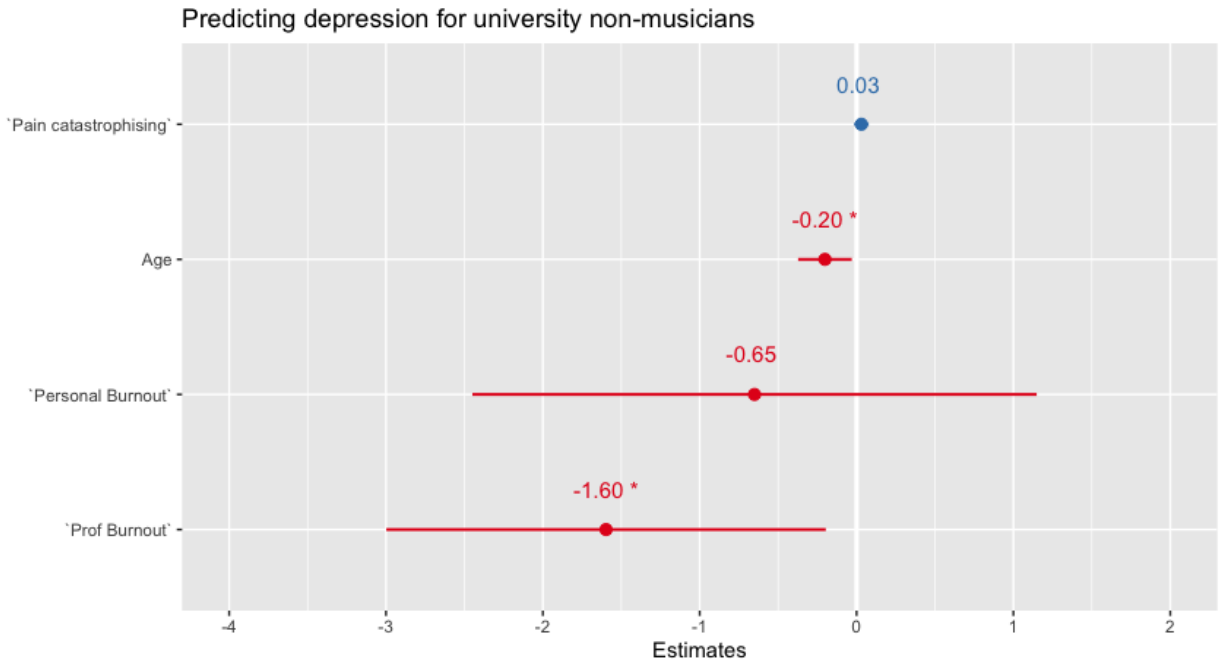

Figure 3.9: Prediction plot for depression based on the multiple linear regression for university non-musicians with 4 variables (pain catastrophising, age, personal and professorial burnout), sorting coefficients by rank, with confidence interval and significance of the individual variables.Negative relationships are in red, positive in blue and significant variables marked with an asterisk, Study I

Note: For a prediction slope for the individual variables, please see fig.A.4, p. 317.

The significant individual variables within the model were age b = -2.0, $t(19)$ = -2.46, p = .02, pr^2 = -.47). and professorial burnout b = -.65, $t(19)$ = -.75, p = .02, pr^2 = -.42). This means that age carries 47% and professorial burnout 42% of the variance, suggesting that participants in the university non-musicians' group with low professorial burnout scores, and of a younger age, were more subject to depression.

In conclusion, the multiple regression model demonstrated that significant depression predictors were found to be different for university musicians and university non-musicians. In accordance with the literature, these results show that the first peak of depression is around 20 years of age. Furthermore, it is possible to conclude that university musicians and university non-musicians will subconsciously approach obstacles, such as depression, differently. Moreover, they will use different strategies to overcome depression. The variable *musician* might not make a difference in detecting higher depression prevalence, indeed the results

indicate that university musicians as a group are subject to similar stressors and have similar coping strategies compared to university non-musicians.

In summary, in answer to research question number one (see p. 94) regarding a difference in depression prevalence between university musicians and university non-musicians, the results from Study I show that university musicians had a 12.4% lower prevalence for both depression and anxiety compared to university musicians, even though this result was not statistically significant. In response to research question number two regarding the role of depression predictors, the results show that individual variables did not significantly differ between groups, even though university musicians, on average, scored higher (i.e. better) than university non-musicians across all variables such as anxiety, depersonalisation and pain catastrophising. Furthermore, the importance of the predictors changed within groups. This indicates that both groups may have distinctly different stressors and coping mechanisms. This was especially noteworthy for the variable pain catastrophising where university non-musicians not only perceived more pain, but also processed the pain in more dysfunctional ways compared to university musicians. In response to research question number three regarding the role of professional identity, results did not suggest this variable to be a significant predictor for depression. Contrary to expectations going into this study (see p. 94), university musicians were neither subject to higher depression prevalence nor did they show higher (i.e. worse) scores in depression predictors, compared to university non-musicians. This suggests that rather than using the variable *musician* or professional identity as a measuring scale or depression predictor, it should be seen as an indicator for belonging to a distinct group.

3.4 Discussion

The first study in this thesis was guided by three main questions. Firstly, is there a difference in depression prevalence between university musicians and university non-musicians? Secondly, what is the role of depression predictors (depersonalisation,

pain catastrophising, burnout, coping skills and stigma knowledge) in predicting depression across student groups as a single predictor and cumulative? And thirdly, what role does professional identification with the profession of a musician play to predict depression prevalence in a musicians' environment at university, if any? Contrary to the hypothesis going into the study, the university musicians's group showed a 12.4% lower depression and anxiety prevalence compared to the university non-musicians' group. This lower prevalence was further supported by congruent results from the other individual variables (anxiety, coping skills, pain catastrophising, and stigma knowledge). Moreover, depression predicting models did not support the idea that professional identity was a valid predictor for depression. When considering the cumulative weight of all variables, university musicians and university non-musicians appear to have developed different mechanisms of coping with depression, and therefore different predictors for depression apply for each group in the multiple linear regression.

However, before further discussing depression prevalence results, it is necessary to review the question if all participants in Study I can be considered *musicians*. Therefore the following discussion section is made up of four parts. Firstly, a discussion whether university musicians in Study I can and should be considered musicians, given that not all were enrolled in a music faculty. Secondly, depression and anxiety comparisons between groups are reviewed and thirdly, the depression predictors depersonalisation and pain catastrophising are reviewed on their own. Fourthly, I discuss the linear models and in this context also the predictors coping strategies and burnout. The reason for this is that coping strategies and burnout are here viewed as contributing factors in connection with a symptom or illness to which they contribute or that they help to prevent, depending on their levels.

Musicians or not?

The first research question was if university musicians suffered more from depression and anxiety symptoms than university non-musicians. However, before answering this question, another issue requires attention: can university musicians in this

study be considered *musicians*, given that the majority of participants considered musicians in Study I, also studied a multitude of other subjects?

The first step was to look at the selection process to qualify a participant as *musician*. The selection was done through the online questionnaire in three steps. First, an individual question ('Do you consider yourself a musician') separated out those who thought of themselves as musicians. This group was then presented with the Musicians' Identity Measurement Scale (MIMS), while everyone else skipped this part of the questionnaire altogether. Second, participants who considered themselves as musicians filled out the MIMS, thus providing details on how strong their identification with the profession of the musician was, and third, the GOLD-MSI collected information about formal training, daily practice and the role music played in participants' daily lives.

Participants who considered themselves musicians had practiced their instruments or voice on average for seven years or longer. They had four to six years of formal instrumental/vocal training and a similar amount of years of formal theory lessons. University musicians practiced regularly up to 4 hours per day. Furthermore, by regularly attentively listening to music (30-60 min per day), and attending concerts as members of the audience (on average three to five concerts per year), university musicians showed that music played an important role in their lives. In contrast, university non-musicians did not play an instrument, had no lessons in either instrumental/vocal studies or music theory, almost never listened attentively to music (0-15min per day) and rarely attended concerts as member of the audience (one time or less per year). Apart from MIMS results, the GOLD-MSI results documented that university musicians had a dedicated space for music in their lives (see see Tab. 3.5 for MIMS results and Tab. 3.2 for GOLD-MSI results). These participants had a certain standard of mastering their instrument as well as music theory knowledge, and invested considerable time into daily practice.

These results could now be added to the information collected by the professional identity questionnaire to complete the picture. Identification with a profession has been more often researched in sports, where the level of identification is taken

as indicator for how much commitment a person has towards training/sports. Identification has not yet been a focal point within musicians' research, although this is not the first study to consider it (Vitale, 2009). Sports research, however, provides valuable guiding points. Elite athletes with longstanding careers tend to show a high level of professional identity. It is slightly different for college athletes. Studies found that college athletes juggled their dual identities - that of professional athlete and that of college student -successfully during their college years. Towards the end of their college years, and depending on their grades, students started to explore different career options. Students with higher grades gradually lost the perception of sports being the most important thing in their lives, and, consequently, lost their high sports identity levels (Wiechman & J. Williams, 1997; P. S. Miller & Kerr, 2003; P. S. Lally & Kerr, 2005). Differences in identification levels were not found between amateur athlete or professional elite athlete college student groups, but rather depended on sports disciplines (team sports received higher ratings over individual sports) and/or the year in college (Chen et al., 2010).

Comparing university musicians and college athletes, or MIMS and AIMS total scores, Study I university musicians scored slightly lower in their MIMS (32.5) compared to the AIMS scores of professional US student athletes (40) found by Brewer, Van Raalte and Linder (1993), or to the AIMS scores of Greek college athletes (37.75; Proios, Mavrovouniotis and Siatras (2012)). Study I university musicians' overall MIMS results were similar to those of college athletes who knew that their career path would not be the one of a professional elite athlete, but still their commitment to sports meant regular (daily) training. If involved in team sports, students would still participate in games, while those who had focused on single (track) athletics were more likely to minimise training and drop out of competitions altogether. Since most Study I participants were not actively studying music at college, but a wide variety of other subjects, this parallel to college athletes seems obvious. University musicians, like athletes, would have invested a lot of their pre-college time into music. The GOLD-MSI showed that musicians studied their instruments professionally for a number of years, as well as having studied music

theory, and still engaged in regular daily practice. In this context a further parallel might be drawn between university musicians and college athletes. It is conceivable, although speculative, that similarly to athletes, university musicians enjoy a special status in university and could be more appreciated by their university professors than non-musicians. This would not only manifest itself by more indulgence or higher grades, but also increase the MIMS score (Chen et al., 2010).

While university musicians scored lower than elite college athletes in their total MIMS/AIMS scores, it is noteworthy that they scored higher in the subscales self-identity and social identity (Murphy, Petitpas & Brewer, 1996; P. Lally, 2007; Gross et al., 2008). This is of particular interest as studies have shown that these two scales combine positive aspects of the identification with the profession and hence could be considered potential depression buffers. Negative affectivity and exclusivity have been found to act in the opposite way. In a combination of both scales (self and social identity) university musicians scored similarly to Greek college athletes with a mean of 13.22, while the mean for athletes was 14.08 (Proios et al., 2012). University musicians also scored higher in this combination scale than the norm of 6.38 defined by Brewer and Cornelius (2001). This suggests that music could have another component not offered by sports.

Other than for athletes, for university musicians neither their relationship status, nor their year of study (undergraduate or postgraduate) showed any effect on or relationship with any MIMS scores. One important factor in sports was the choice of sports discipline: team sports had consistently higher identification ratings. This could not been observed in Study I university musicians. However, other than in sports, where there is a clear distinction between team and individual sports, music does not lend itself to such a duality. All instrumentalists and vocalists can join ensembles as well as pursue a solo career. Even though some instruments are more likely to be treated as solo instruments, such as keyboards, brass or woodwinds - even when playing in ensembles - the clear cut team/individual sports dichotomy cannot be applied. Study I asked about regular practice, but no conclusions could be drawn whether practice took part alone or in ensembles. Equally, the frequency of active

listening to music and attending live events, which musicians did almost three times as often as their non-musician counterparts, did not allow for conclusions on whether active listening or attending concerts formed an indirect part of their practice.

However, MIMS is one way to assess if a person may be considered a musician, based on whether that person perceives themselves as a musician. Another way of investigating this question is to look at commitment to daily practice. Gräser and Belschner (2004) argue that practice time is subject to a high variability for each instrument, country and music college. However, with an average of 1.19 hours spent per day for Study I university musicians, this stayed under the average time found amongst music college students by Gräser and Belschner (2004) with 3.9 hours per day and by Temper (2009) with 2.25 hours per day. However, since the GOLD-MSI does not allow for absolute accuracy in this respect since it only asks for time ranges, the precise time for university musicians is unknown. It could be slightly lower or higher than the one found by Temper (2009). Even though the number of hours practiced does not necessarily indicate whether or not a target is actually achieved, it speaks for how much motivation for achievement is present (Gembris, 2012). Krampe, Tesch-Römer and Ericsson (1991) looked at three groups of music students in German music colleges: gifted musicians, good musicians and those studying to become music teachers, who, as set out by government requirements for music teachers, follow a similar curriculum as the previous two groups, while adding pedagogical aspects to their curriculum. Krampe et al. found all three groups had similar rhythms of practice (about three times a day). Gifted musicians, however, practiced more and longer, adding more hours per day and years in total than those classified as good musicians or those studying to become music teachers. This gave them the (technical) edge, but also made it difficult for the other two groups to catch up. Still, all three groups invested a considerable amount of time each day into music, and all groups perceived themselves as musicians. This would imply that the amount of practice time, similarly to training time in sports, is more likely an indicator for commitment and for the level of perfection rather than perceived professional identity.

Before concluding this discussion, here are a few words on why this thesis did not look into education styles or genres for musician participants, as mentioned above (see 3.2.3). All variables included in this study were selected to provide additional information on whether university musicians were more at risk for depression than university non-musicians. While educational styles might provide additional insight in this respect, the precedent for the use of this variable in the research of (general) depression thus far only reaches to how the individual perceives a particular educational style (e.g. authoritative). There is evidence that an authoritative educational style increases the likelihood of stress and thus depression, anxiety (including performance anxiety), depersonalisation and pain catastrophising (Uhlendorff, 2001; Hildebrandt et al., 2012). However, since the education tradition or style, such as for instance Western classical music education, has not been operationalised in this respect (e.g. by being classified as an authoritative style, as for instance 'Russian style teaching'), an investigation in this direction was not endeavouring and no differentiation was made between different types of musicians at university. Inclusion of particular sub-categories would further complicate a comparison between musician and non-musician as no comparable characterisation of non-musician education would have been available. Both groups are broadly inclusive.

Taking these findings into account, having set out to answer the question if university musicians in Study I could legitimately be called *musicians*, and having critically examined it from various angles, the above findings suggest that the question should be answered in the affirmative. All participants within the university musicians' group not only perceived themselves as musicians, but were also committed for a number of years to practice their instruments and music theory prior to their college years, engaged in daily practice, and spent a considerable amount of their time with music. Even though fewer practice hours might indicate a different choice of career path, the reverse conclusion that these individuals should not be considered (or consider themselves) as musicians on this basis would not be justified.

Depression and anxiety

The first research question for this thesis (see p. 94) investigating a difference in depression prevalence between university musicians and university non-musicians. The hypothesis for this study was that university musicians would be subject to more depression and anxiety symptoms than university non-musicians. The subsequent question was if and/or how professional identification with being a musician could be a variable that might contribute to a higher depression and anxiety prevalence. Primary analysis, using the HADS, indicated that the means of both groups were too close together for statistical significance, and in any case the comparison of means between groups in this instance carried less weight since the mean for both groups was below the cut-off point of 9. Instead, the prevalence of depression and anxiety is in this instance more relevant as it shows the percentage of individuals who are highly likely to suffer from anxiety and depression. While the prevalence for both variables did not differ significantly between groups, still university musicians had lower depression and anxiety scores (meaning they experienced less symptoms) than university non-musicians: 10% lower depression prevalence and 15% lower anxiety prevalence than university non-musicians.

Although an elevated overall prevalence of depression and anxiety was somewhat expected due to the age group of the participants (H.-U. Wittchen & von Zerssen, 1988; H.-U. Wittchen, Nelson & Lachner, 1998; Jacobi, Klose & Wittchen, 2004; Bretschneider et al., 2018), it was in fact even higher than prevalence rates found by other studies investigating other student populations in this age group using the same depression scale (Prinz, 2011). Inevitably, these high scores raise a question regarding cut-off points to help distinguish clinical cases from healthy ones - or at least they should. While cut-off points are presented as quasi de-facto, they are subject to reflection and need to be re-adjusted. I reflected on this issue in the material section (paragraph 3, p. 99) when changing the original ≥ 11, suggested by Zigmond and Snaith, the authors of the HADS, to a cut-off of ≥ 9. Due to the larger than anticipated prevalence and following the suggestion of previous literature (Prinz, 2012), a moment to reflect on cut-off points seems to be called for.

The problem lies in the fact that (quantitative) research is not able, or designed to, correctly diagnose whether individuals over the cut-off are suffering from a depressive episode or syndrome. I believe that depression's characteristic fluidity might be better served by the implementation of grey zones in the detection and diagnosis (Judd, Rapaport et al., 1994), rather than by generally lowering cut-offs and thus creating a, perhaps artificial, spike in depression prevalence. H.-U. Wittchen and Jacobi (2005) showed that generally the first spike in depression is set to occur during adolescence, and interpreting adolescents to continue until 25 years of age. With a mean of 22.7 years, participants of Study I fit well into this age bracket. Even without this, the high depression prevalence for all participants of this study should naturally highlight the need for further investigation. It is possible that the timing of the questionnaire helped to spike the prevalence for instance near exam time, as the study ran during the January exam time.

In Study I, 9.3% of university musicians were affected by depression, and 40.6% by anxiety. At 19.4% depression prevalence and 55.5% anxiety prevalence, the university non-musicians in this study were affected even more than their university musician counterparts. It is possible that this could be due to differences in study subjects or departments. Study I participants did not come from a uniform cluster of study subjects, and only a few were medical students. Andrews and Wilding (2004) found that the financial burden for UK students was a major stressor. How the financial burden makes a substantial difference can be seen when contrasting the UK study by Andrews and Wilding (2004) and the German study by Prinz (2012), both done with medical and/or dentistry students. Prinz (2012) found depression prevalence to be lower in German dentistry students compered to Andrews and Wilding's study of UK dentistry students.

Study I participants were not outliers in a UK/Germany depression prevalence comparison. Both Quince, Wood, Parker and Benson (2012) and Andrews and Wilding (2004) found higher anxiety and depression scores in UK students compared to the German scores, both using HADS as measuring tool. Quince et al. (2012),

using a cut-off of≥8, found that 10.6% of UK core clinical and 8.2% of UK clinical students were affected by depression, however they did not publish the corresponding anxiety scores. (Andrews & Wilding, 2004) demonstrated in their longitudinal study, in which they accompanied dentistry students through their university studies into their first year of work, how much financial stress impacted students in the UK. Using a cut-off of ≥ 10, the prevalence of depression increased for undergraduates from 6.2% before starting university to 16.08% mid-course. Anxiety, however, did not show a substantial increase, rising from 60% at the start to 65.5% mid-way. Both their depression and anxiety scores decreased considerably after starting their first job.

Next to the financial burden, students cited adverse life events (relationship problems, illness or death) and adjusting to university lifestyle as stressors (Andrews & Wilding, 2004). This is in line with other depression research for that age group and stage of life, which found the following stressors to play a significant role: moving out of their parents' homes, learning to adjust to new (relationship) structures, and starting to take control over their own lives (NIMH, 2009).

While it is possible that most Study I participants filled out the questionnaire during exam time, and might therefore have been considerably stressed, these numbers should not be taken lightly since the depressive state − already at a sub-clinical level − impairs physical and mental capacities, and might lead to an inability to relax: an important preventative factor helping to recover in stressful times (Judd, Rapaport et al., 1994).

It is worth noting that university musicians in Study I did have a considerably lower prevalence of depression and anxiety symptoms than their university non-musician counterparts. One possible conclusion, with the caveat of the modest sample size, is that music/practicing an instrument might have preventative properties in regards to stress. Historically, listening and/or playing an instrument has been associated with a lift of the mood and/or curing melancholia, the ancient name for depression. While Avicenna (980-1037) went as far as to prescribe listening to specific instruments as well as tonalities to help against different mental ailments, practicing an instrument/singing as medical treatment slowly faded into

the background after his time (Shoja & Tubbs, 2007). There are a few studies by Esquirol (1777-1840) investigating the playing of an instrument/singing with melancholia/mental illness, but such studies are far and few between, and were not followed up until very recently (Esquirol, 1838). Furthermore, drawing from research into learning/playing an instrument in older age, it might be possible that certain factors of being a musician, which act as preventative measures, haven't yet been fully explored (Gembris, 2008; Korte, Perkins & Williamon, 2013; Noeres, 2016; V. J. Williamson & Bonshor, 2019). One of the current three big research topics being investigated at the Centre of Music at Berlin's Charité hospital is centred around this question: how does being an amateur musician have preventative as well as curative properties for depression and chronic pain, as well as a few other medical conditions (Weikert et al., 2017)? Results from these studies will hopefully shed new light on this question. This demonstrates that Study I, in its structure and results, highlights pertinent and relevant subjects for current depression research.

In summary, results from the HADS show that university musicians in this study were less likely to report depression and anxiety symptoms above a clinical threshold compared to university non-musicians. Depression and anxiety prevalence in both groups was higher compared to the norm (non-student population) and other EU student populations. Further discussion about emotion control and pain catastrophising, as well as a look at fitting all predictor variables together in the following discussions, will shed light on whether these results can be supported, and how/where the differences between groups are most noticeable.

Comorbidities with depression – the role of depression predictors

In this section I will consider the variables depersonalisation and pain catastrophising in more detail. This discussion is based on the findings laid out in the sections depersonalisation 3.3 (p. 117) and pain catastrophising 3.3 (p. 120). In contrast to the variables burnout, stigma and coping strategies, which were supporting variables used to confirm or deny how depression is processed or approached, depersonalisation and pain catastrophising have been demonstrated to have a separate impact on

depression in the literature (see paragraph 2.2.9) It is therefore important to discuss these variables and their impact separately in order to help evaluate findings.

Depersonalistion

Based on the depersonalisation studies by Michal, Sann et al. (2004) and Prinz (2012), the hypothesis going into this study was that university musicians would be susceptible to transient phases of depersonalisation, which in turn would also increase the vulnerability to depression (see paragraph 3.1, p. 94). These phases would be fostered by a gradual increase of stress levels, probably increasing with the number of years practiced rather than with the time spent on daily practice. This would then mean that most university musicians would experience higher levels of depersonalisation (CD-9 scores) than their university non-musician counterparts, and that anxiety would be the mediator between depersonalisation and depression.

Study I results documented the close relationship between anxiety and depersonalisation, especially in the range suggested by (Sierra & Berrios, 2000) for adult participants (namely 19-36 points total score). The prevalence of depersonalisation in Study I was generally high with 48.3% prevalence among university musicians and 61.1% among university non-musicians. To put these results into perspective, depersonalisation prevalence in Study I participants was higher when compared to other representative investigations within student populations in the UK and EU (Quince et al., 2012; Andrews & Wilding, 2004; Prinz, 2011). As an example, Prinz's participants scored on average 21.3 points lower compared to all Study I participants. The participants in Prinz's study were on average three to five years older than Study I participants, which might account for the difference in depersonalisation prevalence. Michal, Duven et al. (2015) argue that depersonalisation forms an aspect of the emotional developmental process and declines with age. The high depersonalisation prevalence in Study I, however, seems congruent with the comparatively high depression and anxiety prevalence, as discussed above. The congruence, however, ends here. University musicians in this study, demonstrated lower depression

prevalence compared to university non-musicians, but showed a slightly higher depersonalisation prevalence. How can this incongruence be explained?

One possible explanation for the higher depersonalisation scores could be that university musicians collectively were subject to more stress compared to university non-musicians, and this stress translated into higher depersonalisation scores rather than higher depression scores. Studies that ran a separate depersonalisation questionnaire and did not extrapolate depersonalisation results from a burnout subscale, found that depersonalisation increased with perceived stress, for example brought on by an authoritative parenting style (i.e. high demand and high responsiveness)(Wolfradt, Hempel & Miles, 2003) or traumatic events in childhood (Ó Laoide, Egan & Osborn, 2018). Even strategies, which from the outside could be considered simple, such as listening to loud music in order to rebel against a perceived authoritative parenting style, had some effect on depersonalisation (Wolfradt et al., 2003). Only one study observed in this context that listening to music lessened symptoms of depersonalisation, but did not further elaborate (Sedeño et al., 2014). One important variable that separated university musicians and non-musicians was the time invested in daily practice, supported by the positive relationship between both variables (depersonalisation and practice time). Daily practice might have been perceived as such a stressor, or as requiring time that would otherwise be needed to work on other university assignments. This was, however, the first time this connection between practicing an instrument and low depersonalisation scores has been reported. Other studies have looked into daily workloads or vocations in combination with *emotional exhaustion*, However, the negative correlation between emotional exhaustion (burnout) and depersonalisation in Study I, as well as in the study by Michal, Duven et al. (2015), does not support the hypothesis that emotional exhaustion equals depersonalisation and its distinct symptomatology. The trend towards an increase of depersonalisation with the amount of time spent on daily practice in Study I appeared to be specific to depersonalisation: university musicians scored higher in depersonalisation, but considerably lower in other mental health scales, such as anxiety and depression, compared to university non-musicians.

It is possible, though speculative, that the increase in transient depersonalisation phases in combination with daily practice could be a phenomenon that occurs naturally, which could enable the musician to concentrate on technique rather than on the emotional content of a piece (Korte, Cerci & V. J. Williamson, 2017).

In summary, the addition of depersonalisation as a first depression predictor to the model underlines the complexity of depression models. Results from Study I are in line with previous studies suggesting that depersonalisation could be part of a process during adolescence where emotion regulation is re-defined. University musicians, who showed lower depression prevalence than university non-musicians, should have also shown a lower depersonalisation prevalence. However, university non-musicians with a lower propensity to depersonalisation, had a higher depression prevalence, which was the inverse of what had been hypothesised at the outset. University musicians showed higher frequency and shorter duration of depersonalisation phases compared to university non-musicians. It is possible that regular interaction with music, such as daily practice, has an effect on depersonalisation and on its function as a depression moderator/mediator.

Pain

The present predominant viewpoint in musicians' mental health and wellbeing research, as laid out in the introduction (see paragraph 2.3), is that most musicians perceive continuous pain for a considerable amount of time. The inference is that pain perception also leads to a higher than average amount of suffering from said pain, and ultimately also a maladaptation of coping strategies. Existing medical literature argues that this can be observed in adults and adolescents (Campo et al., 2004; Kaminsky, Robertson & Dewey, 2006). The research question for this specific variable, pain, was if based on intense and long-time pain perception, university musicians would be more susceptible to higher pain catastrophising. Indeed, university students with higher levels of depression and anxiety also showed higher levels of pain perception and catastrophising. The difference in Study I results, compared to the predominant viewpoint, was that the university non-musicians'

group suffered from pain to larger extents compared to the musicians. Even though most university musicians experienced pain for longer periods of time than university non-musicians, they rated their pain perception less severe and their attitude towards pain was less fatalistic compared to their non-musician counterparts (see Tab. 3.8).

Three points stand out from these results: (1) the length of time that students noticed pain, which is relevant given the age of the population tested, (2) musicians seem to process pain differently compared to non-musicians, and (3) the (seeming) discrepancy between these findings and the predominant view of previous musicians' health and wellbeing studies that high pain perception in musicians equals more suffering.

Regarding point (1), the reported duration of perceiving pain, especially for university non-musicians, is surprising. Coming from a research area where musicians are viewed as an 'at risk' population, the bias to expect such high pain perception results is strong, notably in the area of pain research. Even though Kennedy, Kassab, Gilkey, Linnel and Morris (2008) point out that pain in (normal) adolescents is under-researched, and although little is known about the aetiology and prevalence in this particular age group (Kröner-Herwig, Heinrich & Morris, 2007; Hakala, Rimpelä, Salminen, Virtanen & Rimpelä, 2002), pain appears to be a common feature in adolescents. One factor emerged across a variety of studies investigating pain progression from childhood to adolescence to adulthood: children with maladaptive coping strategies were more likely to perceive more pain as adolescents. This trend increased even more from adolescence into adulthood (Skovron, Szpalski, Nordin, Melot & Cukier, 1994; Brattberg, 2004).

Coming back to Study I participants, the perceived pain patterns in both groups reflect a normal cross-section of the adolescent population, where lower back pain is perceived most frequently at an average duration of 3 months and above (Röder, Michal, Overbeck, van de Ven & Linden, 2007). While the high number of university musicians perceiving pain over the three-month mark (32%) was expected, the high number of university non-musicians who perceived pain for at least three months (27%) was not. However, in order to see the difference between groups it is necessary

to look at the full Örebro score measuring catastrophising levels. High results in the Örebro have predicted with about 90% accuracy that individuals will retire prematurely from work due to chronic pain problems or - in the case of this study - drop out of university. Non-musicians were not only trending by 10.4% over the moderate pain catastrophising prevalence level, but also by 6,9% over the high catastrophising prevalence level. Thus, university non-musicians were more likely to feel disabled by pain compared to university musicians. Expanding the focus, while always using the principle of yellow flags as a basis, university non-musician participants also displayed more signs for maladaptive coping strategies: they were less likely to be physically active, used more substances, and suffered more from depression and anxiety. The more yellow flags rise, the more an individual is likely to be seriously affected by chronic pain.

The results from this study contradict previous studies done in musicians' health and wellbeing (Williamon & S. Thompson, 2006; Kenny & Ackermann, 2013; Lamontagne & Bélanger, 2015), suggesting that more perceived pain equals more suffering and thus more depression. Study I results were congruent with medical (chronic) pain research, demonstrating that while pain has an impact on depression, this depends on how the perceived pain is processed (Pfingsten et al., 2001; Kröner-Herwig, Frettlöh et al., 2011). In terms of the research question for this particular depression predicting variable, the findings regarding pain catastrophising in Study I are crucial. They demonstrate that university musicians are less subject to pain-based depression than expected, which is also reflected in the overall lower depression prevalence in this group. As a reminder, pain literature has only shown this negative effect of pain with depression if a mild depression coincided with acute pain, or at the very onset of chronic pain. If pain is perceived for a longer period time, or in other words chronic, the variable 'pain perception' loses in significance as depression predictor to the same extent that pain processing gains in significance (J. J. den Boer, Oostendorp, Beems, Munneke & Evers, 2006). Steinmetz (2015) showed that pain research for musicians, when compared to general pain research, is in its infancy. Consequently, the focus for pain research here has so far mostly been

on perceived pain. Therefore, studies to determine whether this pain is chronic - other than defined by the length of time the pain has been perceived - or if and how chronic pain affects the musician's brain in a similar way compared to non-musicians, are missing. Fear-avoidance models have only been partially taken into account by limiting research to performance anxiety and not to focus on a broader spectrum (see paragraph 2.2.10, p. 44 for more details). Moreover, as laid out in the introduction (see paragrpah 2.3, p. **??**), the choice of likely overly sensitive instruments for researching pain and depression in musicians have painted a picture that general depression research does not support (Altenmüller, 2013). These might be reasons for the divergence of Study I findings from musician-specific research that has been conducted thus far.

In conclusion, while the findings for the depression predictor pain catastrophising are in contrast with some from previous musician-specific pain research, they are, however, in line with general medical pain research and knowledge.

The differences in results originate from different baseline assumptions. Studies, such as Study one, that are based on currently accepted medical knowledge, which sees pain as a multimodal model, assume pain perception and pain processing to be different variables. Translating this into a practical example: two individuals can perceive a similar amount of pain and react in opposite ways. While one will successively withdraw from (daily) life activities, feeling overwhelmed by, and powerless to fight, pain, the other will try to maintain an active lifestyle. I want to emphasise again, as laid out in detail in paragraph 2.2.10, that these processes are neither fast nor conscious decisions, but complex processes that grow and are reinforced over the course of lifetime. They start when an infant first perceives pain and are extremely difficult to reverse, once they become engrained. Focusing then on how pain processing affects depression, a person who withdraws on the basis of feeling powerless, or not in control, is far more likely to be subject to depression than one who tries to maintain a more active lifestyle. As a reminder from paragraph 2.2.7 on psychological causes of depression, not feeling in control of a situation, or in this case pain, increases the likelihood for depression. Moreover,

if this feeling is engrained, it is more likely that a depression will become chronic. Thus, limiting an investigation to perceived pain levels will only give limited answers regarding pain and depression. To translate these insights in light of Study I results: the low depression prevalence of university musicians are in line with low pain catastrophising results, despite a pain perception for 12 months and longer. What is, however, surprising is the higher level of pain perception in shorter amounts of time in university non-musicians, compared to university musicians. This higher pain perception rating by university non-musicians was also reflected in their higher pain catastrophising levels, and confirmed that the higher depression prevalence of university non-musicians was not an outlier.

Multiple linear regression – fitting results into a larger depression model

The previous sections discussed individual variables. However, this study's second and third research questions inquired about the role of depression predictors not only as single predictors, but also using their cumulative weight. This last section considers how variables fitted together within a linear model. Comparing my results with Wittenborn et al.'s depression model (see fig. 3.10), will allow me to gain a better understanding of the differences between groups in view of depression predictors.

To re-summarise Wittenborn's depression model in short for ease of reference from paragraph 2.2.7 (p. 32), the model is the currently the only comprehensive graphical representation of how depression within its multi-factorial paradigm, combining biological factors (e.g. brain structures) with psychological factors (e.g. dysfunctional coping strategies) and social factors (e.g. economic status) (World Health Organization, 1992). The boxes represent 'regulatory resources' and are linked by feedback loops. Environmental stress and noise are introduced to the model, and the possible outcomes are shown in grey (without positive or negative feedback) and in black (with positive feedback). The question is now, can Study I variables be tied to the Wittenborn et al. model despite Study I covering only a sample of the numerous variables in Wittenborn et al.'s model?

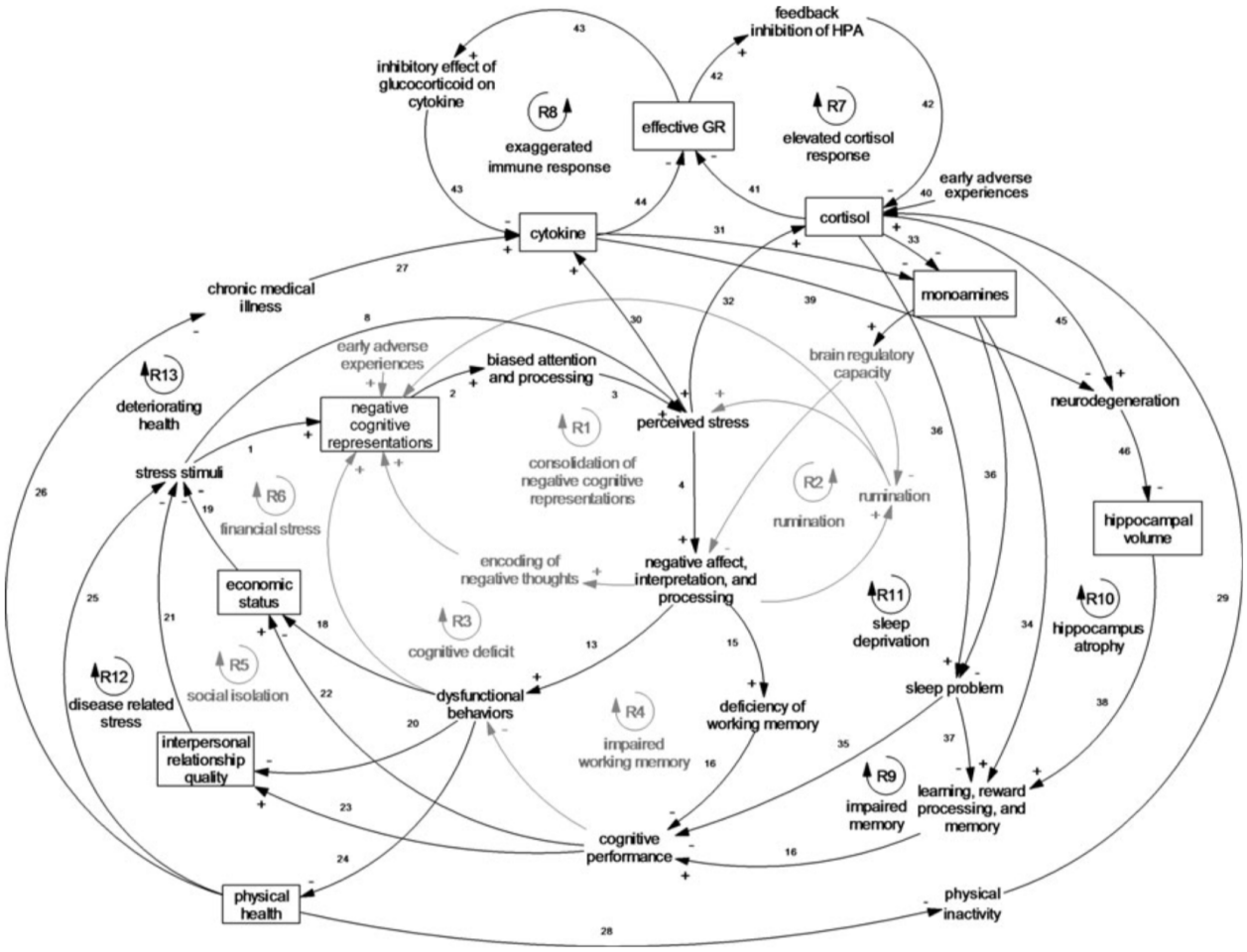

Figure 3.10: Causal loop diagram of cognitive, social, environmental, and biological dimensions for an adult population, by Wittenborn et al. (2016). The diagram includes flow, stock variables (called depression predictors here) and possible feedback loops influencing depression, here marked as MDD (or major depressive disorder) as defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM

Study I variables can be found in various places in the model. For instance, the variable 'family status' is represented in the Wittenborn et al. model by the box 'interpersonal relationship quality' (on the bottom left). Stable positive relationships can then act as buffer towards perceived stress stimuli. Wittenborn et al.'s model shows that variables such as Study I's 'dysfunctional coping strategies' (represented in this model as 'negative affect, interpretation and processing' at the centre) do not stand alone. They affect brain structures (on the right, for instance monoamine and cortisol) on one hand, and on the other intensify bias attention and processing (on the left) via various routes, using different feedback loops. Now that Study

I's variables can be traced in the model, how can the findings from the multiple linear regression be explained using this model?

This can be illustrated in three points. Firstly, results from the multiple linear regression models showed that both groups, university musicians and university non-musicians, had different strategies against depression - or to tie this to the model - used different feedback loops. To reiterate, while I use verbs such as 'use' or 'have' to describe the process, I do not want to imply that this process is an active or even conscious choice. It remains in essence a subconscious process based on learned behavioural patterns, education and upbringing among other factors.

Returning to Study I, the university musicians' model was significant using the variables anxiety, depersonalisation, professional identification (full score), active functional coping, dysfunctional coping strategies, work burnout, personal burnout, student burnout and professorial burnout. Moreover, the difficulty to build a significant regression model for university non-musicians, using the variables selected for Study I (pain catastrophising, age, personal and professorial burnout), was another indication that different loops were of importance for depression in the two groups. This was further supported by different variables carrying different significance for both groups within the model. For musicians, the significant variable was student burnout, possibly best captured in the Wittenborn et al. model by the box 'interpersonal relationship quality' (bottom left) and/or perceived stress (upper middle). The significant variable within the model for university non-musicians was dysfunctional coping strategies. This variable can be found in the Wittenborn et al. model on the bottom left, spreading loops to the resources boxes physical health, interpersonal relationships and economic status.

Secondly, by comparing the Wittenborn et al. model to Study I results, and taking into account the significance of the age variable in depression, it is also possible to say that different loops in- or decrease in significance for depression, based on the age of the individual. The age variable was indeed significant, but only in the multiple linear regression model for university non-musicians, which had a slightly wider age spread. Literature has identified the age of the individual

to be a significant predictor of depression, and adolescents are particularly at risk. Moreover, the emotional regulation learned during this time has a significant impact on depression, not only during adolescence (de Guyter, 2010; Palmer, Lakhan-Pal & Cicchetti, 2019). It can also predict depression in later life, as described in the discussion of the variable depersonalisation. Nonetheless, findings from Study I further add to the literature indicating that age as a variable has a significant function and that emotional processing during the time of adolescence can predict possible future depression episodes (see paragraph 3.4, p. 142).

Thirdly, while the variable 'identifying oneself as a musician' was a predictor in the overall depression model, it was neither significant within the model nor as an individual predictor for depression, and, consequently, does not exist in the Wittenborn et al. model. Study I results suggest that professional identity, rather than being a factor that points towards an innate higher depression prevalence amongst musicians, is instead a combination of several different variables. In regards to the Wittenborn et al. model, this suggests that similar to age, professional identification changes the significance of loops, resources and feedback loops. Or, in other words, since individuals from a particular profession are subject to the same environment and similar stressors, there is a high probability that they develop similar coping mechanisms, which can give the appearance that this groups, as a whole, is more subject to depression than other groups. In this context, I would like to point out that medical students have consistently been found to be at a higher risk of depression compared other study subjects, independent of the place and country of study (Ibrahim et al., 2013; Bacchi & Licinio, 2015). However, there is no literature claiming that individuals who are attracted to becoming a medical doctor do so because they have an innate high tendency towards depression. Yet, literature on depression and musicians proposes this hypothesis (Lauronen et al., 2004). However, university musicians not only showed lower depression prevalence, but this finding was also further substantiated by the results from the individual depression predictors.

Taken together, these results have two main implications, which translate into requirements for further research to be carried out in Study II. (1) Since this is the first study to investigate this selection of variables, can the power of Study I be increased independently by replicating these findings in Study II? (2) Extrapolating from studies with amateur and elite college athletes, can similar results be demonstrated with university and music college musicians, namely that not only a different career trajectory, but also a different study environment changes the levels of professional identity.

3.4.1 Limitations

It is important to recognise the limitations for this study. Firstly, despite providing more than the required amount of participants based on the a priori calculation for a meaningful analysis of the data, the sample size is modest. There is a possibility that the interpretation of questionnaires such as MIMS or Örebro is limited due to a lack of comparability with other findings from the same environment. However, this limitation can be mitigated in the next study (Study II), using the same questionnaires and thus increasing power and possibilities to interpret the data independently. Secondly, for anonymity reasons, and based on the pre-study feedback, I excluded the gender variable. However, while gender would have been interesting for demographics, on balance, anonymity was judged to be more important. Moreover, based on the growing body of evidence that both genders process depression differently, and that current instruments are biased towards women (Nolen-Hoeksema, 2001; Dumais et al., 2005), current quantitative depression tests might be too sensitive to pick up the differences and therefore skew results towards a (false) higher prevalence amongst women than men. Thirdly, reflecting on the current adult multi-factorial depression model, there is good reason to believe that future models will add or subtract variables and/or weight them differently within the model as time progresses. Although it is not a limitation for this study per se, it needs to be pointed out. Moreover, there is solid evidence that adolescents process depression differently, including the evidence gathered in this very study.

However, using the adult model as a basis and comparing it to the results from this study can show trends, for instance where some of the deviations can be found, and help interpret findings where different groups are found to process depression differently. Lastly, whilst the linear regression performed for Study I was useful to show trends, it does not answer the question which variables are stock or main variables, and which ones are resource building/eroding or in other words moderators/mediators. For example, it is not possible to show variables that influence on a physical or neurological level, as these were investigated here. Nevertheless, as expressed in paragraph 3.2.4, this kind of comparison would be useful to shed light on the idea that depression is not linear and has to be seen within a larger feedback loop system.

3.5 Conclusion

Results from Study I showed that university students can identify as musicians whether they study music or other main subjects. While there is no difference in the level of professional identification between musicians who study music and musicians who have chosen another study major, both reach medium professional identification levels, suggesting that neither group sees their future career as exclusively based in music. As expected, both university musicians and university non-musicians were subject to higher depression levels compared to non-student populations of the same age, and students from other European countries, in existing literature. However, comparing Study I results to the literature investigating depression among other UK university students, the levels were similar. Within Study I, the university musicians' group experienced less depression and anxiety compared to the university non-musicians, albeit not significantly so. Furthermore, in terms of group differences, university musicians reported a healthier approach to chronic pain, depersonalisation (emotional growth), and active coping strategies. This seems to point towards the possibility that playing an instrument has a positive effect on depression in various ways within the proposed depression diagram. Looking at Study I as the first building block in answering my overarching research questions, the preliminary

conclusions were that, while all results were congruent in demonstrating a group difference between University musicians and University non-musicians, the lower level of depression prevalence in University musicians compared to University non-musicians was, however, seemingly at odds with the literature. Based on these findings, Study II will now investigate if the same results can be replicated, and how they may differ when investigating the same questions with an additional population from a music college environment.

4

Quantitative depression research with music college students, Study II

Contents

4.1 Introduction

The objectives for this study were to compare university musicians and non-musicians to a more specific population of music college students to assess which factors (from Study I) predict depression severity on their own and cumulatively, and to identify how professional identity impacts depression in these groups, if at all.

Study I investigated depression and selected depression predictors in university musicians and university non-musicians. Results found that university musicians

reported better (i.e. lower) depression scores compared to their university non-musician counterparts, as measured by the Hospital Anxiety and Depression questionnaire (HADS). Moreover, university musicians demonstrated better (i.e. lower) results in depression predictors such as pain catastrophising, burnout, and coping strategies, suggesting that university musicians were not only less affected by depression, but also better equipped to cope with it compared to university non-musicians. Since this was a noticeable trend for almost all variables considered in Study I, the focus for Study II was to investigate how these results would compare to a population of music college students, using the same research questions[1].

Compared to universities, music colleges tend to be more specialised environments. One environmental difference between university and music college is for instance the existence of exchange opportunities between students from different study subjects. Within a music department at university, through playing/singing together in the university orchestra, choir or other ensembles, students are given the opportunity to meet students from other faculties, learn about different study courses and enlarge their network beyond peers from their own department. Given the more specialist environment at music colleges, such impulses are not seen as frequently and therefore music college students are more likely to form a network among themselves (Pitts, 2013; Rumiantsev, Maas & Admiraal, 2017). As laid out in the introduction (see paragraph 2.2.7) and demonstrated in Study I, changes in or by the environment can affect depression scores. These influencing environmental factors can include, but are not limited to, the personal network and exchange of ideas, or the experience of being appreciated more by professor compared to peers. Based on the MIMS results from Study I, and extrapolating from studies that used identity measures with college athletes, I assumed that university musicians did not expect to have a career uniquely based in music. However, I expected that music college students would, at least at this stage, expect to work as a

[1] As a reminder, while in principal Study II uses the same research questions seen in Study I, these are independent studies that were undertaken at different times and following different expectations, as can be seen in the hypotheses. Study II was built based on the results from Study I.

full-time professional musician. Thus, the expectation when investigating music college students was that they would dedicate more time to practice compared to university musicians (Temper, 2009).

Due to a lack of available comparable data in this respect, it remained unclear if or how these differences would affect depression, pain catastrophising, depersonalisation, and coping strategies. Research question 1 in Study I, which investigated differences in depression prevalence between groups (see paragraph 3.1), also formed the basis for my investigations in Study II (see paragraph 4.1). Furthermore, Since high anxiety levels have been associated with the music college environment, and anxiety remains a solid predictor for depression, a closer look into the various forms of anxiety appeared reasonable (e.g. general state of anxiety versus more specific forms of anxiety in the form of performance anxiety). Also, the close relationship between sleep and depression (Tsuno, Besset & Ritchie, 2005), which had so far only been looked at through the lens of pain catastrophising in Study I, was further investigated in Study II. Additionally, Study II offered the opportunity to take a closer look at some questions that arose from Study I, for instance the relationship between depersonalisation and daily practice time. Since these questions formed a sub-set of the study's research questions, they have been organised into their respective results sections, always starting with the main research questions followed by an investigation of a sub-set of questions that arose from Study I.

Research Questions

Study II set out to investigate depression, as reflected in the following research questions. While the main underlying questions for Study II are the same as those in Study I, the expectation regarding the results for the different variables varied from Study I to Study II, partly based on the results found in Study I. This is reflected in the hypotheses for this study (see paragraph 4.1).

1. Can the results from musicians in a university environment be reproduced and/or is there a difference in depression prevalence between music college musicians, university musicians and university non-musicians? This question

links to the first of my overarching questions in the introduction paragraph 2.4.

2. What is the role, if any, of more general depression predictors (professional identity, depersonalisation, pain catastrophising, coping skills and sleep) in predicting depression across all student groups (music college musicians, university musicians and university non-musicians)? This question links to the second and third of my overarching questions in the introduction paragraph 2.4.

3. What role, if any, does professional identification with the profession of a musician play in predicting depression prevalence in musicians within a higher education environment? This question links to the second and third of my overarching research questions in the introduction paragraph 2.4.

For ease of reference, all questions in the following results section will be numbered while hypotheses will alphabetised.

Research Hypotheses

Based on literature and on the results from Study I, the working hypotheses for Study II have been ordered by variables as follows:

1. **Depression and anxiety**: For this variable I assumed that the music college environment would be more competitive and hence more stressful to students (World Health Organization, 1992) than the university. Therefore, I also assumed that:

   (a) in accordance with the literature presented in section 2.2 depression scores would be higher in music college students compared to university musicians and non-musicians. This hypothesis refers to the first research question of Study II;

(b) in accordance with the literature presented in section 2.2, an independent confirmation for the above hypothesis, and in response to Study II's second research question, the scores for anxiety, both a depression symptom and a depression predictor, could present three different outcomes: (i) a high anxiety score with congruent high depression score as was the case in Study I, (ii) a high anxiety score and lower depression score, possibly pointing towards stress in the environment, or (iii) low scores of anxiety and high scores of depression, supporting the hypothesis that musicians have a natural tendency towards depression.

2. **Professional identification**: Based on the results of Study I and the literature on professional identity, this variable will be investigated by looking at its subscales rather than focusing on the total score. This will show a more detailed impact of the different scales on depression (see paragraph 3.3, p. 116). Hence the hypothesis for this variable not only provides an answer to research question three, but will also be an independent confirmation of research question one. Furthermore, I assume that

   (a) high scores in the subscales negative affectivity and exclusivity are depression promoting and participants will therefore show congruent high depression scores;

   (b) high scores in social and self-identity are depression buffers. Participants with high scores in those scales will therefore have lower depression scores;

   (c) professional identity is going to be higher in music college students compared to university musicians;

   (d) a higher total score of professional identity will coincide with longer practice times;

   (e) as professional identity scores are influenced by practice time, the hypothesis for a relationship of practice time (accumulated years or

per day) with depression is that students who accumulated more practice time over the years will be more vulnerable to depression and anxiety;

(f) more specifically, high string players will show higher professional identification scores, invest more time in practice, and therefore will be more vulnerable to depression, than other musicians;

3. **Depersonalisation**: In answer to Study II's second research question regarding the role of different predictor variables, and based on Study I results and the literature presented in section 2.2.9 regarding this variable, I expect

4. (a) that, as found in Study I, the increase of frequency and duration of depersonalisation will be linear, similar to an adult population, making the CD-9 an appropriate instrument to measure depersonalisation in an adolescent population (see paragraph 3.3, p. 117);

(b) to see a difference between all three groups (music college musicians, university musicians and university non-musicians);

(c) to find depersonalisation to be an (extra) indicator for anxiety, namely that individuals scoring between 19-35 (full depersonalisation score) will also show higher scores of anxiety;

(d) to find that high depersonalisation will be congruent with dysfunctional coping strategies such as e.g. coping, negative affectivity, substance intake and non-stable relationships;

(e) to see a relationship between practice time and depersonalisation;

(f) to find an impact of age on depersonalisation. If Michal, Duven et al. (2015) are correct in their hypothesis that high scores of depersonalisation in adolescents can be predictors for depression phases in later life, this variable not only has a value for acute depression, but also carries the potential to help predict future depression;

5. **Coping skills**: The hypothesis for this variable is the same as in Study I (see p.94). As in Study I, it here also contributes to answering the question what role, if any, general depression predictors play in this context:

   (a) higher scores in active functioning and cognitive functioning will be congruent with lower depression and anxiety scores, while higher score in dysfunctional coping will be congruent with higher depression and anxiety scores;

6. **Pain**: The hypothesis for this variable remains the same as in Study I (see p. 94). As in Study I, it here also contributes to answering the question what role, if any, general depression predictors play in this context:

   (a) high scores in perceived pain, either general pain or playing related pain, result in a high pain catastrophising score;

   (b) high pain catastrophising scores will increase with hours/years of practice and, if correct, they should also be reflected in high scores of depression, anxiety, dysfunctional coping and sleep problems;

7. **Sleep**: The hypothesis is that high scores in sleep related problems will correspond to high scores in depression and anxiety (see paragraph 2.2.6). This hypothesis contributes to answering the question what role, if any, general depression predictors play in this context:

   (a) sleep problems such as early morning wakening and increased need for sleep during the day will be congruent with high scores of depression;

   (b) sleep problems such as early morning wakening and almost no need for sleep would also be congruent with high scores in depression, but point towards a manic phase;

4.2 Method

The design and methodology are both described in the following subsections. In short, this quantitative study followed a correlational and predictive design, observing the change in variables between groups, here both groups from Study I and music college students from this study, as well as predicting which combination of variables would most likely determine a high depression prevalence. Data was obtained online and without encountering any participants.

4.2.1 Design considerations

It has been established that students worry about the possibility of being identified as having a mental disorder, believing this might expose them to (academic) disadvantages due to the stigma attached to such a condition. This fear alone, whether perceived or based on experience of such disadvantages, can already dissuade individuals from participating in studies of mental health (Storrie et al., 2010; Gebauer, 2014; Hall, 2018). Paramount for the design of this study was therefore to respect anonymity of participants. I prioritised online survey options with servers based in Europe respecting at least EU privacy laws. This not only insured a high standard of anonymity but also data storage safety. I selected an option that had automatic privacy settings to prevent the collection of personal information during the process of filling out the questionnaire, such as cookies, as well as preventing a later consolidation of data with personal information. No information from participants' computers or IP addresses were requested or stored at any point. This choice also meant that I was not able to track any individual scores, and data from this survey was erased irrevocably from the provider's online storage in November 2017.

4.2.2 Participants

The survey was open to all music (college) students worldwide, who were over the age of 18 years with a good working knowledge of the English language. The decision to open it for such a wide participation was reached as a consequence

of Conservatoires UK (CUK) deciding to run a project with almost the same questionnaires (Centre for Performance Science, 2016) at the time. My survey offered only modest raffle prizes and no additional incentives (such as course points). Therefore, there were reasonable concerns to not be able to motivate enough UK based participants who would fit the criteria. Moreover, since this study used the same participant pool as the aforementioned CUK study, there were also reasonable grounds to expect that participants would be weary of answering the same questionnaire more than once, as previously documented in literature (Hoerger, 2010; Galesic, 2006). This step was not only set out in the ethics application form, but previously also agreed with supervisors and examiners in the confirmation exam (15th September 2016). Participants were exclusively recruited online via social media (facebook, twitter and instagram). 36 participants took part, taking an average of 17.4 minutes to complete the survey (see table 4.1). While it was optional for participants to disclose their age, most of them did (mean = 27 years, SD = 8.7). For ease of reference, and to distinguish participants in Study II from those in Study I, Study II participants will from now be on be referred to as music college musicians (abridged to college musicians in Tables and Figures).

4.2.3 Material

In order to investigate depression, Study I used the HADS questionnaire. Study II aimed to also look at depression, but with a closer look at anxiety and its role. Therefore, it was necessary to re-evaluate the depression questionnaire used, to ensure the most appropriate instrument for this task was chosen. In light of this, the following section discusses the merits and potential downsides of relevant depression/anxiety questionnaires. The discussion focuses around (a) facilitation of comparability of results with other groups (e.g. Study I results and/or (music) student populations), (b) complementary fit to the anxiety questionnaire, and (c)length of the questionnaire, as the overall time to complete the questionnaire should be kept as short as possible.

Taking a fresh look at depression scales

As explained in section 3, the following seven scales have been used most often in quantitative depression research: the Hamilton Scale (Hamilton, 1960), the Symptom-Checklist-90 (Derogatis & Cleary, 1977), Beck's Depression Inventory (BDI,Beck, Ward et al. (1961)) , the General Health Questionnaire, (GHQ, Goldberg (1972), the WHO's Major Depression Inventory (MDI, Bech et al. (2001)), and the Hospital Anxiety Depression Scale, (HADS, Zigmond and Snaith (1983). Finding a depression questionnaire that excludes anxiety is almost impossible, as depression and anxiety can be described as two sides of the same coin (Helmchen & M. Linden, 1986). However, using a depression scale that looks at the mood of the day was not the right option, because the complementing depression/anxiety scale needed to look at a longer period of time in order to avoid confusion with mood swings or "feeling blue" on the day of the survey. This left the Symptom-Checklist 90, the Brief Symptom Inventory, the Major Depression Inventory and the Hospital Anxiety and Depression Scale. The Symptom-Checklist and the Brief Symptom Inventory (the latter being the factor analysis of the former) were problematic due to their length: with an estimated average response time of 12-15 minutes, completing one of these scales would have taken as long as the entire Study I questionnaire. Short versions only exist for the Symptom-Checklist 90, but several studies reported that the brevity also affected the reliability. Looking at the last two remaining candidates, the Major Depression Inventory (MDI) and the HADS, the MDI looks at a two-week period of symptoms experienced, while the HADS looks at a seven-day period. However, the MDI has been found to be skewed towards larger depression scores, as found by Forsell's (2007) 3-year follow-up study, which failed to pick up minor forms of depression, or be validated for this. While the MDI is a well-established questionnaire, this would have made a direct results comparison with Study I difficult. Even though the HADS has a separate anxiety scale, (Lisspers, Nygren & Söderman, 1997) found that the full scale had a strong internal correlation between anxiety and depression, but was less suitable to measure anxiety on its own. In summary, having re-investigated the fit of depression scales

for this study, the HADS was the questionnaire of choice. This choice enable an easy comparison between groups as well as with other studies that looked at musicians and students. While there is no objective standard, or 'gold standard', to measure anxiety, Spielberger, Gorsuch and Lushene's Trait Anxiety Inventory (STAI) was an obvious choice. This questionnaire has established itself as a standard anxiety questionnaire within the music (student) population. Both (Elliott, 1993) and (Millar, Jelicic, Bonke & Asbury, 1995) found the STAI and HADS to complement each other well, as they both illustrated different viewpoints.

The following section presents the questionnaires selected for Study II. Since the first five scales are repeated from Study I, a detailed description can be found in Study I. However, considering that depression is at the core of this thesis, and in view of the study's exploratory nature, it was natural to re-consider the choice of depression questionnaires as described above. The scale for professional identification (MIMS), and the GOLD-MSI subscales looking into practice time and other demographic details, were good choices for Study I. Since participants in Study II could be expected to spend more time practising, a direct comparison with results from Study I promised to be interesting. For the same reason, the pain catastrophising, coping skills, and depersonalisation questionnaires were also used again. Burnout and stigma questionnaires had to be omitted in favour of anxiety and sleep questionnaires (see above for details). The working burnout hypothesis for this thesis assumed that burnout was a transient state towards depression. Study I results did not support this theory. The inverse relationship of burnout with depression (i.e. the more burnout symptoms, the fewer depression symptoms present) suggested that an independent investigation would yield more promising results on this complex topic (e.g questions about burnout and depression symptoms in comparison with academic grades and professional identification within an university environment). Results for stigma did not show promising results. This might be due to the choice of the scale or due to knowledge about stigma carrying less weight than anticipated. Rather than choosing a different stigma scale, where

results would be difficult to compare, re-shaping the investigation towards stronger depression relationships with anxiety and sleep felt more promising.

1. Hospital Anxiety and Depression Questionnaire (Zigmond and Snaith (1983), see paragraph 3, p. 99)

2. Musicians Identity Measurement Scale (Brewer, Van Raalte and Linder (1993), see paragraph 4, p. 101)

3. Cambridge Depersonalisation Scale (Sierra, Senior et al. (2002), see paragraph 5, p. 101)

4. Orebrö Musculoskeletal Pain Screening (Linton and Boersma (2003), see paragraph 6, p. 102)

5. The Brief Cope (Carver et al. (1989), see paragraph 7, p. 102)

6. The State-Trait Anxiety Inventory (STAI; Spielberger et al. (1970)) is a self-reporting questionnaire (40 items, 2 subscales (a) state anxiety, (b) trait anxiety, with 20 items each) used to measure anxiety, whether it occurs in stressful situations or is associated with a psychological disorder. All items are rated on a 4-point scale (e.g., from "Almost Never" to "Almost Always"). Internal consistency coefficients for the scale have ranged from .86 to .95; test-retest reliability coefficients have ranged from .65 to .75 over a 2-month interval. Asking for the mood of the day, this scale is purposefully kept linguistically simple (IQ requirement ≥ 80) to allow the investigation of anxiety across a wider cultural range. There is no objective standard or 'gold standard' for measuring anxiety. Only the trait anxiety subscale of the STAI will be used for this study. The STAI and HADS have been previously used in combination and were found to be in good agreement. The HADS showed more reliability in re-tests than the STAI, but this might be Spielberger's intention, and/or due to the volatile nature of anxiety. The STAI, Spahn's anxiety scale, and the HADS may appear to be doubling up

on the subject of anxiety. However, all three scales complement each other as all illustrate different viewpoints. The STAI does not have a cut-off point per se (Spielberger et al., 1970). Next to its dependency on personality, anxiety also depends on the environment, which has to be taken into account. Three empirical cut-off points have been used as a guide: means between 39-40 are thought to be significant for a state of anxiety (Knight, Waal-Manning & Spears, 1983). In acutely stressful situations (e.g. during pre-op) the cut-off is 44/45 (Millar et al., 1995; Kindler, Harms, Amsler, Ihde-Scholl & Scheidegger, 2000). In chronically ill patients suffering from anxiety, a cut-off between 44-51 has been observed, while a cut-off for patients with mood disorders is at 53 (Kaneda & Fujii, 2000; Stanley, Novy, Bourland, Beck & Averill, 2001; Stark et al., 2002).

7. Taking a closer look at stage fright/performance anxiety, (Spahn, Hildebrandt & Seidenglanz, 2001) developed their own performance quality-rating questionnaire: FZAQ (**F**ragebogen **Z**ur **A**uftritts **Q**ualität). This scale has two subscales, a self-rating and an external rating one. This scale is used to asses the self-perceived quality of the performer during an audition or concert. Seven statements are rated on a five-point-Likert scale (1: disagree to 5: agree) including nervousness of the performer, the extent to which hands were trembling, the influence of movements, the extent of immersion in the performance, the intensity of anger about flaws/mistakes, personal focus on the performance, extent of anxiety during the performance. Answers to questions one, three, four, five and six are reverse-scored. The questionnaire breaks down into two dimensions: (a) coping with the performance situation (nervousness, anger, and diminishing anxiety during the performance), and (b) physical nervousness (trembling hands, performance fluency, immersion, and focus). For (a) the higher the value, the better the person was able to cope, and for (b) the lower the score, the better the candidate was able to work with stage fright/performance anxiety. The internal consistency for the first sub-scale had a Cronbach's alpha of .64 in the pre-test and .61 in the

post-test. The internal consistency for the second sub-scale had a Cronbach's alpha of .89 in the pre-test and .84 in the post-test.

After reaching out to the authors, they requested that their questionnaire should only be administered in person, straight after a performance, and not in form of an online questionnaire. In accordance with their wish, this questionnaire was omitted after the pre-test. As a consequence this meant that research question number four about a special triggers for anxiety (see p. 157) could not be answered.

8. The Pittsburgh Sleeping Quality Index (PSQI,Buysse, Reynolds, Monk, Berman and Kupfer (1989)) is a 9-item, standardised, short, self-reporting questionnaire measuring subjective quality of sleep, sleeping patterns, and depression related problems. PSQI has a high test-retest reliability and a good validity for different age groups (Cronbach's Alpha = .69). The PSQI was able to correctly identify 88.5% of all patients and controls, representing a 89.6% sensitivity and a 86.5% specificity rate, using an empiric cut-off point of 5. This cut-off point separates 'good' from 'bad' sleepers. While the PSQI doesn't allow for a differential diagnostic into various facets of sleeplessness, it provides a solid overview of the nature and scope of insomnia, invaluable in primary care. The HADS deliberately excludes insomnia and fatigue as symptoms. While it indicates depression issues in general, a secondary questionnaire is required for a closer inspection symptoms. Even though all depressive symptoms are alike for all ages, scientists have found that somatic problems in adolescents (16-25 years of age) are characterised by sleeping and eating problems (e.g. early morning wakening, no restful sleep, low mood in the morning) (Schlarb, Imort & Zschoche, 2017). Although sleeping problems are always prominent, younger adolescents' depressive episodes are typically defined by regression (behaviour, motoric and/or speech). The PSQI asks for the sleeping behaviour during the past four weeks, and covers the important parameters during that timeframe: sleep efficiency, sleep latency,

day dysfunction due to sleepiness, overall quality of sleep, need for sleep medication, and sleep disturbance. This scale has been used as a diagnostic tool to measure insomnia as well as a secondary tool in sleep laboratory settings to measure development and success of sleep (Busch, 2003; Owens, Group et al., 2014).

4.2.4 Procedure

The anonymous online questionnaire was designed using Sosci-survey (Leiner, 2014), just as in was in Study I and available to participants on www.soscisurvey.com. As done in Study I, prior to the online launch I collected feedback from 10 participants which included music students, professional musicians, my supervisor, the external medical advisor and (other) members from the Music and Wellbeing Team. Data from the pre-test was collected in the same anonymous way as described above, assigning random numbers to participants who left comments. Based on this pre-test feedback, the question of gender was omitted to prevent the involuntary tracking of participants, similar to Study I (see paragraph 3.2.4, p. 104). Based on this feedback again the question of gender was omitted for the same reason as in Study I (see 3.2.4, p. 104). After the input of all pre-test feedback, data collected was destroyed, only then was Study II launched. The same procedure for missing data used in Study I was also applied here using either the individual questionnaires guidelines and/or depression literature (World Health Organization, 1994).

The study was carried out in accordance with the recommendations of the University of Sheffield, department of Music and granted ethics on 19th January 2017 (see details A.2). Participants could only access the questionnaire after confirming having understood the terms set in the introduction. Consent was automatically collected by the survey. In case of no consent, participants were guided to the last page thanking them for their time, exactly as for Study II (see details for that page in A.2). Participation was voluntary, but in addition to completing the survey, students could participate in a price draw for five Amazon vouchers (1x50GBP, 2x20GBP, 1x10GBP). Students were also able to register their

email address if they wished to receive a brief summary email outlining the results of this study. The survey for Study II ran from 25th February 2017 – 29th April 2017.

Statistical Analysis

The statistical analysis was performed using the same software as in Study I: the software R 3.6.0 (R Core Team, 2017), all graphs were calculated using R's extra package ggplot2 (Wickham, 2016), and the tree analysis was calculated using the extension partykit (Hothorn & Zeileis, 2015). For the list of all extra packages used for calculation in R please see Appendix A.1.1, (p. 307). The a priori calculation to determine the minimum sample size for a meaningful result was performed using the software G*Power 3.19.4 (Faul, Erdfelder, Lang & Buchner, 2007; Faul, Erdfelder, Buchner & Lang, 2009) and a power of .8 was understood to be sufficient (Ellis, 2010). Pairwise comparison analysed group differences. Here, chi square tests are used to compare groups in terms of prevalence (for all questionnaires with a cut-off score). Parametric test or their non-parametric equivalent, were used for group comparisons, depending on the normal/not normal distribution (i.e. for questionnaire without a cut-off score). As these are not the norm, they are specifically highlighted within the text. Bonferroni corrections were applied to safeguard against multiple testing and Spearman's correlation was applied for correlations. Based on the research hypothesis (see section 4.1 , p. 158) and in order to find an answer to the research questions two and three (see section 4.1, p. 157), and in accordance with the literature of depression (World Health Organization, 1994), a simple group comparison does not suffice. While there are numerous techniques to analyse dependent variables and that can also deal with a larger set of predictor or independent variables such as canonical correlations (B. Thompson, 1984) or logistic regression (Hoerl & Kennard, 1970) I opted for a hypothetical approach to linear modelling, based on current medical depression theory. The advantage of a hierarchical regression model, compared to less sophisticated statistical methods, such as t-test or correlations, is the control of a third variable, which can for instance help to detect apparent causalities. The goal here is to compare different models in

order to understand how the relationship between variables changes. For instance, how does the effect of my predictors change if I add/change (control) variables? To be more specific in terms of the research questions: how does predicting depression change when I add the variable 'being a musician' (the MIMS total score)? In other words, can identifying oneself as a musician be considered a predictor variable in depression, as some music psychology literature seems to suggest?

In addition to the linear model, I conducted a similar analysis using tree models. Tree models do not imply a functional relationship between variables and are more robust, and therefore more suitable for the exploratory nature of this study. Regression tree models and forest analysis have been used in larger statistical analysis, in artificial intelligence, and, more recently, in psychology (Pawley & Müllensiefen, 2012)[2]. While these models are typically used for larger data sets, a growing number of studies support their use for smaller collections such as the size of the present data sample W. Liu, Chawla, Cieslak and Chawla (2010), Song and Ying (2015). Tree methodology is used to classify data based on multiple covariates, or develop predictors for a target variable. This approach is robust as the algorithm, does not impose a parametric structure, and can deal with large, complicated data sets. Contrary to the linear model, it does not presume a functional linear relationship between variables. The decision tree's algorithm finds the best splits of the data, so that the entropy is maximised. Tree model partition observations split the dependent variable (depression) into homogeneous sub-groups, where the observations have a similar value (i.e. low, moderate or high anxiety scores). Each node of the tree represents the independent variable that maximally increases the homogeneity of the data for splitting. This splitting process is repeated until it reaches either the group size criterion, or until further splitting would not increase homogeneity. Large data sets are divided into training and testing sets, which further bolsters the model, and pruned to achieve optimal fit. Smaller sets can be used in their entirety, which suits exploratory research (Song & Ying, 2015). Based on the complex nature of depression, this additional step was beneficial for

[2]Detailed introduction to tree methods see (Leo, Friedman, Olshen & Stone, 1984), and for an overview in music research see (Müllensiefen, 2009)

the analysis, to either corroborate the results from the hierarchal multiple linear regression and/or provide additional answers to the question if 'being a musician' can be considered a risk factor in depression.

4.3 Results

The structure of this results section mirrors the that of Study I with one additional segment that sets out the use of modelling to predict depression. It thus divides into five segments as follows: (a) a priori power analysis (p. 172), (b) overview table and correlation matrix for all variables (173), (c) results from individual variables (tables and figures starting from p. 176), (d) hierarchical multiple linear regression (see p. 198) and (d) tree analysis (see p. 199). For ease of reference and comparability, tables and figures show results from Study I in addition to those from Study II. If not indicated otherwise in the material section (paragraph 4.2.3, p. 163), I have used cut-off scores set by the authors for the relevant questionnaires. This allowed for comparability of data with other studies that used the same material and that recruited students as participants. In addition to the mean and standard deviation (SD), I included the prevalence (percentage of individuals significantly affected by a condition) in tables where this was necessary (e.g. depression, anxiety). In figures, this is represented by the cut-off line(s) (the point from where an individual is strongly considered to have been affected). As a reminder and as laid out in paragraph 4.2.4, all group comparisons based on prevalence are done with chi square tests. When parametric tests or their non-parametric equivalents were used, this is pointed out within the text.

A priori calculation

The a priori power calculation, using G*Power software for pairwise comparison with an expectation of non-linear distribution, reported that 58 participants overall or 28 participants were required per group ($\alpha = .05$, $\beta = .8$), and for a linear model (ANOVA) using the same parameters ($\alpha = .05$, $\beta = .8$), the minimum sample size was

96 in total or 33 participants per group. This means that the 36 participants recruited for Study II were sufficient in order to compare these results with those from Study I.

An a priori test was also performed in order to determine the number of participants required to achieve a meaningful result with a linear multiple regression for a fixed model (R^2), setting R^2 to a medium effect size[3]. It found that the number of participants required for this test to return results with enough power, were 82. This meant that the total number of actual participants (103) from Studies I and II would carry sufficient power to produce a meaningful result.

Results overview

This section is composed of three tables to facilitate a quick overview of the data from Study II: demographics (Tab.4.1) GOLD-MSI (Tab. 4.2) and all other questionnaires (Tab. 4.3). For the individual sections, I combined data from Studies I and II to highlight the differences between university musicians and music college musicians, when suitable, rather than focus solely on results from Study II. This look across both studies helps to firmly place the focus on the main research question of this thesis.

Table 4.1: Demographic data for music college musicians including age (mean and standard deviation, SD), family status, pain while playing, methods of stress relief and substance intake, Study II

	College musicians
Age (mean, SD)	27.9 (8.7)
Family status, stable relationship	57.1%
Family status, non-stable relationship or single	42.9%
Undergraduate[1]	8
Postgraduate	12
Pain while playing instrument/singing (total)	77.7%
Pain while playing mild	28.6%
Pain while playing strong	11.4%
Pain while playing very strong	2.9%
Constant pain while playing in the past 7 days	5.7% (77.1% not disclosed)
Stress reducing activity (total)	77.1% (22.9% no activity)
Stress relief, active (running, yoga, etc.)[2]	62.9%
Stress relief, other (meditation, therapies, etc)	31.4%
Substances	91.4% choose not to disclose

Note: 'Music college musicians' is here abridged to 'college musicians'
[1]Undergraduate and postgraduate applies to students at UK/US institutions only
[2]Multiple choice. Regular activities once a week; minimum period of two months.

[3](=.09; with an α error = .05, power 1-β error probability = .08, number of tested predictors = 1 and total number of predictors = 4)

Table 4.2: GOLD-MSI results including regular practice time, daily practice, music theory lessons, formal training, attending concerts and attentively listening to music, Study II

	College musicians
Regular practice time[1] (in years)	4.8
Regular practice time (hours per day)	6.14
Music theory lessons (years)	4.82
Formal instrumental or vocal training (years)	6.11
Attending live concerts (member of audience, during past year)	5.35
Attentively listening to music (average per day)	30-60min

Note: 'Music college musicians' is here abridged to 'college musicians'
[1]Note: GOLD-MSI gives a range not an exact number

Since the questionnaire was open to participants worldwide, nationality (see Tab.A.7) and place of residence (see Tab.A.8) were recorded. The largest number of participants were from English speaking and German-speaking countries (USA, UK, Germany, Austria, Switzerland). Other nationalities included Canadian, Danish, Italian, South African, Tunisian and Libyan. Participants were mostly residing in the USA, Germany and the UK, followed by Italy, Switzerland, Austria, Australia, Denmark, France and Spain.

Students' study majors (see Tab. A.9) were 34.3% classical music and 8.8% music education (focused on teaching in secondary school). The remaining participants were either following a combined degree track such as classical music and musicology, music and art, music and therapy or classical music and research, or they specialised in departments where music performance was not strictly required, such as ethnomusicology, composition, or music theory. Six participants did not disclose their study major.

Participants' primary instruments were mostly voice (25.7%), followed by wind instruments (22.9% in total; flute and piccolo 14.3% and oboe: 5.7%, clarinet: 2.9%), keyboard (piano: 17.1%), upper strings (violin and viola: 11.5%), double bass and drums (5.7% each), and one participant each played cello, electric bass and guitar.

Table 4.3: Overview table, all tests scores for music college musicians, by questionnaire, mean and standard deviation (SD) only, Study II

	College musicians
HADS Anxiety	8.68 (3.58)
HADS Depression	7.80 (1.4)
STAI (trait anxiety)	43.23 (8.97)
MIMS (total score)	49.11 (10.42)
Depersonalisation (total score)	28.6 (6.39)
COPE Active-Functional	21.65 (4.60)
COPE Cognitive-Functional	19.10 (5.69)
COPE Dysfunctional	9.65 (2.64)
ÖREBRO (pain)	82.22 (23.32)
PQSI (sleep)	3.37 (2.77)

Note: Music college musicians is abridged to college musicians

Correlation matrices

Correlation matrices were calculated using Spearman rho calculation to show the individual relationships, as well as help with the step-wise approach for a linear regression.

The same visual presentation guidelines that applied to the previous chapter's heat diagrams, also apply here (see 4.1, p. 176). The colour scale from blue to red represents the existing positive (blue) and negative (red) correlations. The strength of the relationship is represented by the strength of the colour: the darker the shape, the stronger the relationship. Heat maps were used to quickly gain an overview over all significant relationships within the group, and differences or similarities between groups from Study I, all of which was important in view of the exploratory nature of the study. Since all variables used in Study II predict depression in accordance with the literature (World Health Organization, 1994), I assumed for variable that didn't correlate with depression that a different or additional moderator/mediator than the ones used in this study was necessary to create a correlation. While

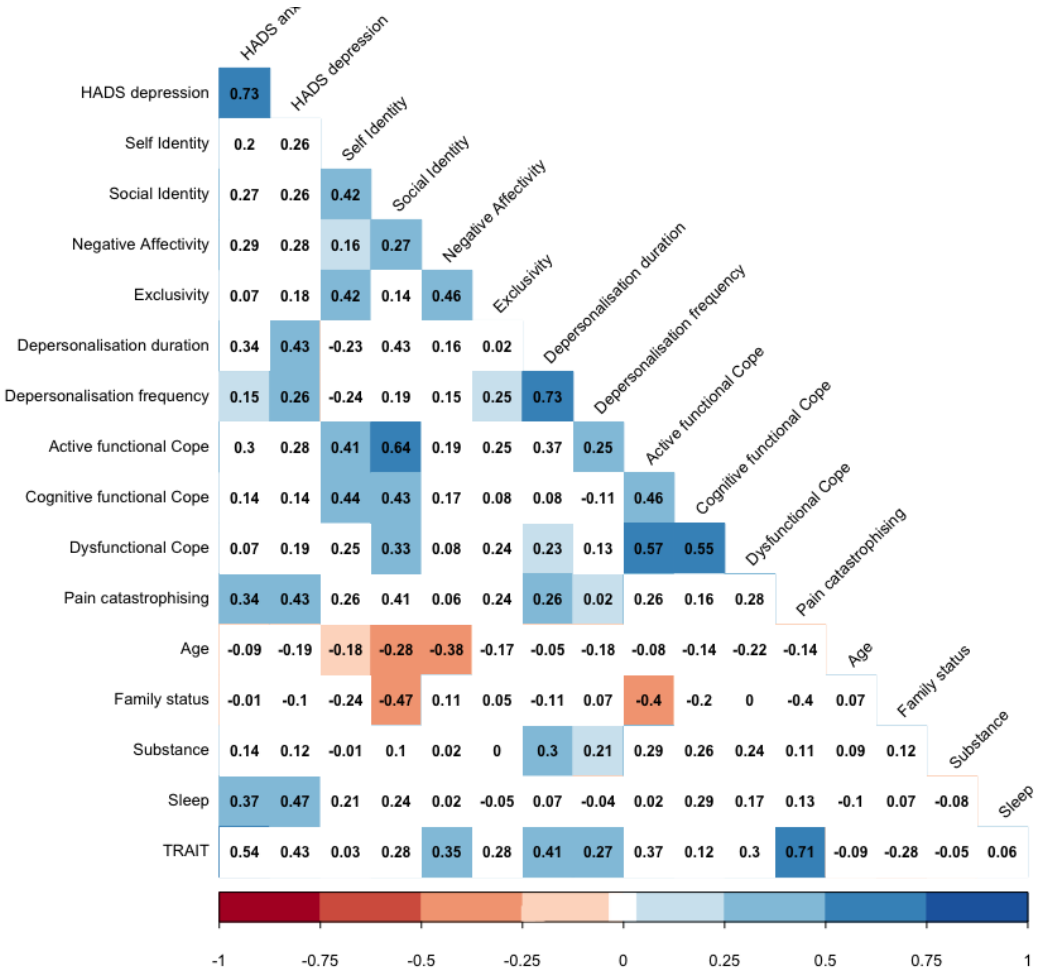

Figure 4.1: Correlation matrix for music college musicians; all variables, significant correlation are coloured [blue: positive, red: negative], insignificant are white, Study I

in the matrices all significant relationships were reported, in the sections for the individual variables only correlations from a moderate strength upwards (0.4) were taken into account for the hierarchical multiple linear regression. Most weaker correlations have been shown to be significant in other, larger, studies, but due to the comparatively low number of participants in this particular study, the decision was reached to focus on stronger connections for this thesis.

Depression and anxiety

This section looks at results from Study II's depression and anxiety scales, starting with the HADS and followed by the STAI. The HADS measures both depression and anxiety, the STAI measures trait anxiety only. The two HADS subscales report

Table 4.4: Hospital Anxiety and Depression questionnaire (HADS), results for music college musicians, university musicians and university non-musicians, mean, standard deviation and prevalence, Studies I and II

HADS	College musicians			University musicians			University non-musicians		
	mean	SD	prevalence	mean	SD	prevalence	mean	SD	prevalence
Subscale Anxiety	8.4	3.58	43.7%	4.3	4.05	40.6%	4.5	3.3	55.5%
Subscale Depression	7.80	1.4	31.2%	8.4	3.26	9.3%	5.2	3.38	19.4%

Note: Higher means indicate more depression/anxiety symptoms.

the score for depression and anxiety separately. Study II used the same cut-off value as Study I, namely ≥ 9. This means that a person with an anxiety and/or depression score of ≥ 9 can be considered to suffer significantly from depression symptoms (see paragraph 3, p. 99).

There was a significant difference between groups in depression prevalence, namely between the music college musicians' group on one hand and both the university musicians (z = -3.67, p = .0002) and the university non-musicians (z = 2.16, p = .003) on the other[4]. In other words, music college musicians showed significantly more clinically significant depression compared to university musicians and non-musicians. The results, put in comparison with both groups from study I, are in Table 4.4, for both depression and anxiety, in Figure 4.2 for depression and in Figure 4.3 for anxiety.

As in Study I, and based on the exploratory nature of this project, I have chosen a violin graph as a visual representation for the data. As a hybrid between a kernel density plot and a boxplot, the violin graph's strength is to show the peaks in the data and within the actual group distribution. I have also added a boxplot and the mean represented as a red diamond shape, within the violin graph.

Comparing the depression prevalence on its own seems to support the hypothesis that 'being a musician' is a variable that contributes to depression.

However, this argument loses its force when we take a look at anxiety prevalence, one of the most significant depression predictors identified by literature (World

[4]Comparing the prevalence between groups is are done with chi square tests, as done in Study I. When parametric tests or their non-parametric equivalents this will be used, this noted within the text.

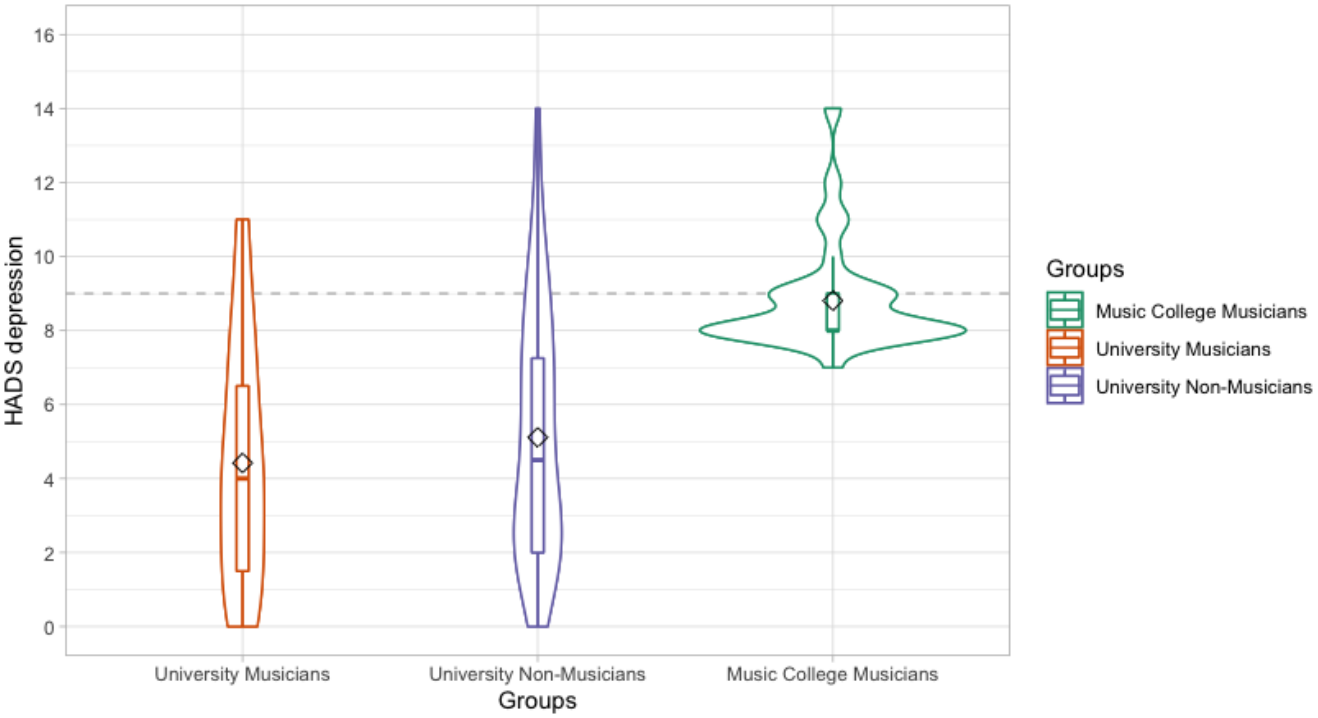

Figure 4.2: Violin plot for depression representing the group distribution for music college musicians university musicians and university non-musicians, including box plot, mean points [diamond shape] and a dotted cut-off line for significant depression at 9, Study II

Health Organization, 1994). The highest prevalence for anxiety was found in university non-musicians. When compared to music college musicians, the difference was significant (z = -2.01, p = .04). While university musicians also had a 14.9% lower anxiety prevalence compared to university non-musicians, there was no statistically significant difference between these two groups (p = .2).

The **Trait anxiety** is one part of Spielberger's anxiety scales, state anxiety (STAI-S) being the other. Anxiety can have different origins. Spielberger's pioneering work in anxiety research formed the basis for separating anxiety into personality (trait) and situationally based (state) anxiety. Even though there are no official cut-off points for this scale to show when individuals can be considered to be suffering significantly or clinically from anxiety, three empirically established cut-off points are considered as reliable guidance: scores of 39-40 are significant for a state of anxiety. For a more stressful environment, the cut-off is at 44-45, and a cut-off of 53 is indicative of patients diagnosed with mood disorders (Kaneda & Fujii, 2000;

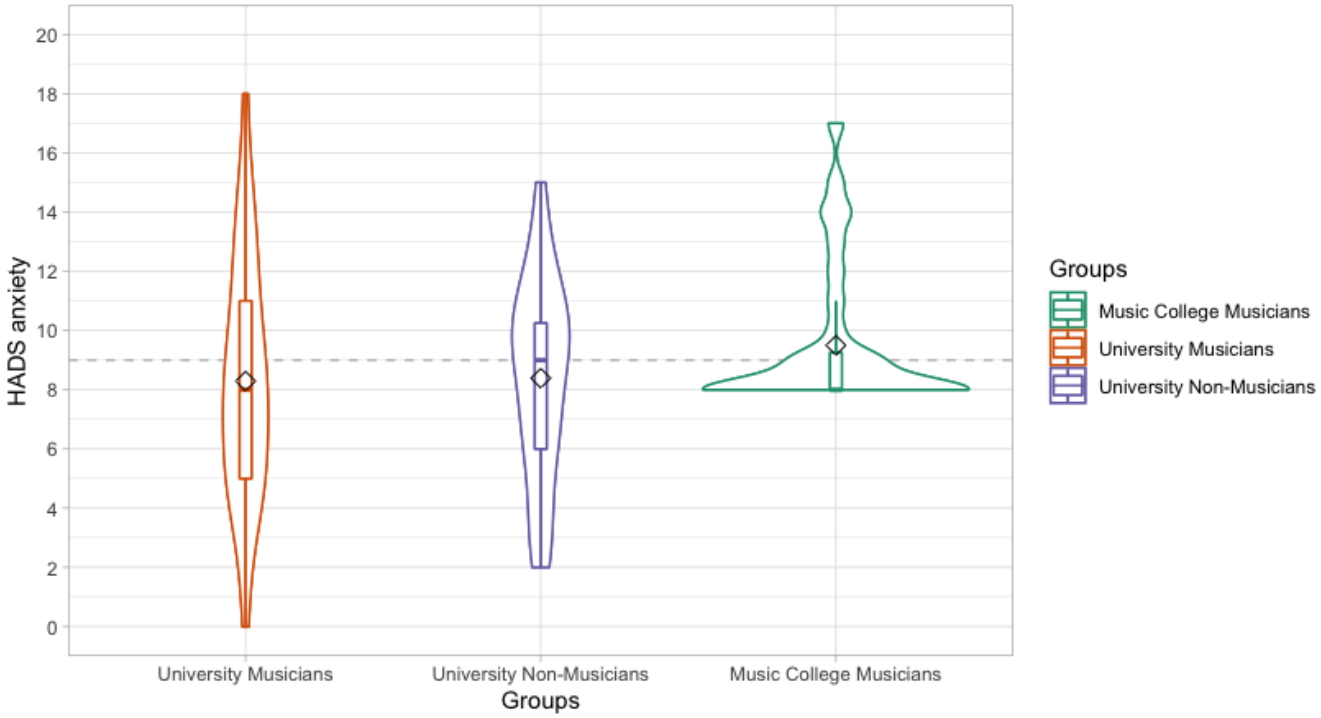

Figure 4.3: Violin plot for anxiety representing the group distribution for music college musicians university musicians and university non-musicians, including box plot, mean points [diamond shape] and a dotted cut-off line for significant depression at 9, Study II

Millar et al., 1995; Balsamo, Cataldi, Carlucci & Fairfield, 2018). The STAI mean score for music college participants was 43.23 (see tab 4.5).

Table 4.5: STAI, total scores, music college students, Study II

	Mean	**SD**	**Prevalence**
Total Score	43.23 (28/66)	8.97	-
% over 44 points	-	-	40%

Accounting for the empirical cut-off points, this means that music college participants' anxiety levels were over the cut-off point of significant symptoms of anxiety (40), and slightly below those of people in imminently stressful situations, such as pre-operative patients with anxiety disorder (44). This could either mean that music college participants have a higher tendency towards anxiety, and/or that the music college environment is particularly stressful. While the STAI was a strong predictor for both pain catastrophising ($r_s(29) = .683$, $p < .001$) and sleep disturbance ($r_s(35) = .421$, $p = .03$), indicating that these scales were a good

choice, neither of these two scales showed high results. This means that despite sleep being an overall good predictor, music college musicians were not particularly prone to anxiety based pain catastrophising or sleep problems.

In summary, and in response to research questions two and three, music college musicians showed a significantly higher depression prevalence compared to both groups from Study I, which was in line with the hypothesis for this variable. However, the significantly lower anxiety prevalence as shown by the HADS and the mean score from the STAI, do not indicate that music college musicians suffered from high anxiety, supporting hypothesis 2(ii). The STAI anxiety results rather suggest that music college musicians have a higher tendency towards anxiety compared with the normal population, most likely based on living in a more stressful environment.

Professional identity

MIMS measures the level to which an individual identifies with the music profession. Four individual scores are taken into account: self-identity, social identity, negative affectivity, and exclusivity. Additionally, practice time (years and days of practice) were included here using a subscale of the GOLD-MSI. The individual MIMS subscales show the degree of influence of the musicians' perception (evaluation and interpretation of the role), the level of social relationships, and the level of support. The following results section will first look at Study II results, and then compare them to Study I results. The aim is to see if (or where) differences can be found between college and university musicians. This analysis, guided by the research question no 4 and specific hypothesis for this variable (see 4.1). It will, thus, look into if and how practice time influences the degree of professional identification, and lastly if specific instruments change the degree of professional identification. A breakdown of all MIMS scores can be found in table 4.6. The mean for the total score was 49.11 points, with a possible maximum score of 70. As a reference, professional elite college athletes usually average around the 40 point mark (Brewer, Van Raalte & Linder, 1993). As Table 4.6 shows there is a difference between music college musicians and university musicians in the total score.

Table 4.6: Musicians Identification Measurement Scale (MIMS), mean and standard deviation (SD) of the full score and all subscales (self identity, social identity, negative affectivity and exclusivity) for music college musicians and university musicians, Study II

MIMS	College musicians		University musicians	
	mean	SD	mean	SD
Total score	49.11	10.42	32.50	16.63
Self-identity	11.71	2.88	7.22	4.20
Social identity	9.88	3.17	5.90	3.37
Negative affectivity	8.31	2.37	6.80	4.59
Exclusivity	10.00	3.12	9.08	4.97

Note: Higher means for the total score indicate a stronger identification with the role of a musician.

Since normality could not be assumed (significant Levene's test), a Mann-Whitney U-test determined a significant difference for the MIMS full score, between university musicians/students and college students, with a large effect size ($U = 856.0$, $p = .001$, *rank-biserial correlation* (effect size) = .57). The question then was, if all sub-scales showed a difference or only some. Bonferroni corrections were added to safeguard against multiple testing, and only the MIMS subscales self-identity ($U = 853.0$, $p < .004$) and social identity ($U = 588.0$, $p < .004$) were significantly higher. Negative affectivity ($p = .4$) and exclusivity ($p = .5$) did not differ significantly, which can also be observed (see figure 4.4). Figure 4.4 demonstrates which subscores changed the total score, specifically highlighting which subscales showed a significant change. This means that in terms of professional identification, and in response to my research question number four, there are significant differences between being a musician studying at music college, and a musician studying at university. While the overall score was significantly different between groups, the contributing subscales were self identification (i.e. considering oneself as a musician) and social identification (i.e. most friends are musicians). Negative affectivity (i.e. feel depressed if perform poorly) and exclusivity (i.e. music is the most important thing in my life) did not differ significantly between groups.

Next, guided by my hypotheses for this variable (p. 157) I looked at how the amount of time spent practising influenced the level of professional identification. MIMS full score and the difference in years invested into practising were weighted

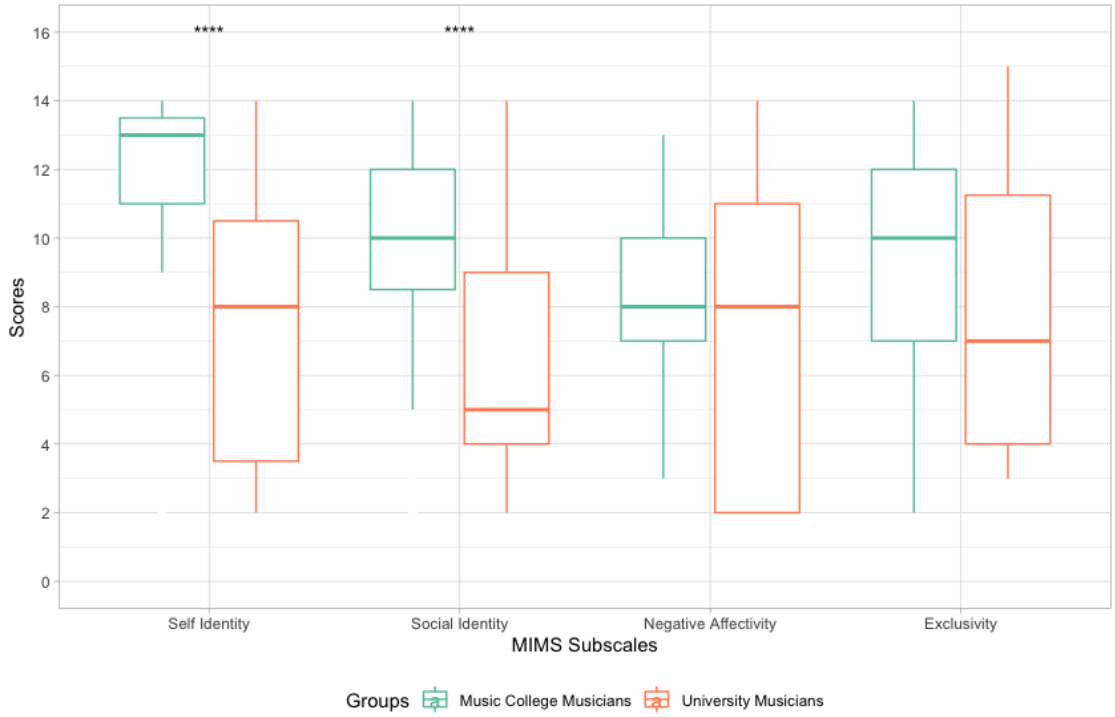

Figure 4.4: Boxplot for MIMS subscales [self-identity, social identity, negative affectivity and exclusivity] comparing music college musicians and university musicians, significant differences marked by asterisks, Studies I and II

Note: all other figures for this variable are placed in the Appendix not to disrupt the reading flow

by daily practice time (see fig. A.5, p. 326). The biggest differentiator between participants belonging to the various institutions was the amount of practice time per day. Even though college students invested more years overall into their instrumental practice, this variable was not significant ($p = .5$). However, college students also spent a significantly higher amount of time each day practising their instrument, compared to university musicians ($U = 990.5$, $p < .001$, *rank-biserial correlation* (effect size) $= .88$).

Table 4.7: GOLD-MSI results for college music in comparison to university music students, including regular practice time, daily practice, music theory lessons, formal training, attending concerts, and attentively listening to music, Study I and II

	College musicians	University musicians
Regular practice time[1] (in years)	4.8	4.25
Regular practice time (hours per day)	6.14	2.45
Music theory lessons (in years)	4.82	4.82
Formal instrumental/vocal training (in years)	6.11	4.74
Attending live concerts (member of audience, during past year)	5.35	3.22
Attentively listening to music (average per day)	30-60min	30-60min

[1]Note: GOLD-MSI gives a range not an exact number

The next hypothesis to investigate was how practice time and professional identity change over time, weighted by practice time in years (see fig. A.6, 327). This point was crucial to check on the point made in Study I, if university musicians could be labelled 'musicians', especially given the fact that not all of them were studying music. Investigating this aspect adds another layer. When pooling the data, not dividing participants by groups as in the above figure with a fact grid, a gap was noticeable after 2 years of practice. Around that time, participants associated more with being a musician than before (see fig. A.7, p. 327). One reason might be that it takes a certain amount of time to master the basics, and to be ready to perform alone or join others in a band or orchestra. A similar pattern can also be observed for daily practice, where shorter practice times went together with lower MIMS scores. This means that independently from the institution, participants practising their instruments for more than 2 years and more than 1 hour per day, had higher identification scores compared to those investing less time in their instruments. For daily practice, the increase appeared more linear than for the number of years practised. The level of professional identification was not determined by studying at university or music college, but by the time spent practicing.

The last hypothesis for this variable was that players had different levels of professional identification based on the instrument they play. Here, instruments were divided into eight groups (upper strings, strings, woodwind, brass, drums, guitar, piano and voice). Since normality was not found satisfactory (Levene's test $p < .001$), a Kruskal-Wallis test[5] found no significance ($p = .06$). Results to the question of identification levels and the instrument played, showed: the possibility that there could be a difference in identification depending on instrument groups, similar to athletes. If this test would have been significant, the most promising group comparison would have been between drums and upper strings, which would have been in line with the literature (Williamon & S. Thompson, 2006).

Focusing now on the research questions, results for this variable showed that music college musicians had a significantly higher total professional identity score compared to university musicians from Study I. However, contrary to what was anticipated, only the subscales of self and social identity were significantly higher, while the others remained constant compared to participants in Study I. These subscales with higher scores are judged to be resource developing, or in other words, have a positive impact on depression. Music college musicians invested more time into daily practice, while the number of years practiced was similar to that of university musicians in Study I. The latter had not been anticipated, since the hypothesis was that music college musicians would have invested more practice time, both in years and per day. However, findings from Study II allowed the conclusion that professional identification levels were not determined by the choice of the institution (e.g. studying at university or music college), but by the time practiced. Lastly, there was a trend towards different instrument groups showing different levels of identification. While it is always difficult to comment on a trend, the same had been previously observed by (Gembris, 2008), and therefore should be mentioned in this context, as it further adds to the body of knowledge indicating that high string players are more exposed to possible depression than other musicians.

[5] the appropriate non-parametric test to compare one numeric and one factorial variable

Table 4.8: Cambridge Depersonalisation Scale (CD-9), results for music college musicians, university musicians and university non-musicians, mean, standard deviation and prevalence, Studies I and II

CD-9	**College musicians**			**University musicians**			**University non-musicians**		
	mean	SD	prevalence	mean	SD	prevalence	mean	SD	prevalence
Full score	28.6	6.39	-	32.06	16.42	-	32.9	17.67	-
CD-9 duration	16.23	28.6	-	14.61	6.00	-	15.03	7.56	-
CD-9 frequency	7.80	1.4		17.9	10.73	-	17.86	10.29	-
Prevalence $\geq$ 19	-	-	93.3%	-	-	100%	-	-	90%
Prevalence $\geq$ 35	-	-	36.6%	-	-	43.48%	-	-	40%

Note: Higher means indicate more depersonalisation symptoms.

Depersonalisation

Depersonalisation, as measured by the CD-9, is one way of looking into emotion processing. The key symptom of depersonalisation is described as feeling emotionally distant, for example 'feeling as if I was a robot/someone else'. As discussed in Study I, depersonalisation is a particularly interesting phenomenon in adolescents. Age is a crucial variable when looking at depersonalisation, and so the age mean was re-calibrated based on the participants who completed this part of the questionnaire. The re-calculated age mean was 21.3 years, which is lower than Study II's overall age mean of 27. This lower age mean allowed a direct comparison with Study I results. Music college musicians experienced depersonalisation less compared to the two other groups (CD-9 mean score for music college musicians: 28.6, for university musicians: 32.06, and for university non-musicians: 32.9 (see tab. 4.8 and fig. 4.5). Looking into the two CD-9 subscales, depersonalisation episodes for music college musicians were less frequent, but longer in duration compared to the two other groups in Study I.

Similar to the HADS, the CD-9 scale doesn't lend itself to a discussion of the mean in isolation. Three cut-off points are of significance for this scale: $\geq$ 19 (mild), $\geq$ 35 (moderate) and $\geq$ 90 (severe) depersonalisation (Michal, Beutel & Grobe, 2010). For this study, exactly as for Study I, only the first two cut-off points will be taken into account as the top score for the CD-9 in Study II was 62. As a reminder, the cut-off value refers to the point from which an individual can be considered

as significantly (or clinically) affected. Depersonalisation usually comes in phases. At a score of ≥ 19 depersonalisation starts to be clinically significant, indicating a mild depersonalisation. With an increase of frequency and duration of phases, depersonalisation becomes more severe (starting from ≥ 35). At a total score of ≥ 90, depersonalisation is no longer transient but becomes a permanent state. As shown in fig 4.8, music college musicians' full score did not exceed 62 compared to a high score of 70 for university musicians, and 89 for university non-musicians.

As laid out in the hypotheses for this variable (see paragraph **??**), six sub-points guided the investigation. These either grew out of, or where rolled over from, Study I: (1) investigating a linear increase of duration and frequency in this age group, (2) the difference between groups, (3) a possible relationship of depersonalisation with anxiety, especially for scores that were ≥ 35, (4) the impact of dysfunctional coping strategies (e.g. coping, negative affectivity, substance intake and non-stable relationships) on depersonalisation, (5) the impact of daily practice on depersonalisation, and (6) the impact of age on depersonalisation. There was a linear increase of depersonalisation, both in frequency and duration, which has until now - as noted in Study I - not been as thoroughly tested for adolescents compared to adults (see Fig. A.8). This linear increase indicates that adolescents experience depersonalisation in the same way as adults, and that the CD-9 is a valid instrument to measure it for this age group. Are depersonalisation scores different depending on the group (music college students, university musicians, non-musicians)? The data was screened for normality and found satisfactory (Levene's not significant). A between subjects ANOVA was used to analyse the difference in duration of depersonalisation episodes, and the group means were found to be significantly different ($F(2, 91) = 6.0$, $p = .004$, $\eta^2 = .11$). A post-hoc analysis found that music college musicians were different from both university musicians ($t(62) = -3.210$, $p = .006$, $d = .81$) and non-musicians ($t(64) = -2.63$, $p = .003$, $d = .72$). As could already be seen in fig. 4.5, the groups experienced depersonalisation in a different way, with music college musicians experiencing the longest durations and university non-musicians the highest frequencies of depersonalisation episodes.

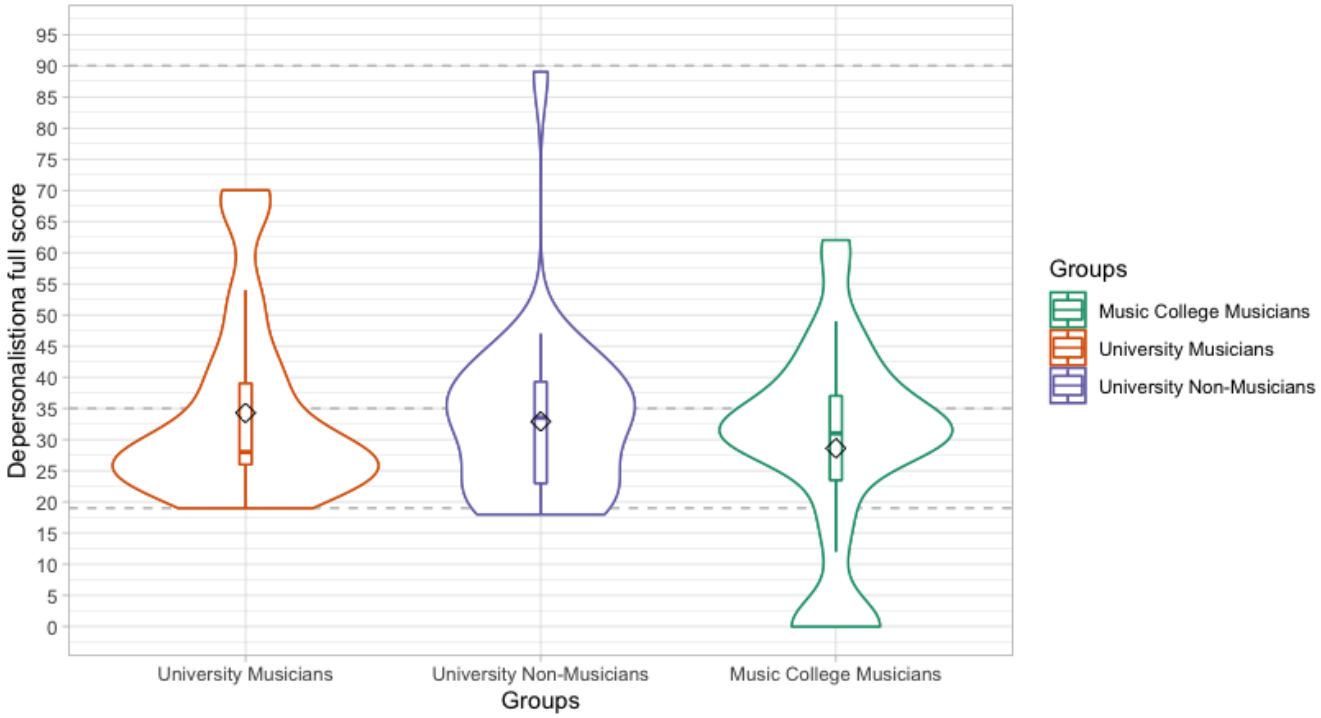

Figure 4.5: Violin plot for depersonalisation representing the group distribution for music college musicians, university musicians and university non-musicians, including box plot, mean points [diamond shape] and a dotted cut-off line for significant depersonalisation phases at 19, 35 and 90, Studies I and II

Point three investigated a closer connection between anxiety and depersonalisation among Study II participants. This was done by comparing depersonalisation in the CD-9 and anxiety in the STAI, as well as pooling HADS results from Study I and Study II into two groups (19-34 and ≥ 35). The reason for doing this was that Sierra, Senior et al. (2002) found that anxiety disorders were significantly higher between CD-9 scores of 19-35. As Study I did not find a significance, the question here was if more data was required for significant findings, or if the HADS was not the optimal tool in this respect. Both the HADS and the STAI correlated with the CD-9 subset scores: STAI and the total depersonalisation score ($r_s(35) = .36$, $p = .04$), and the pooled data from Study I and II HADS anxiety questionnaire $r_s(29) = .24$. Both scales showed that that low scores of depersonalisation could be used as extra indicator for anxiety, also in this environment, as intended by the CD-9 authors.

Point four investigated the relationship of depersonalisation and dysfunctional

coping strategies. Especially in this age group, dysfunctional coping is found with emotional processing (or not-processing in case of high CD-9 scores), and has been used to predict long term higher propensity for depression. Figure 4.6 shows that a higher frequency and duration of depersonalisation also influenced dysfunctional coping (or vice versa).

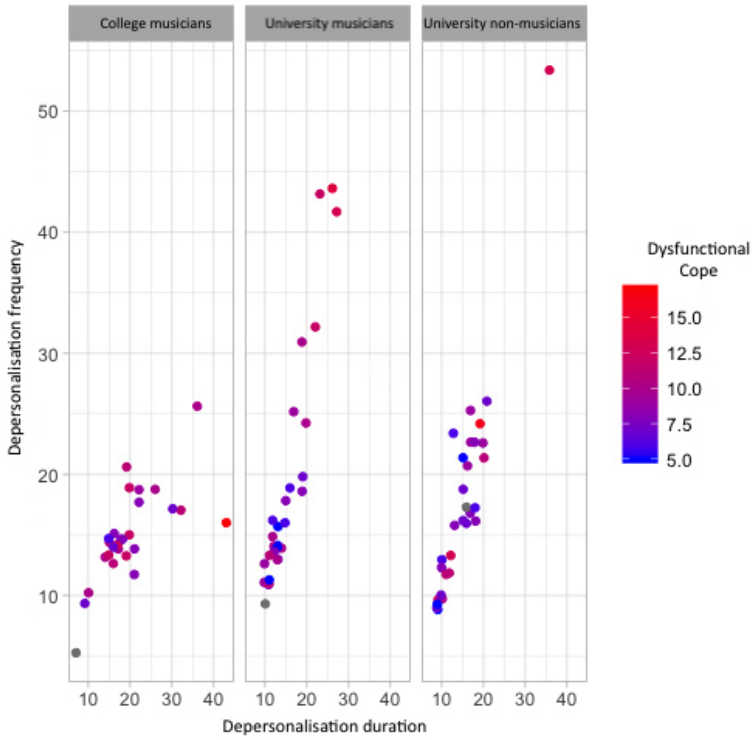

Figure 4.6: Depersonalisation duration and frequency weighted by dysfunctional coping strategies [blue = low dysfunctional score, red = high dysfunctional score] for music college musicians, university musicians and university non-musicians, Studies I and II

Using depersonalisation as a predictor for dysfunctional coping returned a significant result ($F(1,\ 55) = 19.6,\ p < .001,\ R^2 = .27$). As a comparison, the sub-scale negative affectivity, which also comprises some dysfunctional coping strategies, was not significant ($p = .06$). Neither relationship status, substance intake nor age (point six), also predictors, were significance here. This might be due to the way that reporting substance intake is perceived in this environment or that participants were too close in age.

The last point (five) looked at the question born out of Study I, if daily practice influences emotional processing as defined by the CD-9. Daily practice showed a

significant correlation with depersonalisation ($r_s(29) = .22$, $p = .03$) (see fig. A.8). This was an increase from showing only a simple trend in Study I, indicating that the amount of hours practised could have a significant influence on depersonalisation. Concluding in the context of research question 3, as hypothesised, linearity of frequency and duration of depersonalisation showed that the CD-9 was a suitable instrument for this age group and environment. Also as expected, dysfunctional coping strategies scored higher than in Study I: where they had been a trend in Study I, they were a significant predictor for depersonalisation in music college students in Study II. The reason for this could be slightly more elevated dysfunctional coping strategies for music college musicians compared to Study I participants. Study II also confirmed that CD-9 scores between 19-35 could be used as an added indicator for anxiety related problems. The STAI emerged as a better choice of a complimentary anxiety questionnaire. As hypothesised, depersonalisation was experienced significantly differently by music college musicians, university musicians and university non-musicians. Music college musicians experienced fewer overall depersonalisation episodes compared to university musicians and non-musicians. Music college musicians also experienced the longest durations of depersonalisation episodes compared with both other groups from Study I, while university non-musicians showed the highest frequency of episodes. It is possible, although speculative as it has not been investigated previously, that practicing an instrument/singing helps with emotional processing in adolescence. Depersonalisation still remains a mystery variable, as it is difficult to see where exactly it would fit within a larger depression model. It is nevertheless worth investigating in a musician population and in a depression context. Especially the fewer depersonalisation episodes, as found in music college musicians, could be seen as predictors for better wellbeing and lower depression risk. This would mean that indeed playing an instrument not only has a direct impact on depression, but also has an indirect impact via depersonalisation - and in the long term.

Coping

Coping strategies are measured by the Brief Cope, which divides them into three categories: active-functional, cognitive-functional and dysfunctional coping strategies. Analysing coping strategies can help to interpret other variables such as depression, anxiety or pain - which essentially can be viewed as stressors leading to a certain way of coping. The question here was if there were (significant) differences between groups that would help to further define each group in terms of coping strategies.

Table 4.9: Brief Cope, results for music college musicians, university musicians and university non-musicians, mean and standard deviation, Studies I and II

Brief Cope	**College musicians**		**University musicians**		**University non-musicians**	
	mean	SD	mean	SD	mean	SD
Active-functional	21.65	4.60	21.55	4.32	20.54	7.11
Cognitive-functional	19.10	5.69	17.24	5.60	15.96	4.88
Dysfunctional	9.65	2.64	8.65	2.53	8.53	2.72

Note: Higher means indicate better coping, with the exception of dysfunctional coping.

An ANOVA found no significant difference between groups in active functional cope ($p = .6$), cognitive functional cope: ($p = .2$) or dysfunctional cope ($p = .7$). This means that all groups had a (relatively) healthy approach to coping with stress and/or problems and favoured an active approach (e.g. actively looking to overcome a problem, asking for help) over a cognitive one (e.g. finding the positive aspect in what happened). In terms of depression, this shows that all groups have the ability to to cope relatively well with depression when they are affected.

Pain

Reflecting current knowledge about the multifactorial pain concept, the Örebro questionnaire measures pain catastrophising. To summarise briefly, this questionnaire measured one fear-avoidance strategy, thus it informs about how the perceived pain is processed. Two individuals perceiving a similar amount of pain (e.g. rated 8 out of 10) for a similar amount of time can have two different pain catastrophising results. The person with a high pain catastrophising score can be left crippled,

while the other with a low pain catastrophising score, will be able to pursue their life goals. Pain catastrophising is one crucial variable in chronic pain, especially in regards to strategies promoting prevention or enhancing quality of life and wellbeing see paragraph 2.2.10, p. 44 for more details about pain)

For this study, all cut-off scores are as requested by the authors: low-risk cut-off scores at $\geq$ 105, moderate one between $\geq$ 105 and $\leq$ 130, and high-risk ones at $\geq$130. As a reminder, when used as a screening tool in primary care, the recommendation for individuals reaching a low cut-off of $\geq$ 105 is to be referred to a psychologist/psychiatrist for further assessment. This means that these individuals are most likely to accept help and should therefore be encouraged. This is pertinent when considering that individuals with a high score are most likely to reject help, and therefore will likely retire prematurely due to pain problems. The Örebro has a success rate of over 70% in predicting if individuals' wellbeing and life will be affected by pain problems within the next 6 months.

Although the Örebro is not intended for descriptive pain perception, the first questions of the questionnaire can be used to provide an overview of whether and how long pain has been perceived. As in Study I, the reason to deconstruct the questionnaire in this way is to get an idea of (a) perceived pain, (b) the duration of pain, (c) how pain was rated, and, specifically for Study II, (d) variables that distinguished the groups. This section will give an overview of how pain was perceived by Study II participants, and then go on to investigate if and where the groups differ. Table 4.10 shows that pain is mostly perceived in the neck and shoulder region. The results are about 35% higher compared to both groups from Study I. Back pain, which was anticipated to be higher in this group, matched the numbers from both groups in Study I. Again, the Orebrö was not conceived to pick up exact pain perception. The main insight from this table is that music college musicians perceived pain for a longer period (12 months or more) compared to both groups in Study I.

Table 4.11: Orebrö [pain catastrophising], results for music college musicians, university musicians and university non-musicians, mean, standard deviation and prevalence, Studies I and II

Orebrö	College musicians			University musicians			University non-musicians		
	mean	SD	prevalence	mean	SD	prevalence	mean	SD	prevalence
Full score	84.22	23.32	-	73.97	25.41	-	80.54	30.27	-
Prevalence ≥105	-	- 13.3%	13.79%	-	-	24.13%			
Prevalence ≥130	-	-	0%	-	-	3.4%	-	-	10.34%

Note: Higher means indicate more symptoms of pain catastrophising.

Table 4.10: Orebrö sub-score for descriptive pain perception, multiple options were possible for each question, as an individual might have pain in several body parts at the same time, Study II

Pain	College musicians
Neck[1]	53%
Shoulders	53%
Arms	7%
Upper back	28%
Lower back	21%
Legs	7 %
Other	10%
No pain	17%
Duration past week rated 5+[2]	35%
Duration past 3 months rated	28%
From that how often 5+ pain	42%
Duration of pain beyond 3 months	53%
Duration of pain beyond 12 months	39&

[1]Multiple options possible
[2]Pain rated from 1-10; 10 being as bad as can be.

39% of music college musicians perceived pain for 12 months or longer, compared to 32% of university musicians and 22% of university non-musicians. The average time that pain was perceived was 20.2 weeks, no matter how high it was rated. This is similar to university non-musician group in Study I. However, the tendency to dramatise pain was lower in music college musicians compared to the two other groups, as shown in the Orerbrö full score (see tabs 4.11 and fig. 4.7.

There was no significant difference in moderate pain catastrophising between groups, however, there was a significant difference in high pain catastrophising ($\geq$ 130) between music college musicians and university non-musicians ($z = 1.94$, $p = .05$). However, looking at the distribution in fig. 4.7 and tab. 4.11 the difference between groups becomes obvious. While slightly more music college musicians

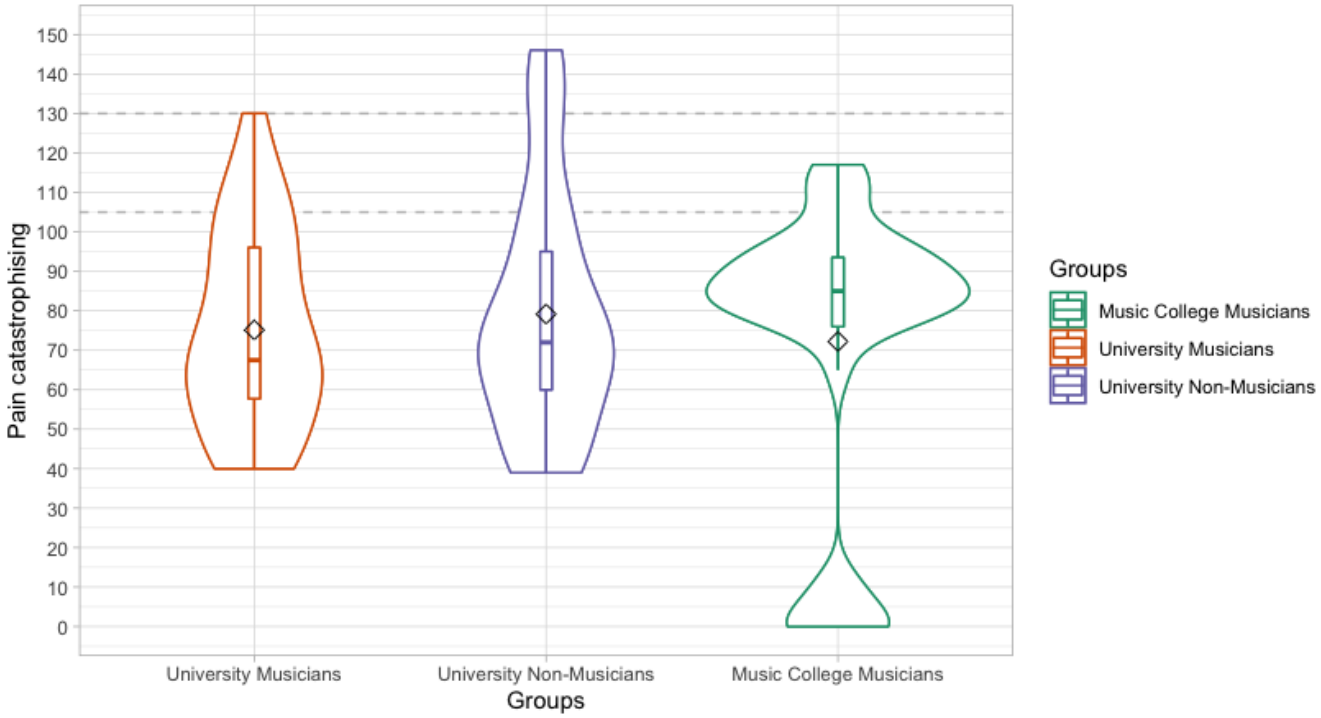

Figure 4.7: Violin plot for Orebrö [pain catastrophising] representing the group distribution for music college musicians, musicians university musicians and university non-musicians, including box plot, mean points [diamond shape] and a dotted cut-off lines at $\geq$ 105 for moderate and at $\geq$ 130 for high pain catastrophising, Studies I and II

(.4%) were over the moderate cut-off point compared to university musicians, considerably fewer of them (10.8%) scored over the moderate cut-off compared to non-musicians. No Study II participant scored over 117.

These findings suggest that both music college musicians and university musicians have learned to evaluate pain differently compared to university non-musicians. This runs contrary to the expectation that people who experience more pain for longer periods will also catastrophise more.

This unexpected result warrants a closer investigation of the individual variables in the Orebrö score (see tab. 4.11, tab.3.8 and fig. 4.7). In order to explore the differences between groups, the Orebrö questionnaire was deconstructed to its individual questions, enabling me to compare lengths of pain and those items investigating pain processing. Items covered missing work days due to pain, monotony at work, being tense, depression due to pain, fear of chronicity, job satisfaction and sleep. In addition to the lengths of perceived pain during the last 3

months (see fig A.9), two items emerged as significant differences between groups: (a) sleep and (b) missing days of work due to pain. All items were assessed on a 1-10 Likert scale with 1 = not at all, 10 = all the time.

Perceived length of pain data was not found satisfactory for normality (Levene's test significant, p =.001). Therefore a Kruskal-Wallis test was performed which found a significant difference (Υ^2 (2, N = 92) = .206, $p < .001$ (2.698e-05). This is indicative of a large effect between groups. A post-hoc (dunn test) found that the length of pain perceived by music college musicians was significantly different to that perceived by university musicians $t(58) = 5.87$, $p < .001$, $d = .3$ and university non-musicians (t (61) = 6.0 , $p < .001$, $d = .4$[6]).

For the variable sleep, results data was screened for normality and found satisfactory (Levene's not significant). A between subject ANOVA was used to analyse the difference between groups of sleep loss due to perceived pain. The groups were found to be significantly different ($F(2,92) = 3.39$, $p = .03$, $\eta^2 = .06$). A post-hoc analysis found that music college musicians lost significantly less sleep due to pain compared to university non-musicians ($t(61) = 2.26$, $p = .05$, $d = .62$).

Data on missing days at work was then screened for normality and not found satisfactory (Levene's test significant $p = .001$). A Kruskal-Wallis rank sum test was performed, which did not return significant results ($p = .07$). In summary, even though music college musicians reported more pain for a longer period of time, compared to both groups in Study I, they were significantly less prone than the other two groups to catastrophise pain, i.e. returned the lowest prevalence of suffering from catastrophising pain. This finding reflects the hypothesis for this variable and is particularly remarkable when taking into account the duration of pain experienced, as well as the high pain scores. The individual variable of importance that distinguished music college musicians from the groups in Study I was sleep disturbances. In terms of depression, this variable demonstrates that the higher depression score cannot be based on pain catastrophising, since these results show that pain was processed in a healthier way compared to university

[6]Cohen's d not accurate

non-musicians. In other words, university non-musicians are more likely to suffer from depression based on an unhealthy way of processing pain, even though they perceived pain for significantly less time compared to music college musicians.

Managing Stress

37% of participants reported being affected by pain while playing, but did not further elaborate on how (psychologically, physically or both). 31% of music college musicians reported taking substances, 68.6% did not report taking substances in response the main question (use of substance: yes/no), but despite this some of them went on to give details about their specific drugs of choice. One minor change from Study I to Study II was that a wide variety of options were offered (including nicotine and other recreational drugs), which achieved slightly better results regarding information on individual choices.

Table 4.12: Disclosure of regular substances use for music college musicians (in percentage), Study II

Substances	College musicians
Not taking anything	68.57%
Analgesics, sedatives	2.87%
β-blocker	5.71%
Alcohol	11.42%
Other psychiatric drugs	5.71 %
Nicotine	8.57%
Other recreational drugs	5.71%

Stress relieving activities: As table 4.13 shows, college musicians as their university musicians counterparts in Study I fight prefer active stress coping methods.

Table 4.13: Actively relieving stress options practiced regularly that means at least once a week for the past two months for music college musicians, Study I

Act. Rel. Stress	College Musicians
Sport, yoga or similar	85%
Meditation/prayer	14%
Alexander technique or similar	14%
Reached out to prof. help	14%
No activities	15%

The main difference between participants from Study I and II was that Alexander Technique was not as widely practised by music college students (Study II). Alexander Technique was exclusively practised by students from the UK or US, or students from other nationalities studying in the UK or US. In summary, music college musicians reported that they were fighting stress in a more active way. The slight change in correlations to certain variables (e.g. no correlation with coping strategies) and the surprisingly low pain catastrophising score in combination with a high pain perception score, point towards music college musicians dealing with pain in a slightly different way compared to both groups from Study I. These unexpected findings are difficult to interpret without the possibility of asking further questions, as they stand in contrast to relevant pain literature, where the general assumption is that higher pain perception equals higher pain catastrophising. The only tentative conclusion we can draw here is that practicing an instrument for longer - both in terms of years and time spent per day - makes a difference in how chronic pain is (subconsciously) processed. The surrounding variables (e.g. low anxiety score, few sleep problems) and other mechanisms used in pain catastrophising, in so far as they were investigated by the questionnaire, were in congruence with general chronic pain literature (e.g. no lack of sleep, fewer missing days at work). Therefore, these results do not speak for an error in measurement. Further studies need to investigate this phenomenon more closely, which, if it can be replicated, would have implications not only for musicians, but also for general chronic pain literature.

Sleep

The Pittsburgh Quality Sleep Index (PQSI) investigates sleep quality of the last four weeks, with subscales looking at the subjective quality of sleep, sleep latency, duration, efficiency, disturbances, sleep medication and daytime dysfunction (e.g. tiredness during the day). The main reason to explore the quality of sleep in this study was to investigate the relationship between sleep and depression. One symptom of depression is an increase in sleep or, in a manic phase, a significantly reduced need for sleep. This statement is slightly simplifying depression in order

to make a point. In terms of a depression, there is a possible diagnose of 'atypical depression'. This type is associated with a reduced need for sleep and is not considered manic.

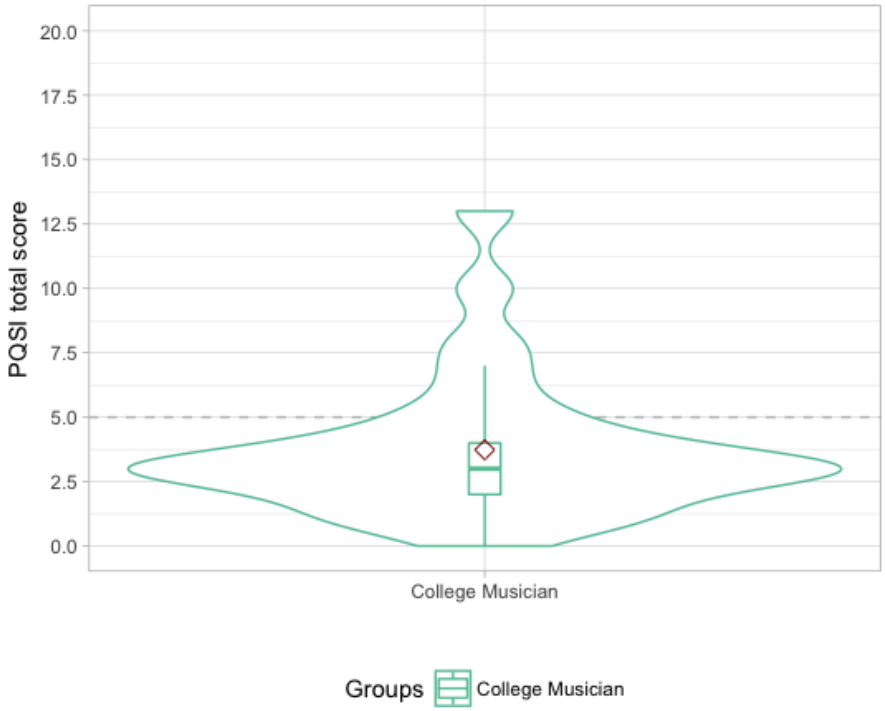

Figure 4.8: Violin Plot for Pittsburgh Quality Sleep Index, including box plot, mean points [diamond shape] and a dotted cut-off lines at 5 separating good from bad sleepers, Study II

While there is no mandatory cut-off separating 'good' from 'bad' sleepers, an empirical cut-off value of 5 is generally used as a guide, defining results over 5 as 'bad sleepers'. As can be seen in both Table 4.14 and Figure 4.8, at 3.4 the group's mean is below the cut-off point for bad sleepers.

Table 4.14: Results for the Pittsburg Quality Sleep Indey (PQSI), total scores and all subscores [subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, sleep medication and daytime dysfunction] college students, Study II

PQSI	**mean, min/max**	**SD**
Total Score	3.37 (1/13)	2.77
Subjective sleep quality	0.24 (0/2)	0.42
Sleep latency	0.50 (0/1)	0.51
Sleep duration	0.44 (0/3)	0.81
Sleep efficiency	0.80 (0/3)	1.21
Sleep disturbances	0.77 (0/2)	0.50
Sleeping medication	0.33 (0/2)	0.67
Daytime dysfunction	0.55 (0/2)	0.57

The hypothesis for this variable was that high scores in sleep related problems, especially sleep problems such as early morning wakening, would be linked to high scores of depression and anxiety. In fact, participants with a PQSI score over 5, which separated good from bad sleepers, also had significant depression scores (≤ 9). There was a strong correlation between daytime dysfunction (the need to sleep/nap during the day) and depression ($r_s(29) = .91$, $p = .001$), indicating that the need for increased sleep, especially during the day, pointed towards a possible depression. Bad sleeper participants had high scores in pain catastrophising and anxiety - both in the HADS questionnaire and the STAI - and low dysfunctional coping scores. However, with a mean of 3.37, and thus 1.6 points under the cut-off for bad sleepers, and a prevalence for bad sleepers of 10%, music college musicians were less at risk of depression based on sleeping problems.

Predicting depression using modelling

Hierarchical multiple regression modelling

Model 1

The variables for this model were (HADS) anxiety, pain catastrophising and client (professor/teacher) burnout. The overall model was significant: $F(3,87) = 33.33$, $p < .001$, $R^2 = .535$. All individual variables were significant: anxiety ($b = .58$, $t(87) = 10.7$, $p < .001$, $pr^2 = .568$), pain catastrophising ($b = .015$, $t(87) = 1.67$, $p < 001$, $p^2 = .031$) and client (professor/teacher) burnout ($b = -.25$, $t(87) =$

-1.72, $pr < 001$, $pr^2 = -.035$). Anxiety emerged as the strongest predictor. With every 1 unit increase in depression, the model predicted a .58 increase in anxiety. Both pain catastrophising and professor/teacher burnout predicted depression with approximately similar strength, but both were weaker predictors compared to anxiety. Burnout, however, returned an inverse score, suggesting that the higher the burnout score would be, the lower the depression score would become. This is in line with the most recent publications suggesting that, while burnout was a separate condition to depression, both were related.

Model 2

This model added the professional identification full score to the model. The model here was equally significant ($p <.001$). However, this only demonstrates that R^2 is greater than zero. The question for this calculation, however, was if adding the variable 'being a musician' significantly improved the model or does adding the variable 'being a musician' help to better predict depression? The comparison of both models with an ANOVA showed that this was not the case: $\Delta F(1,86) = 2.50$, $p = .11$. Moreover, the 'being a musician' variable was not significant within the model ($p =.1$). Furthermore, the levels of predictability of the individual variables within the model changed with this addition. While anxiety and professor/teacher burnout increased in importance (anxiety: $b = .58$, $t(86) = 10.8$, $p < .001$,$pr^2 = .575$; professor/teacher burnout: $b = -.43$, $t(86) = -2.34$, $p = .02$, $pr^2 = -.06$), pain catastrophising became an insignificant predictor ($p =.06$). This was plausible, since musicians with the highest investment into music (e.g. music college students) showed the lowest levels of pain catastrophising despite a high level of perceived pain, suggesting that pain would have to be evaluated differently for musicians than non-musicians.

Tree model

Using a non-linear modelling approach, I calculated a tree model to predict depression, using all 21 variables: (HADS) anxiety, all four sub-scales of the professional identification scale, but not the full score, duration and frequency of depersonalisation, all three coping scales, pain catastrophising, all burnout

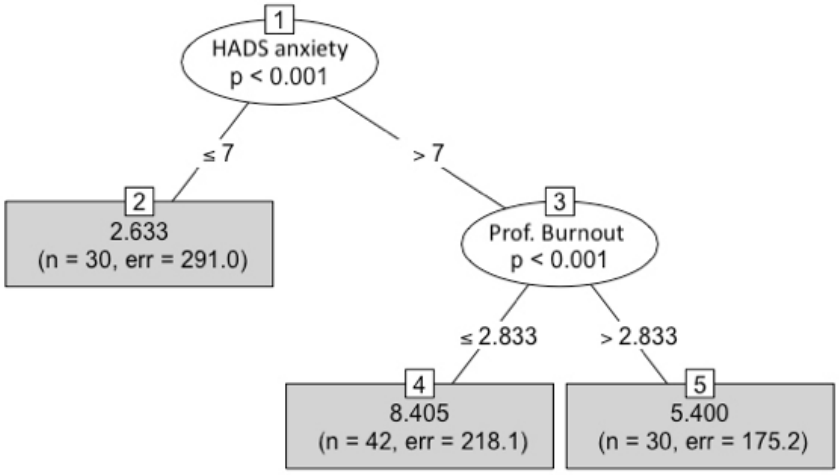

Figure 4.9: Tree model predicting depression, including probability and number of participants belonging to each branch [grey panel], Study II

Note: the tree model starts at the top [node 1], and offers 4 different possible outcomes, from which only node 4, a combination of [HADS] anxiety [> 7] with low teacher/professor burnout [≤ 2.8] predicts depression with a score of 8.4, which is almost significant. The cut-off for significant this study was at > 9

scales, stigma knowledge, practice time (total of years and per day), study courses (undergraduate, postgraduate at university/music college), age and family status. The result can be seen in figure 4.9.

The tree model can be understood starting at the top (node 1) predicting that (HADS) anxiety as the top predicted variable for depression, and follow the branches down to the final nodes. The significance is included in the node, while the score for the individual variables can be found at the bottom (grey panel). The most promising combination of variables can be seen in panel 4, a combination of (HADS) anxiety (> 7) with low teacher/professor burnout (≤ 2.8), which approaches significant depression with 8.4. The cut-off score for significant depression was here set at > 9. Hereby the tree confirms the result of the hierarchical multiple linear regression, namely that low burnout predicts high depression. The tree model did not find the variable 'being a musician' as a predictor for depression, regardless of the study institution or study course. In conclusion of all result sections and summarising the key points, depression prevalence did not differ between

student musicians and non-musicians if musicians of both studies were combined. However, split up into three groups there was a significant difference between music college musicians, with the highest depression prevalence, and university musicians with the lowest depression prevalence. Initially this seem to suggest that professional identification could play a role in depression prevalence. However, neither models found professional identification to be a significant variable. High levels of anxiety and low level of burnout with teachers/professors were found to be reliable predictors. While depersonalisation showed a connection to professional identification and the hours of daily training, it was not found to play a role in predicting depression, suggesting that it is either a moderator variable and/or requires the combination with other depression predicting variables. Despite the length of perceived pain, pain catastrophising was significantly lower in music college musicians compared to university non-musicians. This suggest not only that musicians process pain differently compared to university non-musicians, but also further underlines that pain perception in this age group is not limited to student musicians, but rather a more general problem. Moreover, the high levels of pain catastrophising in university non-musicians suggest that pain is a larger problem for this group than for student musicians.

In summary and in response to research questions number one and two, the results from Study I could be reproduced and there was a significant group difference in depression prevalence, however, not between musicians and non-musicians, but between music college musicians and both university groups. In terms of depression predictors, looking at individual variables first, all three groups, music college musicians and both university groups, showed a high anxiety prevalence and there was no statistical difference between groups. There was also no uniform distribution of anxiety between groups. More than half of the university non-musicians, or 55.5%, reported clinically significant anxiety, followed by music college musicians with 43.7% and university musicians with 40.6%. The general anxiety scale showed that music college musicians were most likely reporting high anxiety scores because of a stressful environment rather than based on psychiatric

illnesses. While there was a significantly higher professional identity in music college musicians compared to university musicians, only subscales found to be depression resource building, namely self and social identity, where significantly higher, while depression resource eroding subscales, namely negative affectivity and exclusivity, were not found to be much higher in music college musicians. There was a difference in the quality of depersonalisation between groups, with music college musicians experiencing the longest duration and the lowest frequency of episodes, and university non-musicians the shortest duration, but highest frequency of depersonalisation phases. Dysfunctional coping strategies significantly increased the overall risk of depersonalisation phases in all groups. Moreover, individuals scoring between 19-35 on the total depersonalisation scale, were also more affected by general (unspecific) anxiety. In this respect, the STAI as a general anxiety scale, showed more conclusive results than the HADS, which is more specific in terms of anxiety in depression. While it is always difficult to comment on a trend, it should be noted here nevertheless. Depersonalisation emerged in the literature as a predictor for both depression and dysfunctional coping in adolescents, and thus is not only a predictor for a short period of time, but also a life-time predictor (see, for instance, paragraph 2.4). Successfully learning how to manage emotions was a key point in this age group in terms of predicting future depression over the course of a life time. In this respect, both musicians' groups in Studies I and II showed better results than their university non-musician counterparts. It is possible that having learned an instrument/singing, and keeping up practicing/playing an instrument or singing, might have an impact on depersonalisation phases, emotion regulation and thus depression. As Studies I and II were, so far, the first studies to look at the impact of this combination of variables in a musicians' context, the resulting hypothesis needs to be seen with a critical eye. It should nevertheless be followed-up in future studies as this could help to establish a different layer of understanding regarding the impact of learning an instrument/singing in terms of mental health prevention. Moreover, if results from Studies I and II can be replicated, the results could emerge as answer to why depression declined in older musicians

while increasing in other stressful professions as shown by Voltmer, Schauer et al. (2008). The variable pain catastrophising (pain processing) declined in significance from Study I to Study II in terms of acting as a depression predictor for musicians. Music college musicians reported the lowest score in pain catastrophising of all groups. This is particularly notable, because their's was the group with most participants who reported the longest occurrences of pain (12 months and longer). This clearly shows that pain perception and pain processing are two separate variables that should not be conflated, as general pain literature has pointed out for some time. Consequently, this means that the variable pain perception has little validity on its own as a depression predictor, if at all. The variables sleep and coping strategies are congruent with the depression score, that means individuals with low scores of dysfunctional coping strategies, high active functional coping, high cognitive functional coping and who are good sleepers (scores below 5) also had low depression scores. High depression scores were reflected in the inverse scores on the aforementioned variables. In terms of combining the weight of variables in order to predict depression, clinically significant anxiety (in terms of the HADS) emerged as the best predictor for depression in both models. Neither model showed professional identity to be a specific predictor for depression. This applied to the full score in the hierarchical multiple linear regression as well as to all subscales in the tree model. The low score in burnout with professor/teacher that the tree model calculated as second pertinent variable to predict depression, showed that the environment has a considerable impact on the predictive value of depression. Individuals with high anxiety and low burnout scores with their professors or teachers are more at risk for depression compared to individuals showing high scores of any other combination of variables.

4.4 Discussion

The aims of this study, Study II, was to further add to the knowledge in investigating depression in students of higher education as well as how to better predict depression

in this environment using well documented predictors such as anxiety, depersonalisation, pain catastrophising, coping strategies, burnout and sleep. Depression prevalence was significantly higher in music college musicians when compared to university musicians, but not to university non-musicians. Professional identity increased with hours of practice, but not the years, which was contrary to the exception. Based on the higher number of hours daily practice by music college musicians, it was therefore significantly higher in music college musicians compared to university musicians. It also showed that the level professional identity depended on the number of hours spent on daily practice rather than on the institution. The higher number of hours practiced daily the in a high identity score, no matter which institution the participant was studying at. This was most noticeable after four hours of daily practice. However, neither models predicting depression found that professional identity was a significant predictor for depression. Depersonalisation was experienced differently in music college musicians compared to both other groups, suggesting that the number of hours practice might influences phases of depersonalisation. Depersonalisation and learning to regulate emotions have been found to significantly predict depression in later life. While depersonalisation results here were limited concerning depression, the results suggested that studying depersonalisation offers a different route to investigate depression for longitudinal studies. Pain perception and catastrophising was significantly lower in music college musicians compared to university non-musicians. Despite the fact that music college musicians perceived pain for longer, they rated it lower compared to university non-musicians. This result for music college musicians were reflected in the lower pain catastrophising results as well as in the low sleep results. Finally, predicting models identified high anxiety and low teacher/professor burnout to be the most promising combination to predict depression.

Similar to the discussion for Study I (see section 3.4), this section is composed of three parts: (a) professional identification with being a musician, (b) depression and anxiety, (c) variables that have been found to contribute or counteract depression (emotion processing, pain and sleep). However, as I was taking into account

the cumulative weight of the predicting variables to depression, larger models (hierarchical multiple regression and tree model) will be discussed in the appropriated place within the three sections. This make for a more succinct discussion and avoided unnecessarily repetitions.

Musicians or musicians?

While depression was the central focus of this thesis, the question whether participants can be considered musicians had to come first, similar to Study I (paragraph 3.4). While there are reasonable grounds to expect that music college students are musicians, we have to investigate how their professional identification level compares to student musicians from Study I, especially when conclusions about depression and anxiety scores are drawn based on professional identification subscale levels.

One of this thesis' central aims was to investigate professional identification, and if or how it may relate to depression and anxiety. Music science has not yet used the level of identification as a research variable to the degree that sports psychology has. However, in order to draw parallels between athlete and musician identity, the first challenge was to establish whether participants from Study I could be considered musicians, especially given the fact that not all of them majored on music studies. I concluded that Study I participants could indeed be considered musicians, see results (p. 116) and discussion (p. 132), no matter what their main study subject was. Using MIMS scores and the time invested in practising, university musicians compared to either amateur college athletes or elite college athletes who were not pursuing sports as a career. Results from Study II shed further light on the concept of identification levels in music students. Overall there was a noticeable increase in the identification level after about 2 years of having practised an instrument, and from 4 hours of daily practice, no matter which main study subject or institution. This might be due to the fact that it takes a while to master the basic technique of an instrument. However, students from a music college environment have been immersed in music to a higher degree, and, by studying in a specialised institution, have set their career goal more definitely as finding their

place somewhere in the music business - ranging from active musicians to music therapists to teaching music at schools[7]. This is also reflected in their total MIMS score, which is significantly higher compared to university musicians. Grove, Fish and Eklund (2004) point out that professional identity not only reflects a person's personal attitude but is also fed by the environment. They investigated players (basketball, field hockey and volleyball) before, during and after an all-star selection process, and found that the level of identification corresponded directly to being selected or not. This could explain the difference between university and college participants. Even participants majoring on music at university did not match the level of identification of those studying at a music college.

Research into sports identity observed that identification levels tended to be higher for team sports compared to individual sports (see Study I 132). This aspect is difficult to directly compare, since musicians mostly practice alone. This is in contrast to sports practice, where at least warm up exercises are more of a communal/social part of the day, while a musician will always play scales or other warm-up exercises alone. However, concerts or even competitions − with a few exceptions such as solo piano − are more of a team effort for musicians, while competitions or fixtures for athletes usually are clearly either a team or an individual affair. Sport is also almost always geared towards a goal, e.g. winning the game or race. In music, the goal varies from winning in a competition to performing at one's best in a concert or at times simply 'getting through the evening' and playing all the notes, as anecdotal evidence shows (more detail for this see paragraph 4.4). Observations of trends in larger orchestras and anecdotal evidence in larger and more prestigious orchestras, however, show that longtime members of these orchestras tend to form ensembles within or outside of their instrument groups, and report that playing in smaller groups boosted their morale and helped their music making to be more alive, avoiding a descent into routine (see Lucerne Festival Orchestra or Berliner Philharmonica). This is certainly an aspect that could be revisited in a

[7]see Study I p. 132 for other EU music teacher training

larger study, as it would help to understand how professional identification levels in musicians change with the environment they are in.

The most important aspect that MIMS contributed towards answering the question if musicians were more prone to depression than other populations could be found by investigating its sub-scores. When the scale was originally conceived in sports psychology, only the total score was used, and the concept of high levels of identification was associated with a domination of an athlete's life style choice, excluding all other other life roles, and thus fostering social isolation, decreased time with family and other network possibilities (Brewer, Van Raalte & Linder, 1993). Subsequent years of research found that this view was only partially accurate. A high total score on the professional identification scale can be broken down differently: e.g. high self and social identification levels can cause a high total score, even with low levels in the other sub-scales. Music college students had significantly higher identification levels than the other musicians' group, especially in the subscales self and social identification. This is important, because (a) these scales have been associated with a healthy approach and (b) the high scores appear to be particular to music college students. Neither the amateur nor elite college athletes identification sub-scores had the same level as those of musicians in both studies, which might point towards it being a variable particular to music. Studies using music as a tool, e.g. improving wellbeing for cancer (Burns, 2001), in pre- and post operative setting (Hucklebridge et al., 2000), in hospice (Pfefferle, 2005), or improving wellbeing of older adults (Korte, Perkins & Williamon, 2013), reported that it had a superior quality compared to sports. Participants who opted for music dropped out of the study less often, had better morale, and experienced less loneliness compared to control groups including those who chose sport/fitness (Cohen et al., 2007).

The other interesting factors were the comparatively lower negative affectivity and exclusivity sub-scale scores of musicians compared to athletes. This result from Study I was repeated in Study II and is noteworthy in this context for two points. Firstly, the total score was significantly higher for college participants

compared to university participants. Secondly, as a high total score has been associated with the possibility of being more susceptible for depression, it underlines the necessity to distinguish positive and negative subscales when investigating professional identification and depression. The attitude of a group can be used as a predictor for mental health problems. For athletes, high levels of negative affectivity and exclusivity have been found to contribute to mental health problems − especially when injured − and complicated the transfer process from professional to retired athlete (Murphy et al., 1996). Qualitative and quantitative research with athletes retiring successfully showed a strong correlation between athletic identification with active coping strategies (Grove, Lavallee & Gordon, 1997; P. Lally, 2007). Lower scores in both (negative) scales for participants in Studies I and II suggested that students musicians have a healthy approach to their career in music, even when their main focus is to find work in the music sector. This was also true for both groups of participating musicians, though college participants' relationship of active coping with subscales social and self identification was stronger compared to that of university musicians. This result shows that music participants should have a healthier approach towards (mental) health problems, choosing active coping over passivity. Lastly, acceptance of a mental illness is a general problem as I have laid out in the introduction, influencing the acknowledgement of a problem or the possibility of suffering from depression, seeking help and accepting treatment options see paragraph 2.2.7, p. 29). However, with higher levels of active and functional coping strategies there is a greater chance that these individuals will accept help and treatment, and already have establish a good support system or will find it easier to find social support. With higher than average depression rates, or as found in Study II high rates of refusal to answer a depression questionnaire − which will be discussed in the next section − these structures are of particular importance.

In summary, while on its own the total score of professional identification could suggest music college musicians being more susceptible to depression a closer inspection of subscales showed that only positive subscales social and self-identification (i.e. subscales that buffer against depression) significantly increase

the total score. Negative affectivity and exclusivity (i.e. negative subscales) also reflected in dysfunctional coping results and depression scores, did not increase. This does not support the hypothesis that a total score of professional identification can be used as a tool to predict depression. Extrapolating from results in sports psychology and based on the the close relationship of the subscales of professional identification with positive and negative coping skills in the past two studies of this thesis makes it clear that a differentiated look is the basic minimum requirement for using this variable as a depression predictor. Moreover and on this basis, it is possible to assume that music students with high scores in social and self-identification will be more open for (mental health) prevention strategies, given that they already display a high level of employing active coping strategies. Music student participants in all higher education institutions showed identification levels associated with a healthy approach towards life, and strong active coping mechanisms.

Depression and anxiety

Questions about depression and anxiety, and how they relate to music students, are at the core of this thesis. Results from Study I showed that university musicians were less affected by depression (10%) and anxiety (15%) than university non-musicians. However, both groups of Study I participants scored higher in depression and anxiety compared to non-university adolescents of a similar age group, and their EU student counterpart in medicine and dentistry by up to 30% (Prinz, 2012). Participants of both, Studies I and II, were, in line with other UK university students in medicine and dentistry (see Study I, p. 138). Study II brought two interesting points to light: (a) depression scores were significantly higher for college participants compared to university musicians but not to university non-musicians. (b) Although well documented by literature that participants will drop out or refuse participation if they only perceive to be subject of academic disadvantage (Storrie et al., 2010; Gebauer, 2014; Hall, 2018), the number of respondents who opted out of answering this specific section of the survey was surprising. It is even more remarkable as this response behaviour stood in contrast to students from the university environment

from Study I, where with an almost identical survey and similar time frame (January to March) and 195 students felt confident to respond to the depression and anxiety questionnaire. The survey for Study II went through similar recruitment channels as for Study I (internal college networks, social media, personal connections etc.).

In both pre-test feedback rounds (Study I, Study II), the majority of music college participants pointed out that a similar questionnaire was already running at CUK and that there was risk that participants would not want to repeat filling out the same questionnaire, even more so as this one was not coming from within a music college environment. Literature has shown that behaviour is not unusual (Hoerger, 2010; Galesic, 2006). Moreover, to the point of different behaviour of university participants and music college participants, sports psychology has documented that athletes and non athletes have a different behaviour towards mental health problems and seeking help (Watson, 2005; Gulliver, Griffiths & Christensen, 2012; Moreland, Coxe & Yang, 2018). Help seeking is essentially a positive coping mechanism when encountering a problem (Gulas, 1975). Based on the high active and functional coping skills found in this study by music college musicians, it would have been reasonable to expect a good cooperation by music college musicians. If student musicians have a more positive approach towards seeking help and, as documented in Study I even a better knowledge of depression problems, but they do not want to be part of a study investigating this subject, which is undertaken for their benefit, how can we explain the behaviour of music college musicians?

On one hand it is possible that music college musicians prefer to keep all health problems mostly to themselves as this might be held against them (Rosset i Llobet, 2004). On the other hand it has been shown that students fear a breach in confidentiality and/or academic disadvantage or even perceive it, are not likely to cooperate or, if they nevertheless require help, seek it outside of their study environment Storrie et al. (2010) documented that 42% students of medicine preferred to use outside services to college/university services and Roberts et al. (2010) reported that from 1,027 medical students a majority preferred outside healthcare. 90% preferred that to be organised by their insurances, especially in

case of stigmatised illnesses, and 70% felt that their confidentiality was better ensure in outside facilities, expressing concerns about academic jeopardy in association with personal illness. Moreover, Roberts et al. (2010) found considerable differences between institutions and training levels of students. Students in clinical training (i.e. in higher progress in medical school) were more concerned compared to pre-clinical students. The different institutional approach to their students' health was another striking indicator how the milieu not only greatly varies and thus influences – positively or negatively – the students' perception of personal health issues. Already a perceived risk of confidentiality was enough for students to prefer outside health care to the institutional offers. Studies looking into depression and wellbeing carried out in UK music colleges so far, have avoided the subject of confidentiality, the possibility of students perceiving academic disadvantage when admitting an illness and/or any institutional differences (Perkins, Reid, Araújo, Clark & Williamon, 2017; Matei, 2019). In case of Perkins et al. (2017) it is surprising as the argument for their paper is based on Storrie et al. (2010), where perceived lack of confidentiality and institutional differences where major investigative points.

Tying this back to results in my studies, at three instances the results points towards the environment playing a substantial role in student musicians' lives. Firstly, the depression predicting models showed that the environment, in this case represented by teacher/professor burnout, has a significant effect on depression levels, regardless of the institutions. Wanting to shape their career in music, students attending music college often decide to attend a specific institution based on the instrumental/singing/composition teacher, thus allowing teachers to considerably shape their experience at music college (Hays, Minichiello & Wright, 2000; Presland, 2005). As a reminder at this point, burnout with clients or by teacher/professor as it the case here, is a state of emotional and physical depletion previous transforming previously engaged and motivated people into increasingly distant and depersonalised individuals (Willcock, Daly, Tennant & Allard, 2004; Dahlin & Runeson, 2007; Maslach & Jackson, 2007; Campos et al., 2013). In case of conflict between student and teacher burnout experiences are a logical consequence. Secondly, professional

identification is not only influenced by the environment is not only based on one's own self-perception of a musician, but also sustainably and significantly fed by the environment, as explained in the discussion above (Grove, Lavallee & Gordon, 1997). Extrapolating from sports psychology, the significantly higher professional identification scores for music college musicians thus not only point towards students with a career in the music business in mind, but also towards students that have been selected for competitions, audition, etc. by their teachers/professors that significantly boosted their career aspirations. Thirdly, the STAI results further contribute to the hypothesis that the music college environment plays a considerable role for music college musicians. Almost all studies of this variable have used the STAI-T to report anxiety. As explained above, the STAI-T does not have clear cut-off values, but a few values have been used as empirical guidelines. As a reminder, Study II participants' mean was at 43.2. Scores for anxiety fostered by an imminent stressor such as the environment are set around the 44/45 mark. Scores for anxiety in combination with chronic illnesses are set around the 44-51 mark and diagnosed mood disorders are generally found at a cut-off of 53. coring on average 10 points under the mood disorder cut-off, it would be safe to say that Study II participants were probably not suffering from mood-related disorders as defined by this scale, but that the anxiety is rather fostered by the environment (Bergner-Köther, 2014; Rosenfeld, 2018). In summary, while the high depression scores point towards music college musicians being more affected. However, results such as the low anxiety score and low scores of pain catastrophising rather point towards a depression that might be fostered environment. This is further supported by the significantly higher results in professional identification that also relies on positive feedback by environment. Based on the results of the previous two studies and works such as by Storrie et al. (2010) and Roberts et al. (2010) and it would be reasonable to assess that the environment points towards being a reason for the higher depression scores for music college musicians. However, this question can as of yet not successfully be answered due to the lack of literature of this topic in music colleges.

Depersonalisation

Depersonalisation is an intriguing aspect of depression research, even though it is an under-researched area, especially in adolescents. Depersonalisation has a symptom that − for the patient feels similar to depression. In depression, the main symptom is absence of emotions (anhedonia), while the main symptom of depersonalisation is a feeling of being distant from oneself (and one's emotions), often described as feeling 'like a robot' or 'on autopilot'. Anecdotal evidence from musicians often finds that musicians refer to being 'on autopilot', when coming out of a concert or audition. The understanding is that they were able to reproduce a piece to their customary standard, but were unable to connect emotionally to the piece (see discussion in Study I, paragraph 3.4). As highlighted in this paragraph, it is believed that depersonalisation forms part of the developmental process. Lower scores of depersonalisation in adolescent participants predicted better emotional processing as adults. This positive effect reached into many areas in later life, from higher emotional stability and wellbeing to fewer job problems, and less job loss. In terms of researching depression, emotional stability equals fewer stressors in life, and as Wittenborn et al.'s intricate depression figure shows , social and emotional stressors contribute significantly to the risk of depression (see fig.3.10).

Study I results showed that university musicians were slightly more susceptible to depersonalisation compared to their non-musician counterparts. The quality of depersonalisation differed in both groups. The trend was that university musicians' depersonalisation episodes were longer in duration and shorter in frequency compared to university non-musicians (Korte, Cerci & V. J. Williamson, 2017). The questions that arose here from Study I were (a) how would Study I's results compare to results from music college participants in terms of relationships between variables (practice time, dysfunctional coping, etc.), and (b) would the STAI be a better instrument than the HADS to investigate the relationship between mild depersonalisation and anxiety as described by the authors (Sierra & Berrios, 2000).

In Study I, results showed a difference in the quality of depersonalisation between groups, namely in frequency and duration of episodes. However, this difference was only shown as a trend. In Study II this trend increased to significance: depersonalisation phases for musicians were longer in duration, but less frequent compared to non-musicians. Given that this a new research area, reasons for this difference in the quality of depersonalisation are not yet clear. Causes could be music specific (e.g. elevated practice time among music college musicians) or specific to the CD-9 scale. The authors, Sierra and Berrios, explained that the frequency and duration measured by CD-9 scales were adjusted after testing. There was a need for higher values in frequency compared to the duration scale, in order to keep in line with the clinical observation of depersonalisation, so that groups with short durations and long frequency (or vice-versa) scored at an equivalent degree on this scale. However, to my best knowledge previous studies only reported the overall scores and did not further investigate the underlying differences in frequency and/or duration. This seems to be a general problem in depersonalisation research as discussed in Study I (see paragraph 3.4, p. 142).

The overall prevalence for mild depersonalisation (≥ 19) was 7% lower among music college musicians compared to university musicians, and for moderate depersonalisation (≤ 35), comparatively longer in frequency and duration, 6.9% lower among music college musicians compared to university musicians. Two obvious possible explanations for these results are age and, taking results from Study I into account, making music/practising an instrument. The variable 'playing an instrument' has so far only been identified in my study. However, (Michal, Duven et al., 2015) showed that age is an important variable, and that children and adolescents show a higher prevalence of depersonalisation compared to adults. This suggests that going through phases of depersonalisation is part of the adolescent process. Study I results showed that older non-musicians also had fewer depersonalisation episodes for both cut-off values. However, music college musicians' prevalence for mild depersonalisation phases at ≥ 19 was lower than that of university musicians. Consequently, numbers over the moderate depersonalisation value ($\leq$

35) were also lower for music college musicians compared to university musicians. Interestingly, music college participants' prevalence was also 4% lower than that of university non-musicians. This was the case despite the latter having a slightly higher age mean, which should have pointed towards better emotional processing among non-musicians. While this is a small percentage, and the current study is one of the first studies investigating this subject, it seems reasonable to assume that making music or regular instrumental/vocal practice is a potential reason for this change. Further investigation in this area are required to confirm or reject this hypothesis.

In regards to question (b) (Sierra & Berrios, 2000) suggested that their depersonalisation scale could be used as an additional indicator for anxiety, especially if the total score was around 20. Using the HADS anxiety or depression subscales in Study I did not return results indicating a relationship between anxiety and depersonalisation. However, STAI's moderate to strong correlation with the CD-9 indicated that the STAI was a better instrument to measure this relationship. The significant correlation between STAI and CD-9 also confirmed the hypothesis discussed above, that Study II participants' anxiety stayed at low to medium levels. This suggests that anxiety in combination with depersonalisation should be measured by using an instrument that is broader (such as the STAI), and not as specific as the HADS, which essentially registers depression related anxiety problems.

The relationship between depersonalisation and practicing hours was observed as a trend in musicians in Study I, and increased to a significant relationship in Study II. Taking the consensus from paragraph 3.4 about practising time and gifted musicians as a basis, it is possible that depersonalisation occurs as a natural consequence to longer hours of practice, and therefore should not be considered as pathological or clinical phenomenon during longer practising hours. The main difference between gifted and good musicians was the hours spent practising. Longer hours enabled gifted musicians to focus on technique and musical expression, while good musicians with lower practice time had to opt for only one of the two. This meant that in stressful situations gifted musicians could reliably retrieve a high performance standard. The assumption of naturally occurring depersonalisation here could

explain why gifted musicians – as for instance the violinist Itzhak Perlman, who confessed in interviews to 'playing on autopilot' when under stress – were not perceived by the audience to have a noticeable difference in their (musical) standard. From this hypothesis arises an interesting question: how much does the audience perceive of this lack of emotional connection, and how (if at all) does this affect their concert experience. This could be a subject for further investigation into a more depersonalisation specific area. In conclusion, depersonalisation research remains an intriguing area in musicians' emotional processing. Building on previous studies where depersonalisation in adolescents was found to be a significant predictor for depression later in life, and higher depersonalisation scores were also associated with poor emotional processing (Michal, Heidenreich et al., 2006), both Studies I and II looked at this phenomenon in more detail than previously recorded, and added to it the hypothesis that playing an instrument affects depersonalisation in that the more time (day and/or years) students practiced, the more the quality of depersonalisation changed, and phases became more transient. Even though the total scores for non-musicians and musicians were similar, the change in quality of depersonalisation points towards better emotional regulation for music students. This was additionally reflected by music students coping with stress and problems in a more active way, and less with dysfunctional strategies compared to non-music students. Studies I and II were only able to detect an indirect effect of depersonalisation on depression via emotional regulation. Previous studies suggested that this link should not be underestimated in adolescents, as (inappropriate) emotional regulation as an adult is a solid predictor for depression. Studies I and II were the first studies to show that playing an instrument in adolescence has an impact on the ability to process emotions, which in turn impacts long term mental health in adulthood.

Pain catastrophising

In musicians' mental health and wellbeing, pain is predominantly seen as a negative influence on depression, and mainly explored in a one-dimensional, linear way: more pain equals more depression (Kröner-Herwig, Frettlöh et al., 2011). However,

adopting the current medical standard of pain being part of a multimodal bio-psycho-socio model, the current study did not investigate pain perception, but rather pain processing, and how this reflects on depression and anxiety. Again, as a reminder and brief summary of the key points for this pain model and current knowledge about pain in musicians: musicians are believed to to suffer from chronic pain. In chronic pain the goal is not to completely eradicate pain, but to enable the individuals to achieve better life quality. Hence, simple pain perception become largely irrelevant when researching chronic pain and depression. The relevant question is how the perceived pain is processed, because this result answers the question if the perceived pain is likely to lead to depression or not.

Study I results showed that while both university student groups show an average cross-section of the adolescent population in terms of pain (e.g. location, length of pain and combination with anxiety/depression symptoms), university musicians had a healthier approach to pain catastrophising and fewer anxiety and depression symptoms than university non-musicians. This occurred despite the fact that university musicians perceived pain for long periods of time (see paragraph 3.4, p. 144). The ensuing question for Study II was how music college students would compare. College students invest considerably more time in practising. Based on this, I started from a working hypothesis that practising more hours and more years would inflict significantly more pain (see p.158). Study II results were not only notably different to Study I results, but also the opposite of what I hypothesised. They differed in three points: (a) duration and location of pain, and (b) levels of catastrophising, especially relating to significant differences within individual pain catastrophising variables (e.g. sleep problems, missing days at work). (c) Moreover, neither models predicting depression using the cumulative weight of all variables for both studies, predicted pain catastrophising as a relevant variable or predictor.

The location and duration of pain perceived by Study II participants differed from Study I participants and the adolescent norm (Campo et al., 2004; Noeker, 2007). While in Study I back pain was most frequently perceived, Study II participant reported the main pain area to be the neck and shoulder area. Music college

musicians reported 34% more pain in the neck area and 31% in the shoulder area compared to university musicians. Reports about back pain were, however, similar. Compared to university musicians, college students perceived more pain: 48% of university musicians reported to be free from any pain, compared to 18% of music college musicians. An initial look at the literature showed that a higher percentage of neck and shoulder problems is associated with the work of a musician, and specifically tied to high string players (Paarup, Baelum, Manniche, Holm & Wedderkopp, 2012). Study II participants represented a good cross section of instruments (high and low strings, voice, brass and woodwind, drums, piano and guitar), with a slight bias towards strings and voice. However, on closer inspection, the direct comparison remains difficult: different studies used different terminologies. This reached from 'pain while playing' (Spahn, Wasmer, Eickhoff & Nusseck, 2014; Steinmetz, Scheffer, Esmer, Delank & Peroz, 2015) to 'troubles (i.e. pain, ache or discomfort)' (Paarup et al., 2012), to 'pain, including disabling pain defined as pain present for at least a month, which prevented attendance from work for at least 1 day' (Leaver, Harris & Palmer, 2011) to a more complex description (Ackermann, Driscoll and Kenny, 2012 e.g. 'any pain, weakness, numbness, tingling or other physical symptoms that interfere with your ability to play your instrument at the level to which you are accustomed. This definition does not include mild or transient aches or pains'). This means that studies such as Paarup et al. (2012) already rate discomfort as a step towards pain, while Ackermann et al. (2012) exclude mild pain and discomfort explicitly. Furthermore, this difference stretches into dividing instruments into groups (especially for woodwind and brass) up to the statistical analysis (Altenmüller, 2013). Therefore a meaningful comparison in this area remains difficult when taking these differences into account.

Study II results also did not support the hypothesis that only high string players suffered from neck and shoulder problems (see p. 158). This raised the question how to sub-divide into groups for an analysis, if not per instrument which seemed to be a natural selection. A solution is proposed by Nyman, Wiktorin, Mulder and Johansson (2007). They recommend not separating instruments into instrument

groups, but rather combining them under the header of physical strain (arms bend to 40° angle) and hours of practising, for a more suitable way in terms of investigating neck and shoulder pain. Their study groups instrumentalists with a 40°angle such as flute, trombone, trumpet and higher hours of practising such as violin, viola that reported significantly more neck problems to those with arm neutral positioning. Under these terms proposed by Nyman et al. (2007), Study II participants played instruments that were either in the 40° angle or higher amount of hours of daily practice categories, which might explain the higher tendency towards neck and shoulder pain.

Turning now to hypothesis (b) from p. 158, that levels of catastrophising would be greater in music college musicians despite the amount and the length of pain, significantly longer than for university musicians, music college participants reported the lowest rating in pain catastrophising compared to both groups from Study I, with .3% fewer participants over the moderate cut-off point compared to university musicians, and 10.3% less compared to university non-musicians. No music college participant went over the high-risk cut-off value. Pain catastrophising, as a reminder, measures the way individuals process perceived (chronic) pain and to which degree this pain influences the individual to (a) give up or (b) further pursue life goals. The item from the Orebrö scale that was significantly different in this respect was sleep. Music college students reported being less disturbed by pain in their sleep. This is also reflected in their low PSQI (sleep questionnaire) score. Music college students also displayed a trend towards missing fewer work days due to pain, and experiencing higher job satisfaction. Contrary to Study I results, catastrophising did not correlate with any coping strategies, and correlated only with the STAI. Thus confirming the literature that anxiety is a good predictor for pain catastrophising. However, as this study investigated pain catastrophising under the header of depression, it is vital to point out the cumulative weight of the predicting variables did not find pain catastrophising to be a significant predictor for depression in student musicians, because these scores were significantly lower for music college musicians compared to university non-musicians. In other words, it is not a case of pain catastrophising

becoming an insignificant predictor for depression altogether, but that musicians' low scores in pain catastrophising make this particular variable irrelevant when investigating depression. This does also not diminish the importance and necessity of trying to prevent and treat pain in musicians. This should be taken seriously based on the time (12 months and above) they perceived it.

In summary, as I have demonstrated in the literature review, investigating pain in musicians is still at the very begining compared to the field of pain research (Steinmetz, 2015). Oversensitive instruments and dismissing internationally agreed medical definition of (chronic) pain have further complicated comparisons and limited the scope and conclusion of pain research in musicians (Altenmüller, 2013). Results from both studies showed that university non-musicians demonstrated the pain catastrophising is a valid predictor for depression, supported by the congruence of additional variables such as anxiety, dysfunctional coping strategies and the cumulative weight of all predicting variables in the hierarchical multiple linear regression. To reiterate, the large amount students perceiving pain presents a problem that should be taken seriously. However, according to literature and based on the high catastrophising levels of university non-musicians creating prevention strategies for this group will present a more substantial problem than for both university and music college musicians with significantly lower pain catastrophising scores. For musicians, these two studies have consistently shown that pain catastrophising is not a significant predictor for depression neither as a single variable nor in single combination with anxiety or dysfunctional coping strategies nor using the cumulative weight of all predicting variables. Using the variable 'pain' in depression research for musicians should therefore be evaluated differently as the perceived pain is not processed in a dysfunctional way and hence looses its predictive value.

Sleep

The main reason for including a questionnaire about sleep in this study was the solid evidence that depression is linked to sleep. This could mean lack of

sleep – mainly the tendency to sleep more during the day, or in bipolar (manic) depression a noticeable reduced need for sleep (Katon & Sullivan, 1990; M. Fava, 2004; Dickinson, Wolkow, Rajaratnam & Drummond, 2018). Individuals with depression tend not to complain about main depression symptoms, such as lack of emotions (anhedonia), but more about minor symptoms such as lack of sleep. Sleep (or insomnia) in adolescents and younger adults has become an important variable compared to (older) adults (Bootzin & Stevens, 2005; Schlarb et al., 2017; Urschitz, Wiater & Heine, 2009). To tie the depression-sleep problem back to the Wittenborn et al. depression model

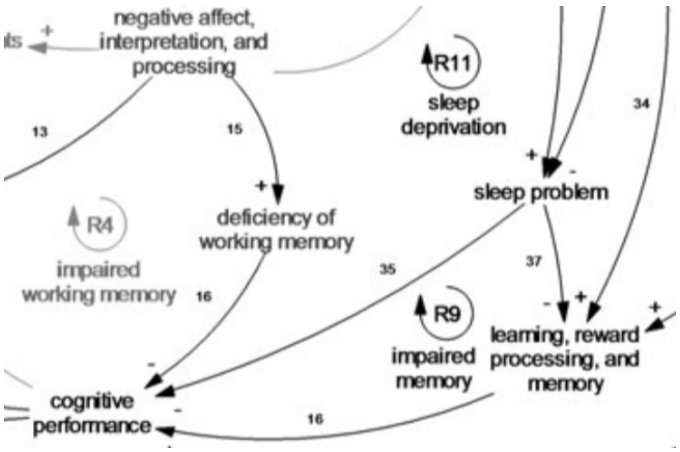

Figure 4.10: Larger view of Wittenborn et al. (2016) depression model, extracting loop 36 [sleep] which highlights how sleep deprivation [R11] and lack of sleep impact depression

Note: loop 36 is found at the middle right of the entire model in a key place combining biological variables [the lack of monoamine] and social variables [interpersonal relationships]

This model is the first depression model calculated using all three areas (biological, psychological and social) and reflects the current medical knowledge about depression. The intricacy of this model shows the complexity of this illness. While one can investigate one aspect on its own, changes in the other aspects will influence depression, either enhancing/aggravating it or acting as prevention/alleviation. The grey loops show resource erosion (sleep deprivation), and by this promote depression on the psychological side. These increase rumination and negative cognitive representations, or as noted by the PSQI, the need for daytime sleep.

This can lead to a bias in attention and increase the overall stress level. Results from Study II showed that the majority of participants did not report sleeping problems. The PQSI has an empirical cut-off value of 5, separating good sleepers and bad sleepers at this value, with good sleeper at ≤ 5, and bad sleepers at ≥ 5. 16% of Study II participants reported a higher value than 5. All individuals with sleeping problems reported significant depression and anxiety symptoms (mean of 12 for the HADS subscale depression, with a cut-off value for clinically significant depression at 9), anxiety, depersonalisation, and pain catastrophising. In the PSQI the subscales the need for daytime sleep, shorter sleep cycles or insomnia were elevated in those participants, but not for other participants. Research into adults and sleeping problems showed that these variables contribute independently to depression (X. Liu et al., 2007). Even though stressors have to be adjusted for the adolescent or student population (e.g. academic failure rather than (office) career failures), Sivertsen, Harvey, Lundervold and Hysing (2014) found in their large adolescent population study that, for sleep, it is reasonable to assume similar stressors for an adolescent population compared to adults. Sivertsen et al. found that it eight times more likely that individuals reported significantly more depressive symptoms if the individual had less than six hours of sleep per night. The study took into account that the perceived sleep problems could subjectively increase due to depression, and differ from actual clinically measured sleep deficiency. On average, adolescents with a high level of depression symptoms in this study reported 2-3 hours less sleep compared to those with fewer depressive symptoms. This is noteworthy as this study showed that participants reported fewer hours of sleep than experts recommended. Even though most Study II participants had irregular sleeping hours due to already working as a musician, the majority reported an average of eight hours of sleep, even if that meant they were 'sleeping in'. Study II found a significant relationship between the PQSI and the HADS, but not the STAI. This suggests that anxiety problems such as those measured by the STAI were too unspecific. However, this does not mean that general anxiety problems such as brought on by a stressful environment do not contribute towards general stress,

and therefore to lack of sleep. It is more likely that general stress acts more as a mediator or moderator in enhancing or preventing sleeping problems (as highlighted in the loop 36 above). While it has been suggested that higher levels of depressive symptoms are more frequently found in adolescents (see Study I, paragraph 3.4), it remains unclear if and how this is part of the adolescence process. Research showed that depressive symptoms are particularly high in an university environment, but decline after university graduation and with the start of a professional career (Andrews and Wilding, 2004; Quince et al., 2012, see paragraph 3.4. Elevated depression levels in the adolescent age, however, remain a significant predictor for future depression as adults (Gregory et al., 2005; Michal, Duven et al., 2015). They should therefore not be minimised or downgraded to an adolescent problem than one eventually grows out of, but equally not be over-exaggerated to scare adolescents.

This investigation into sleep offered a different window into the question whether student musicians experienced more depression than other populations. As sleep is a decisive symptom in depression, the results reinforce the HADS results that music college participants were not more at risk of being depressed than their university students counterparts. This investigation angle of sleep was especially useful due to the low return in answers for the actual depression questionnaire HADS. Taking into account the clinically non-remarkable PSQI score, it is likely that the HADS score would have been considerably lower, had the questionnaire not been skipped by a large number of participants. Given the close relationship between depression and sleep, and especially insomnia, future studies should try to extract which sub-variables for sleep, for instance early morning wakening, could be significant and form part of preventative measures in this population.

Overall, while the high depression score of music college musicians on its own would support the hypothesis that musicians are more vulnerable to depression as a group, neither the individual analysis of the variables predicting depression nor the cumulative weight of it supports this hypothesis. Rather, Studies I and II suggest that playing an instrument is more helpful with coping strategies, and positively contributes to the adolescent process in terms of emotional growth. Results also

suggested that processes for depression are approached differently in non-musicians and musicians. This was especially noticeable for the variable pain catastrophising, which lost its predicting value for musicians in both depression predicting models. Based on this it is possible to conclude that individuals belonging to a certain profession should not automatically identified with higher (or lower) depression scores. General common depression predictors which may impact individuals in the same way are more promising to investigate depression. One of such stressors might be the study environment, which could be one reason for the higher depression scores in music college musicians. Deducing from sports psychology and professional identification significantly higher total scores of identification were not only traced back to the individuals' personal perception, but also significantly feed by the environment. However, as Perkins et al. (2017) showed that investigations into the music college environment in this area are still at the beginning it remains difficult to isolate specific stressor. Without speculating it is only possible to conclude that environmental stressor seem to be fewer for university participants.

4.4.1 Limitation

It remains important to note the limitation of this study for the interpretation of the data. Firstly, despite Study II provided more than the number of participants required by the a priori calculation, the overall sample is modest. Secondly, many participants did not feel confident to disclose their mental health status (i.e. HADS), even though this study aimed to assure confidentiality and anonymity to a high standard. This is however, in keeping with the literature (Clement et al., 2015). It is possible that the estimated scores might have erred slightly despite carefully calculated based on current medical knowledge (World Health Organization, 1992). Thirdly, due to anonymity reasons variables such as gender, socio-economic background, etc. have been excluded. While this data might have been interesting especially for the cumulative weight of predictor variables, on balance anonymity was more important to collect any data at all. Fourthly, I based both studies on empirical findings on depression and pain perception in musicians. I did not

anticipate that results of processing said perceived pain for music college musicians would contrast with current finding. Since this was the first study to investigate pain processing in music student and using it as a depression predictor it was not possible to foresee these results.

4.5 Conclusion

In conclusion, Study II results provide several finding that implicate the field of depression in student musicians. Firstly, Study II results were not only able to reproduce key elements of Study I, but expand on this knowledge. Results that were trending in Study I were significant in Study II (catastrophising pain, depersonalisation phases and daily practicing time). The reason for this could be that college students were more immersed in music compared to university music students. Secondly, this study did not find that the total score of professional identification or 'being a musician' is a valid predictor for depression. Rather than classifying musicians as being innately vulnerable to depression, depression should be understood based on its multifactorial model. This should also prevent using overly sensitive instruments that reflect this model only partially. This is important as this entrenched belief of innate vulnerability of musicians has contributed to a self-stigma of musicians (Pryal, 2011), requiring studies to only find a deviation of this aspect to point this out especially (Chávez-Eakle, 2006). Thirdly, by replicating results in general (chronic) pain research (Kröner-Herwig, Frettlöh et al., 2011), I demonstrated that there should not be a causal link between pain perceived and how that pain is processed. These should instead be investigated separately especially when researching depression. When, as in this case, pain processing such pain catastrophising is significantly low it looses its predictive power in depression. Moreover, the significantly higher pain catastrophising scores for university non-musicians showed that this is more a problem for non-musicians than for musicians. Fourthly and lastly, the lower depression scores for university musicians suggest that prevention methods used here, the environment or a combination thereof are more efficient than those for university non-musicians and music college musicians.

Taking Study II as second building block for the overarching research questions, the preliminary conclusions here were that adding a third group helped to further define groups. While the variable 'being a musician' helps to distinguish groups, it has not shown to be a depression predictor. Furthermore, when combining data from Studies I and II, the results suggest that the culture of teaching institutions may play a vital role in the experience of depression in student musicians. This is not only reflected in the significant difference in depression between groups in both studies, but also borne out by the regression and tree models. As Study III will look at possible prevention strategies for depression, a closer investigation of the music college environment, which showed the highest level of depression, will be one of the main strands going forward.

5

Qualitative investigation with professional musicians who have been formally diagnosed with, and treated for, depression, Study III

Contents

5.1 Introduction

In her conference presentation 'Biography and Psychopathology: Lessons from Robert Lowell's Mental Illness, Life and Work', Jamison (2019) underlined her previous findings that poor mental health, and thus depression, is quasi innate to all creative professions, including musicians (Jamison, 1995). However, general depression research and studies investigating depression in musicians using (medical) standardised instruments showed that this innateness should not be assumed for various reasons (Mayberg et al., 1997; Mayberg, 2004; Abkevich et al., 2003; Spahn, Strukely & Lehmann, 2004; D. F. Levinson, 2006; Voltmer, Schauer et al., 2008; Glazer, 2009; D. E. Linden, 2014; Wittenborn et al., 2016; Gembris et al., 2018).

Firstly, in contrast to illnesses such as Huntington's, where a genetic component has clearly been demonstrated, no genuine depression gene has been identified for depression (Myers, 2004). Secondly, therefore the current multifactorial model of depression refers to the genetic element as a vulnerability-stress model: a genetic predisposition only becomes relevant when the individual is subject to high stress (Caspi et al., 2003) (see paragraph 2.2.7, p. 24 for details on aetiology of depression).

Stress accumulation can occur either individually, that is stress proliferation over a period of time, for instance through the loss of a spouse and subsequent loss of a job, or it occurs across generations. In other words, stress accumulation is generally brought on by social inequalities or serious life events (Thoits, 2010). Serious life events, such as loss of a parent at a young age, have been reliably found to make individuals significantly more vulnerable to depression for the rest of their lives (Lorenz et al., 1997; Umberson et al., 1992; Thoits, 2010; Cockerham, 2017) (see paragraph 2.2.7, p. 26 for details on the multifactorial depression model). It follows then, thirdly, that genetics only play a relatively small part in depression, based on the multifactorial depression model: the social and the psychological aspects, or in other words life events and our behavioural reactions to them, make up two thirds of the multifactorial depression model, and the biological aspect of the model, of which genetics are only one aspect alongside others such as for instance brain areas, neurotransmitters and pathways, makes up one third of the model. So, to

reiterate, while a genetic predisposition to depression plays a role, current research only supports a vulnerability model (see paragraph 2.2.7, p. 28 for more details on the vulnerability stress model). In summary, and in the light of Jamison's (2019) presentation, it is important to investigate depression predictors that are supported by research which is based on the currently accepted multifactorial depression model, in order to reach meaningful conclusions. Although her presentation was carefully phrased, her words re-enforced the creative mystique, as documented by the audience's questions during the question time that followed the presentation. As laid out in paragraph 2.3.1 (p. 71) in detail, while this belief has little support within general depression research and statistics, it is none-the-less entrenched in the minds of some scientists and creative professionals such as musicians (Dietrich, 2014).

One of the aims of this thesis was a closer investigation of the hypothesis that musicianship and depression are somehow linked, while also endeavouring to find out how much of the historical outlook on depression is reflected in today's evidence (see paragrph 2.4, p. 82). Upon first inspection, the results from Studies I and II seemingly contradicted one another. While the results from Study I did not indicate that university musicians were significantly more depressed compared to university non-musicians, and, in extension, therefore did not support the hypothesis that depression could be obviously linked or innate to being a musician, Study II results found that music college musicians had a significantly higher depression score compared to both university musicians and university non-musicians. What could be the reason for this difference, and could professional identification with being a musician play a role in this? While looking at depression results from Studies I and II in isolation might suggest that the difference could be linked to professional identification with being a musician, a more detailed look at all results did not support this idea for three reasons. Firstly, while depression scores for music college musician were high, they were not corroborated by depression predictors such as anxiety, depersonalisation, and pain processing (in this case, pain catastrophising). Secondly, the results of the larger models (hierarchical multiple linear regression and regression tree models) did not find professional identification with being a musician

to be a significant variable. Instead, they pointed towards a combination of factors that best predicted depression: high anxiety combined with a low level of burnout with teaching staff. Both of these points suggest that the environment might play an important role in depression. Thirdly, a closer look at the difference in professional identity scores between university musicians and music college musicians showed that music college musicians disposed of good depression buffers. Music college musicians showed significantly lower negativity and significantly higher social identity scores compared to university musicians. Both of these factors have been identified as depression buffers (Goodwin & Gotlib, 2004; Kuehner, 2017). In other words, while music college musicians showed a momentary high depression score, likely based on their current situations (e.g. environment, age, etc.), they were better protected from future depression by possessing good depression buffers. In this context, Kuehner emphasised that low negativity and high social support not only act as a present buffer, but also can be seen as predictors of fewer future depressions.

However, at this point quantitative depression questionnaires, as used in Studies I and II, have limits. While they can be used as significant indicators for depression, as depression predictors or to identify target areas for future research, they give no information about how the individual experiences depression. This is due to the nature of depression, which remains an illness that is only diagnosed verbally in a dialogue between patient and physician/psychologist (see paragraph 2.2.4, p. 15 for more detail). However, it is vital to understand how individuals from within a group (professional or age group) perceive depression, because this provides insights that can help shape future prevention strategies. Nonetheless, qualitative investigations into how individuals - in the case of this study musicians - have experienced depression are challenging. So far, to the best of my knowledge, no study has been carried out that collected qualitative data to investigate the symptomology of depression in musicians (professionals or students). Based on the available literature on depression, prejudice and stigma (see paragraph 2.2.2, p. 13 for more detial), and on the experience gained from Studies I and II, it

can be expected that a high need for anonymity is essential in order to gleen any qualitative data from musicians on this sensitive topic.

In conclusion, while quantitative depression research can identify a target population and key variables, only qualitative research can document if these key variables are the most pertinent, or if others are perceived as more important by sufferers. A combination of generalised and specifically perceived variables are then assembled to form the basis of a targeted prevention strategy. Study III therefore focused on questions that were raised by results from Studies I and II, such as how musicians experienced depression, which coping strategies they found helpful, and if/how these strategies differed from those described in the relevant depression literature (Kessler et al., 2009).

Research Questions

Based on the results from Studies I and II, this third study was guided by the following questions:

1. How did participants perceive depression symptoms? Could they rate how depression symptoms impaired their daily life/professional life? This question asked about depression symptoms, including which symptoms were perceived as most difficult in terms of working as a professional musician. This was a direct follow-up question built upon the HADS (depression) questionnaire, where each question refers to one depression symptom as defined by the ICD-10, which was described in the introduction section 2.1, and reflects the second of my overarching research questions.

2. Reaching out for help: did participants turn to a specific person for help or talk to a doctor? Was there a person or experience that became or provided a turning point for them and their recovery, and what treatment option(s) worked for them? This question asked about networks used for help, treatments followed, and turning points experienced. If we accept the premise of the literature on depression that stigma and prejudices apply differently to each

group – as laid out in my thesis introduction (paragraph 2.2.2), a qualitative investigation should look into this aspect. As a reminder, beliefs are strong incentives to look for or refuse help and/or treatment in depression. They are directly reflected in the psychological causes for depression, for instance in the process of learned helplessness (see paragraph 2.2.7). An individual who feels that depression is somehow required (e.g. for creativity and thus success, as would be the case for the 'creative mystique') will be more likely to endure the illness rather than look for help and treatment. Depression is already plagued by various forms of beliefs as illustrated by Mauz and Jacobi (2008). Moreover, and as a reminder, depression involves elaborate belief systems, depending on social class, economic background etc.. In this specific context it was relevant whether or not particular beliefs could be motivators for specific actions or non-actions. Literature showed that many musicians hold specific beliefs on depression (e.g. 'creative mystique'). Therefore, this aspect was particularly important and contributed towards answering the second and third of my overarching research questions. The idea behind this section was to find out more about:

(a) the network(s) upon which musicians relied for help, as a follow-up to Studies I and II

(b) if participants consulted a medical practitioner at all. While H.-U. Wittchen and Hoyer (2011) pointed out that not seeing a doctor is quite common for individuals affected by depression, independent of their profession, Pryal (2011) showed that many artists were resistant to seeing a doctor and/or following a therapy, out of fear that this could affect their creativity.

3. How did, in their opinion, (the stigma of) depression impact the participants' professional lives? This focused on difficulties that participants judged to be unique to musicians, and that, in their opinion, would not be experienced by other professions (e.g stigma, hiding depression from colleagues). It also

investigated if they believed that their education prepared them for these challenges. Following up directly on the stigma-related data from Studies I and II, this question asks how the stigma attached to depression impacted the professional life of a musician. As such, it contributed towards a perspective for future prevention methods in light of my second and third overarching research questions.

4. What preventative methods, if any, did the participants focus on? This part explored if participants were aware of available structures (ranging from classes at college or local GP practices to charity websites, etc.), and which structures they would recommend, for instance, to music students or young musicians, after having experienced depression themselves. This question inquired about preventative strategies used, also asking which ones the participant would recommend to others in the same situation. It therefore logically follows up from question two above, and reflects my overarching research questions two and three.

5. At the end of the interview, additional time was given to allow participants to raise points they considered to be important, but that had not been included in the interview questions (for the detailed interview questions see Appendix A.3.

5.2 Method

The design and methodological approach are described in the following subsections. In short, the underlying qualitative design for Study III was used to produce contextual real-world knowledge on how professional classical musicians, who had previously received a formal medical diagnosis of depression, experienced the illness in terms of symptoms, reaching out for help, and treatments, and what resources and approaches they would recommend for current music students, based on their personal experiences.

5.2.1 Design considerations

The two main challenges for this study were (a) to develop a questionnaire to collect qualitative data while keeping in mind the clear definition of depression by the literature (World Health Organization, 1992), and (b) to identify candidates who would be both trustworthy sources and willing to talk on the record about their depression experiences, despite a possible perceived negative impact on their careers. Certainly these challenges apply to most, if not all, interviews. However, this study faced the added challenge that it did not set out to collect information on subjective wellbeing (or the absence of it), but instead wanted to investigate the symptomatology of depression (World Health Organization, 1992). This set clear terms and demands for Study III.

In order to have worthwhile data for the analysis, certain parameters had to be fulfilled and obstacles had to be overcome. To demonstrate, the following sets out two examples: Firstly, in order to collect data on how depression was experienced, I had to trust that participating musicians had previously received a formal medical diagnosis of depression. Furthermore, for ethical reasons, these candidates had to have been in remission for a sufficiently long period of time in order to be able to safely conduct an interview and not accidentally trigger a flare-up[1]. Secondly, in order to accurately reflect depression symptomatology while focusing on challenges that are specific to musicians, the interview questionnaire needed to not only reflect the actual symptomatology as defined in the ICD-10, but also include the knowledge gained from Studies I and II findings. This was particularly challenging as, to the best of my knowledge, this was the first focused study to undertake a qualitative investigation of professional musicians who had previously experienced depression. There have been studies using standardised questionnaires such as by Jacobi, Höfler et al. (2002) or H.-U. Wittchen, Jacobi, Klose et al. (2010). However, the description of professions in these was deliberately vague. Musicians could have identified with the categories 'freelance' or 'employed' and, as discussed for Vaag et al. (2016) in the literature review, both categories

[1]here defined as a minimum of six months in remission, diagnosed by the treating physician

face completely different sets of challenges and stressors. In these studies, the possibility that musicians could be part of both categories was also given, which further diminishes the possibility to extract information about depression and the profession of a musician on the basis of profiling by profession.

Having used a standardised approach to Studies I and II, this third study was also to use a standardised tool. One such detailed standardised interview tool, based on the same diagnostic approach that had been employed in Studies I and II in the form of the World Health Organization (1992), was the *Diagnostisches Expertensystem für Psychische Störungen* (DIA-X), also published as the Composite International Diagnostic Interview (CIDI) (H.-U. Wittchen & Pfister, 2007). This semi-structured interview lasts for about one hour and has 95% sensitivity in screening for depression and 96% sensitivity in screening for anxiety, with a specificity of 84% and 82% respectively. The test-re-test reliability lies between $r = .81$ for depression and $r = . 84$ for anxiety. The modular construction of the interview allows for combining aspects that are of interest without disturbing the validity or reliability of the test (see Appendix A.3.1 for details). However, the authors stress that the interview requires specific training sessions and should only be undertaken by a qualified clinical psychologist or psychiatrist for various reasons, for instance the possibility of detecting a (recurrent) depression. This meant that the full interview could not be conducted by me. However, in order to mitigate the validity paradox, assuring high standardisation (internal validity) and collecting data about effect mechanisms (external validity) needed for prevention strategies, I opted for a combination of the DIA-X/CIDI modular construction (the sections on mental wellbeing and coping strategies) with a focus on prevention methods (Neugebauer, Pfaff, Schrappe & Glaeske, 2008).

Interviewing friends

The interview followed a problem-focussed approach (Andreas, 2000), for which a trusted relationship between interviewer and interviewee is vital in order to collect trustworthy data. While still having an interview guide, based on the research questions, such an interview does not follow a strict protocol. While the

interview guide assures that all participants are asked the same questions, the interviewer can request an interpretation of a term, ask clarifying questions or refocus the narrative at any point. Redundancies are highly desirable as they show the congruence of data and allow for an easier interpretation. Inconsistencies show individual ambivalence and can be discussed immediately. Especially interview studies with individuals who experienced a depression have found such an approach beneficial, because of the nature of depression distorting personal perception (Hölzel et al., 2018). Andreas (2000) points out that biographical data of the illness is essential for the progression of narrative during these interviews, as it can help to 'jog the memory' for instance if the participant has suppressed some painful memories. Furthermore, a problem-focussed interview requires the interviewer to have considerable knowledge on the subject. It is, in essence, a 'reflexion of the interviewer's prior knowledge'. Prior knowledge and own interpretations have to be explicitly taken into account. These enable the interviewer to understand the interviewee, to (intuitively) follow or change the approach during the interview, provide (new) impetus and/or expand fundamental aspects.

In order to fulfil the requirements set out above under point (b), namely to identify candidates who would be both trustworthy sources and willing to talk on the record about their depression experiences, despite a possible perceived negative impact on their careers, possible candidates for this study needed to be evaluated carefully. As this study was was the third within my overall thesis, and had to fit into the set time frame allocated for this part of the thesis, the most sensible choice was to ask friends with an established trusted relationship, who fit the criteria. The prior personal acquaintance with the candidates allowed firstly to have the knowledge that the potential candidates did not self-diagnose, but had a formal medical diagnosis of depression. Secondly, it provided me with enough information to pre-screen possible candidates with such a formal diagnosis, making sure that they had been in remission for a minimum of six months. Potential candidates who were evaluated in a pre-interview chat as still being emotionally too close to the illness were excluded from the study. This set-up meant, thirdly,

that a trusted relationship had already been established, and that I could expect frankness and depth in the narrative (McConnell-Henry, James, Chapman & Francis, 2010). Considering the time allocated within my PhD thesis for this study, time was an important factor to consider.

Balancing friendship and research as Brewis (2014) suggested, was not an issue for these particular interviews. No candidate confused the interview with a therapy session or felt the need to unburden oneself during the interview. The friendship meant that the participants tried to be as helpful as possible to make the interview possible and give clear, honest and genuine answers. This, for instance, included making sufficient time in their busy schedules. On the other hand, I fully respected if participants chose not to speak to a specific issue or question, or wanted to go 'off the record' with a part of their answers. Other than in Brewis (2014)'s study, there was no need to remind participant that their interviews would form the basis of my study and would, at the very least, be read by supervisors and examiners. The nature of the topic and the the fact that this research was being conducted within a department of music rather than, for instance, in a psychology or medical/psychiatry department, meant that everyone was familiar with the setup. The balancing act for me as interviewer was to find answers to questions without trying to stretch participants too far out of their comfort zone. This also meant allowing participants to find a space where they would feel comfortable for an interview, even if that meant taking a spouse or friend to the interview alongside them.

More than for Studies I and II, the anonymity of participants was of the utmost concern. This was particularly evident in view of practical findings from sports psychology, which have been a precursor for studies in this area of music psychology (Mastnak, 2016). Even though the last ten years have considerably changed the approach to depression in sports, especially after the suicide of successful and well-known athletes, still psychiatrists who practice in this field advise their patients not to disclose their depression to their employer or the public, if avoidable (Frank & Nixdorf, 2013; Frank et al., 2013). In their experience, neither the employer nor the public were sufficiently prepared to deal appropriately with an athlete who

suffered from depression. Due to the lack of appropriate protection by employers, athletes have had to bear such consequences as facing their (angry) fans in the arena (Brauckmann, 2019). This confrontation of an already mentally fragile athlete with emotional fans, who, based on the stigma of depression, interpret the illness as 'personal weakness' or accuse their hero of not 'being able to pull it together' could easily create a situation that spirals out of control. The pressure of not performing well - even if only perceived so by fans - and the absence of appropriate help by the employer could further undermine the mental state of the athlete and negatively affect any progress/remission efforts. While these experiences cannot be applied to musicians in their entirety, it is vital to take the stigma of depression, and the subsequent need for patient protection, seriously (see paragraph 2.2.2, p. 13 for more detail on depression prejudice and stigma). Moreover, the avoidance of disclosing any mental health conditions due to the stigma attached is not unique to sports, but also well documented for the military, for medical professions (both for students and physicians), and for musicians (Rosset i Llobet, 2004; Greene-Shortridge, Britt & Castro, 2007; Dyrbye et al., 2015; Gold et al., 2016). Even though research into the difficulty to collect data based on this stigma is limited, artists and physicians have repeatedly documented this fear of being subject to professional repercussions or loosing work (Schödel, 2010; Voigt & Wunderlich, 2011; Kowalewski, 2012). In terms of interviewing friends, this knowledge was the most difficult to balance with the need for openness and genuine data - both for the questionnaire and during the actual interviews.

5.2.2 Procedure

Potential participants were approached for the interview and interviews were scheduled for June/July 2017. It was imperative to interview during the UK music festival season since most participants were planning to work in the UK during this time, and would therefore be available to interview in person. All interviews were to be recorded on a flip F260W-UK mini video camera, pointed towards the ceiling/floor to ensure privacy while still having a high quality digital

audio recording. However, the dichotomy between on and off the record remarks during the interviews was considerable. Participants would not make remarks on the record that could reflect negatively on them, or on their place of work (e.g. music college/festival, etc.). However, they freely shared their thoughts as 'off the record' remarks during the same meetings when the camera was switched off. The recorded interviews were not representative of what participants truly thought, felt and/or had experienced. Mason (2010) points out that it is not unique, especially in an exploratory study, to be confronted with these challenges. In such a situation, the main issue is to find ways to overcome such challenges in order to still collect data, all while keeping to the time frame set for the study. The evasiveness of participants in the area of depression is well documented in literature (Rosset i Llobet, 2004; Greene-Shortridge et al., 2007; Dyrbye et al., 2015; Gold et al., 2016). Feedback from some participants during rescheduled interviews showed that despite all precautions taken for anonymity, they perceived taking part in an interview study, where their voices could be identified, as being 'too risky' for their professional careers. They also voiced a preference to have more time to reflect on their answers, fearing that a hasty narrative would make them or their place of work identifiable based on the sum of smaller details included in their answers. In view of the challenges described, and based on the feedback of participants, I changed the research approach to a qualitative online questionnaire, treating the first in-person interviews as pre-tests, and subsequently duly applied for a new ethics approval based on this change. This was granted, and the study was subsequently re-launched as an online questionnaire omitting only section 1 questions that were felt by participants to be too personal. This online questionnaire had no space limits for answers and could be accessed as many times as needed in order to be completed. The time it took participants to answer the questions was not tracked. However, participants' reactions were prompt, and except for one participant, who had extensive work travel between US and EU concerts during that time, all responded within a short timeframe. In fact, all but this one participant filled out the questionnaire immediately after

receiving the email invitation, even the participants who had previously been too busy to to find and agree time for an in-person interview.

5.2.3 Participants

Seven participants answered the questionnaire (instrument: three voice, two keyboard, one high string). As a reminder, table 5.1 provides a quick overview of the selection criteria for participants. Participants had studied music (up to and including undergraduate and postgraduate college years) for 8.3 years on average (ranging from 5 to 23 years, SD = 7.1), and had been musicians after graduating for 7.3 years on average (ranging from a few months to 21 years, SD = 12.8). Even though participants had been selected with the prerequisite of a previously medically diagnosed depression, all but one acknowledged having suffered from mental health problems. Depression had either affected them during their study years or later in their professional career. Respecting the feedback from pre-test interviews, the questionnaire did not ask participants if they had been or currently were teaching at a UK music college, or where they performed. One participant voluntarily disclosed that they were teaching at a US music college. It is possible to infer from some answers that candidates are or were teaching at a UK music college, although it is not mentioned explicitly.

As laid out in paragraph 2.2.6, this thesis only looks at unipolar depression. A formal diagnosis of bipolar depression would have led to the exclusion of the candidate from the study. Moreover, and to reiterate at this point, interviewing bipolar patients, even during an asymptomatic phase, raises ethical concerns, as potential candidates with such a diagnosis are considered to be vulnerable.

It was important to recruit participants who had studied music in the UK system. This piece of research has been mainly conducted in the UK, and the UK music college environment is quite unique. Most participants happened to have experienced teaching at a music colleges in the UK, in the rest of Europe, and/or in the USA, although this did not form part of the recruitment criteria. Participants' teaching experience is evident in some of their answers.

Table 5.1: Inclusion and exclusion criteria for participants in Study III

Inclusion criteria	Exclusion criteria
Classical professional musician	Other musical fields
Having graduated from (UK) music college	Still studying at music college
Medical diagnosis of depression in the past, and six months or longer in medically diagnosed remission	Recently diagnosed with depression or other mental illness, still on medication for mental health problems or below six months of remission
Unipolar depression	Bipolar depression
Trusted relationship with participant or trusted referrals	Referrals from outside of that trusted circle where a trusting relationship would first need to be established
Possibility to check in regarding participant's mental wellbeing after interview (spouse, friend, etc.)	No possibility to check on participant's mental wellbeing following the interview

5.3 Results

Using NVivo for thematic coding, as presented in Table 5.2 and diagram 5.1, the answers were split into seven points, or nodes, with each containing one central element that helped to elucidate one of the research questions. A separate point/node collected participants' additional thoughts on the subject, which were thoughts/ideas not asked for specifically within the questionnaire, as noted in research question five. However, rather than order this results section by the numbering indicated above, I will instead be following the logical structure indicated by the answers to the questions themselves. For instance, question three (if education prepared participants for mental health problems) indirectly answers question two regarding support used when ill), thus determining the order of appearance.

5.3.1 Does education at music college prepare musicians for mental health challenges?

Answers relating to research question 3 were collected in node one as explained above. All participants, who at some point had been diagnosed with depression, reported that their education at music college did not prepare them for their mental

Table 5.2: Nodes, thematic coding including reference to research questions, Study III

Node	Research Question(s)	Theme
1	RQ3	Preparedness for mental health problems (5.3.1)
2	RQ2 [a and b]	(Personal) support used during illness (5.3.2)
3	RQ4	Support structures that were experienced as helpful (5.3.2)
4	RQ2 or RQ4	Structures used subsequently that participants had not been aware of during studies (5.3.2)
5	RQ3	Special difficulties in mental health for musicians (5.3.4)
6	RQ2 or RQ3	Opinion regarding mental health classes (or similar) taught in music college (5.3.3)
7	RQ4	Participants' recommendations for music students based on personal experiences (5.3.4)
8	RQ5	Additional thoughts on the topic (5.3.5)

health challenges. Answers ranged from '... I don't think the education system prepared anyone for mental health issues while I was in school. ...' (participant 101) to '... not at all. ...' (participant 96)

> " ... We were on our own then in dealing with whatever came up for us. [...] There were no structures in place then [...] I am acutely aware that there is still a lack of support in acute need. ... " (participant 100)

Participants' collective experience covers 40 years of UK music college education, stretching from the late 1970s (participant 100) to recent, albeit not current, years (participants 96 and 99).

The participants who graduated more recently[2] acknowledged that mental health and wellbeing topics were covered in classes, but noted that practical support when students were in need was scarce, or students were reluctant to make use of it (see answers to node six).

> "Now as a professor, I find there are many more places for students to turn to if they are having problems. I also found that when I was in school, people didn't talk a lot about their mental health." (participant 101)

[2] A more precise timeline is not possible, as it would compromise participants' right to anonymity. A lot of ideas for mental health classes have been implemented more recently.

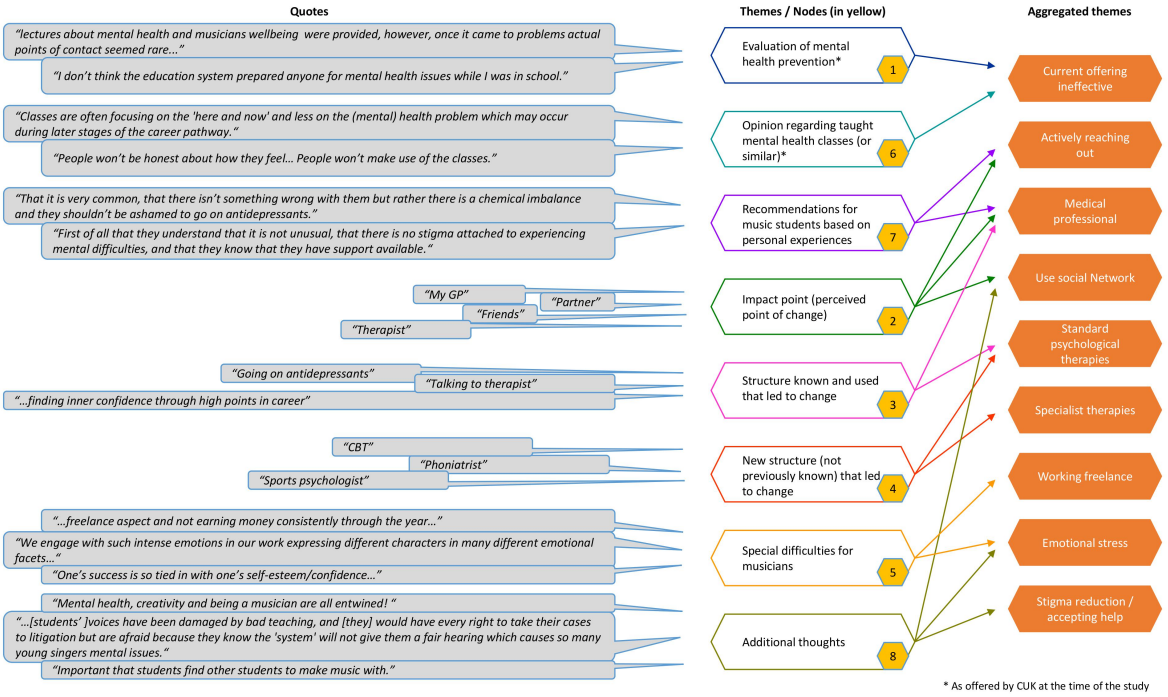

Figure 5.1: Data structure containing an overview of codes and themes with (selected) quotes

Only the participant who stated that they were teaching at a US music institution, noted a change of culture among students and staff between their own experience as a student compared to today. Both groups were now more open to being approached, and to talking about mental health. However, this perception of change might be specific to US music institutions. Media and other coverage about mental health generally tends to be more positive in the US compared to the UK (Huang & Priebe, 2003; Corrigan, Powell & Michaels, 2013).

In conclusion, all participants acknowledged that music college did not prepare them for the challenges they faced as professional musicians regarding depression. In this context, the 40-year period that participants collectively referenced is important to note. For a large portion of this time, no health structures were available to students, and despite the fact that these are now available, the feedback from participants still shows that they did not feel supported in this area. Contact points for mental and physical health at UK music colleges is available directly (in person) with a counsellor or, more recently, at nearby health centres, for instance Paddington Green for RAM or Imperial College for RCM. Students are informed

students during introduction classes how to deal health problems, would they arise usually by their student president. Whether or not such information is offered, depends on the initiative of the current student president. Furthermore, the music colleges' own websites provide comprehensive information about a wide variety of health problems and help contacts. Students can also request to see a practitioner registered with BAPAM (British Association for Performing Arts). However, these results highlight that changes introduced by institutions over recent years did not (yet) benefit students as much as expected. All participants concluded that music students were used to dealing with all sorts of problems, including mental health challenges, on their own.

5.3.2 Supportive structures - making a difference?

Responses to the previous question showed that either music college provided appropriate help, but students did not accept or music colleges did not provide participants with appropriate knowledge/help regarding mental health problems, or a combination of both. If music college was not the institution students turned to, the next step was to investigate which supportive structures participants turned to instead. This point comprises nodes two, three and four, all referring to various forms of support and networks (see research questions two and four). The answers stretched from deciding whom to trust or ask for help, structures that helped, and helpful structures participants wished they had known about earlier (in college). All participants noted that they sought professional (medical) help. Answers ranged from GP to a general therapist to psychiatrist to sports psychologist.

" GP was very helpful and understanding. Though I know [I] was lucky in this as it is not the norm." (participant 100)

Two participants reported that they also made use of their personal support systems such as family, partner and/or (close) friends. While all agreed that reaching out for help was the key/turning point, answers about which support was the most effective varied greatly. Individual strategies by the professional therapists reached

from prescribing medication to talking therapies, but also included simple practical approaches such as 'learning to be selfish with personal time' and building up self-confidence and 'remembering high points in one's career'. All participants felt that their approach worked best for them. However, all approaches mentioned are generally used for mental health treatment and are not specific to musicians. For instance, guideline principles and goals for depression treatment encompass three factors (a) acute therapy (e.g. medication usually with psychotherapy), (b) maintenance treatment (e.g. talking therapies) and (c) long-term therapy or preventing relapse (e.g. finding structures that help prevent relapse) (M Härter et al., 2010). Only one participant mentioned a specific music related experience with 'pre-nerves for auditions' and finding the tools to overcome this challenge:

> "... The biggest turning point was a 3 day session on 'Stage Fright' with a sports psychologist, who was helpful in giving tools to battle all forms of stage fright. ..." (participant 101)

In retrospect, after their experience with depression, most participants would have appreciated knowledge about therapies that turned out to be personal key turning points. These stretched from understanding cognitive behavioural therapy (CBT) to more general information about depression and wellbeing, but being able to recognise (key) symptoms. This particular remark regarding the ability to recognise symptoms was made by a participant who likely attended health and wellbeing classes as a more recent graduate. It was not obvious from this answer if classes were optional and they did not attend, or if they did attend, but the content of those classes was of limited personal help. Two of the three singer participants would have preferred access to medical professionals rather than being taught about these issues by music staff. They suggested the help of a Phoniatrist (speech specialist with special qualification) to understand specific singer problems and find a useful way forward. Mental health problems might affect singers physically, compared to instrumentalists, and 'cost them their voice', that is render them unable to perform, which adds extra stress.

In summery, participants all saw a medical professional either a GP or a psychiatrist in combination with another therapist, and recommended this approach and subsequent therapies as helpful. This is noteworthy for various reasons: (a) this behaviour contradicts the idea that musicians would be highly reluctant to see a medical professional and/or follow treatments, as laid out above (see paragraph 2.3.1), and (b) participants chose medical professionals and talking to their partners over talking to instrumental teachers or using their music based network, which was the opposite of what was in the literature (Williamon & S. Thompson, 2006). However, these results support the findings from Study I to Study II that stable relationships become gradually more important with age. They also show more congruence with Nanke and Rief's (2003) hypothesis that utilising medical help can be more reliably predicted by the amount of symptoms (or the amount of suffering) and the age than any other predictor. On research question four about available helpful structures for mental health issues, respondents displayed a lack of awareness about treatment options. All options suggested by participant were standard, and could have been covered in mental health classes, at least for participants who were recent graduates. It remains unclear if this not-knowing stems from the actual teaching content, not attending classes (i.e. classes being optional), or students otherwise not participating in these classes. This question will be the focus of the next paragraph.

5.3.3 Should mental health classes be taught in music colleges?

The answers in this node (node six) were centred around the question if health and wellbeing classes should be taught in music colleges, and tie back to part two of research question four, as discussed above. Five out of six participants felt that mental health classes in music colleges would only provide very limited benefits for students. In their experience, classes were not structured in a helpful way for students and students would either 'not be honest about how they feel' or reject the idea of investing themselves in those classes completely.

> "... Classes are often focusing on the 'here and now' and less on the (mental) health problems which may occur during later stages of the career pathway. ..." (participant 99)

> "... [students are] be too afraid to admit that they struggle to cope with emotional and mental demands ..." (participant 96)

The question resonated particularly with participant 100, who went through a recent traumatic loss:

> "What is needed, certainly from my experience of dealing with music colleges after the death of my friend, is that they recognise their [the music college's] culpability and that the endemic problems within the establishment are addressed. Only then can the concerns of students, who are afraid to challenge the supposed authority within these establishments feel safe to take their concerns to those who will listen and respond, without fear of it affecting their grades etc."

While it would be easy to dismiss this answer as a reaction of a grieving friend, this participant's expressed participant 96's words in more detail. Moreover, the participant's experience of music colleges and their professional career as a musician stretching over 40 years should be noted. This participant directly pointed to problems within the music college environment that other participants addressed indirectly when they mentioned students refusing to invest themselves into these classes out of fear. This also seemed to be backed up in the answer to node seven (personal recommendations) by participant no. 98, who was the only participant not admitting to previous mental health problems, despite my personal knowledge that they had received a diagnosis in the past. In this answer, the participant referred to 'someone approachable to talk to' while excluding college counsellors and/or other structures currently in place within music colleges.

> "... Ensure that there is someone approachable to talk to who is in a position to advise or refer a student further. ... "

The same participant also saw a problem in creating awareness for mental health problems.

> "... It would be a shame to introduce the idea of suffering to students who would otherwise manage any struggle independently and quickly."

Interestingly the second part of this sentence refers to what all other participants remarked often in many other points, albeit in a more positive way: students at music colleges are used to deal with all problems themselves. In conclusion to part two of research question four, if mental health classes should be offered as part of the music college curriculum, participants were not convinced that music college was the right environment for mental health and wellbeing classes. There are three possible reasons that this conclusion was reached by participants: (a) refusal of cooperation by students (i.e. not making use of offered classes), (b) classes not being useful, because of the structure/content not being useful for students (e.g. too general for singers), or (c) classes not being useful, because students have to be untruthful (or not refrain from stating their real problems) as they have to fear repercussions. While all of these points or a combination is possible, a likely clue lies within the observation that the request for anonymity was common to all three studies, and points towards point (c) as a likely underlying reason. In essence, this fear of repercussions is also reflected in the open critique of music college institutions by one participant, whose a contrario argument summarised the majority of points collected in this node, and highlights an aspect of why students might fear disadvantages arising from attending and sharing openly in mental health classes.

5.3.4 Special difficulties for musicians

In node five, answers relating to the first part of research question three, about musician specific problems in mental health, were collected. Participants highlighted a wide variety of problems. However, many of the problems raised, were equally applicable to freelance professions in general. Issues such as living with constant (financial) stress, or the need to appear successful in order to build a career, are not problems only encountered by musicians. Financial aspects were particularly important for participants who recently graduated. Singers remarked on the specific problem that this general stress expressed itself in physical problems such as nerves (auditions) and/or loss of voice, and instrumental participants also noted lack of confidence and/or creativity and subsequent lack of professional success. One answer

characterised the creative musical world as unique in the sense that it was inevitably connected with the need to express a wide variety of emotions.

> 'Because we engage with such intense emotions in our work, expressing different characters in many different emotional facets, it is almost inevitable that we as musicians are more in touch with the extreme highs and lows.' (participant 100)

Summarising part one of research question three, what challenges participants believed to be specific to musicians, most aspects were not unique to the musicians' world, but also experienced by other freelance professions, such as stress, financial strain, and the need to remain competitive. Reactions to stress, however, such as lack of nerves and/or subsequent loss of voice, are central to musicians/singers. Also, the need to engage with and internalise heightened emotions on a daily basis is particular to musicians. However, whether having to deal with a wide range of heightened emotions on a regular basis should be counted as a problem or an asset in terms of promoting (mental) health, was not explored by participants.

5.3.5 Personal recommendations to current music students

Node seven relates to research question four, what participants would have liked to have known before experiencing mental health challenges, and what they would like to communicate to current students in relation to this issue. All participants wanted current students to know that there should be less fear or stigma of mental health problems, and less shame in accepting help or following prescribed treatments (such as medication).

> "... it is very common, that there isn't something wrong with them but rather there is a chemical imbalance ... " (participant 96)

> " ... It is important to allow oneself help, it is also important to evaluate whether the help is professional (and actually helpful) ..." (participant 99)

> " ... they understand that it is not unusual, that there is no stigma attached to experiencing mental difficulties, and that they know that they have support available ... that peer support can be there as well as professional support ... " (participant 100)

> "... I would tell them not to be afraid to talk about it ..." (participant 101)

It is important to note that the things participating musicians found to be particularly helpful to know, and that they would like to pass on to young musicians in terms of (mental) health, where not different from those emphasised by other individuals who recovered from depression, irrespective of their profession (Mauz & Jacobi, 2008; Corrigan et al., 2013). In classical music careers, job recommendations often depend on physical and mental fitness, and therefore admitting to physical/mental problems is unusual. Peer support is important in this environment, and musicians who experienced mental health problems could be ideal contact persons for current music students in this regard. A similar idea was already suggested by a participant in answer to a different question (node five).

In summary, in their personal recommendations to current music students, all participants stress the importance of breaking through fear, shame and stigma. All points raised were not necessarily specific to musicians, but critical to musicians - particularly in view of the importance of personal endorsements. This cannot be emphasised enough in view of students fearing disadvantages if they were to admit mental health problems in music college. In terms of possible prevention, participants suggested that the ideal ambassadors would be musicians who previously experienced mental health problems. However, the question where such preventative measures should be made available remains problematic in view of previous findings regarding mental health classes in music college.

5.3.6 Random thoughts

In node eight, participants were given unlimited space to express their thoughts and raise points not covered in the previous questions, which would in their opinion be valuable for this investigation. Participants answers can be summarised into four categories (a) mental health knowledge or myths in the musicians' world, (b) actively applying more ideas/techniques from sports psychology within the curriculum,

(c) creating networks with other musicians, and (d) particular challenges within the music college environment.

Participant 96 described the belief that 'mental health, creativity and being a musician are all entwined!' and suggested to translate more ideas from (sports) psychology into tangible ideas for music students, rather just looking at the theory.

Participant 101 would like to see more focus on activities and end goals rather than the emotions felt during a process. Participant 98 pointed out the need to form smaller networks through 'making music together', fearing that soloists would perceive (mental) health problems more severely when lacking a similarly strong network. Participant 100 brought the conversation back to the music college environment and raised four different (sub)points. These were:

- Problems with authorities (i.e. teaching professors) perceived by overseas students, that they could not solve due to their culture and upbringing

> "... concern about Asian students' mental health. Their culture and training is all about hierarchy in their home countries. They feel when attending somewhere such as [redacted] that they are mere students, and cannot, nor should question what is happening to them as a result of the culture within those colleges. ... "

- Students' (singers') distress, for instance in view of wanting to change teacher (e.g. relationship between student and teacher did not develop as anticipated by the student and/or student preferred a different approach). These topics are difficult to judge at the start of a student-teacher relationship at music college, especially when students have a different cultural background from the teacher and/or institution.

> " ... As someone who sees students 'in secret' who come for out of college lessons because they cannot face the systemic fallout from requesting a change of teacher, I see the huge stress this puts on them. This is immoral and should be stopped. ..."

- Music college being a special environment

> "It became quite clear in my investigations, that sexism, racism and misogyny were rife at [redacted]. ... [redacted] is particular in its ethos, as it behaves very much like an 'old boys club' and without doubt they close ranks when there is anything which threatens them."

- The consequence from the last point is that students feel left alone with their problems with few means of addressing them.

> "...promises were made about processes being put in place to ensure that there was a safe mechanism for students from other cultures to discuss their [problems] ... singers whose voices have been damaged by bad teaching, and would have every right to take their cases to litigation as a result, but are afraid to do so, because they know the 'system' will not give them a fair hearing which causes so many young singers mental issues ..."

Similar answers were given to other questions, for instance if mental health classes should be offered at music colleges, implying that the music college environment was not a 'safe place' for students with mental health problems. However, these specific answers went a step further. As harsh as they might sound, similar points were made by music college students during pre-tests and other off-the-record conversations prior to Study III. These points also underline the need of participants to remain anonymous. This fear remains with musicians after having left music college, as demonstrated by the fact that all participants in this study were graduates, but still would not like to openly critique music college institutions.

In conclusion, two items stood out in this section: (a) musicians seem to believe that musicians and mental health problems belong together. This was astonishing in view of previous answers, which indicated that musicians did not seem to experience mental health problems any differently than other professions (see point one). (b) The unique stress in music college for students having to deal with fear on many levels. While only one participant pointed out these problems, the difficulties to set up an in-person, on-the-record-interview, and the fact that none of the participants recommended or personally made use of existing college structures, such as a music college counsellor, student services or even more general structures such as BAPAM (British Association of Performing Arts Medicine), speaks for itself.

5.4 Discussion

The findings from Study III raised a multitude of questions about mental health issues in music college environments, such as high anxiety levels or how musicians perceived mental health problems. The following discussion will focus on two main points (a) musicians' perception of (their) mental health problems, namely the belief that creativity, musicians, and mental health problems belong together, and (b) how this knowledge should influence depression prevention strategies. This ties in with the overall research question for this thesis, whether musicians perceive depression differently compared to other professions, and how this knowledge can be of practical help for musicians/music students.

5.4.1 A discrepancy between expectation and reality? Musicians and mental health problems

This section looks at the belief that musicians and mental health issues are inseparable from each other, or - going one step further - that mental health issues, such as depression, might even be necessary for creativity and thus for a musician's success. This point was not only raised in Study III, but also frequently came up in off-the-record remarks during my investigations prior to Study I. This perceived link was remarked upon by Study III participants in an unprompted section of the questionnaire that asked for free text about items or issues they believed to be important, and that had not been raised in the previous questions. This remark stood out particularly since it was the only one made about is called the 'creative mystique' (Pryal, 2011) or 'I want to bipolar' (Chan & Sireling, 2010), and there was no reference to this idea in the questionnaire. It is worth mentioning that surprisingly none of the Study III participants - not even the person believing in 'creative-mania' - reported to have had any artistic benefits from their mental health/ depression struggle. On the contrary, participants reported a 'creative drain' and more stress and fatigue in order to stay competitive while simultaneously 'feeling down'. In their recommendations to current students no participant mentioned a 'no-pain no gain attitude' towards depression, or that 'creative mania' needed to be

endured in order to have a successful career. Participants wanted current music students to know that professional help should be sought out, that taking medication did not mean defeat, and there should not be a stigma attached to depression. However, at some stage this belief in 'creative-mania' must have been present, since it was remarked upon without prompting. On the basis of this observation a question poses itself: why would anyone, but especially an entire professional group, be tempted to (self) diagnose an illness that is currently considered to be the leading causes for disability worldwide (World Health Organization, 2018)? The idea of having an illness seems to be counter-intuitive to wellbeing. My attempt to answer this question here is based on the hypothesis firstly that music students/musicians are not necessarily natural scientists, and can therefore easily be influenced by semi-scientific publications in this area, especially if the author has a scientific education and popular books are marketed as 'medical textbooks'.

Secondly, while the disclosure of bipolarity by public figures does provide moral support for 'ordinary people' suffering from the same disease (Ellison, Mason & Scior, 2013), the disclosures of famous artists have reinforced the belief that bipolar depression is a condition that is attached to the creative profession (Cross & Walsh, 2012; Ellison et al., 2013; Wong, Lookadoo & Nisbett, 2017). However, with a 1-2% prevalence worldwide, but a risk of heritability of up to 80%, this belief would effectively mean that bipolar depression, and thus the creativity-genius, almost exclusively runs in artists' families (see 2.2.7 for more information on low prevalence and high risk of heratibility). Such a line of thought would have to consequently culminate in the conclusion that non-artists could not be amongst those suffering from bipolar depression, contrary to the real cases documented for instance in Fry's BBC documentary *The secret life of the manic depressive*.

Sarris (2018) points out that society expects creative artists to be 'mad-geniuses', suffering from a variety of mental health issues. But is there a scientific basis for this argument? There are several problems in regards to the creative mystique belief as discussed in paragraph 2.3.1. To name two, (a) this 'creative-mania-mystique'

equation is mainly based on a correlation between creativity and mania, and (b) there is no agreement on how to define and subsequently measure creativity.

Dietrich (2014) refers to various statistical flaws in studies that investigated the creative mystique such as for instance base rate neglect or overpowering of simple correlation studies.

Looking more closely at the correlation issue, scientific studies investigating creativity and depression aspects found a correlation between depression prevalence, premature death (suicide) and creative professions (Ludwig, 1992, 1994; Andreasen, 1997; Jamison, 1995). Ludwig (1992) is one of the frequently named studies and will thus be used to illustrate the controversial nature of this subject in more depth here. In order to investigate a possible correlation between creativity and psychological disorders Ludwig looked into 1005 published biographies. These were explored for psychological pathologies and categorised into 'certain', 'probable' and 'non existent' pathologies. Categories one and two were merged into one for the analysis. Creativity was operationalised on the basis of posthumous appreciation, influence on other works, productivity and fame. Ludwig found a higher prevalence in psychological pathologies such as depression, anxiety and dependencies on alcohol and other drugs, in creative professions (artists, musicians) compared to non-creative professions (soldiers, athletes, administration employees). These results however, did not demonstrate a causal connection of psychological anomalies and the creativity of the individual, because it is correlational data and not causative. Furthermore, despite the large number of study subjects, which should have rendered a stronger correlation, the actual correlation for 'creative achievement' and depression was was weak ($r^2 = .04$). The interpretation of correlations can be problematic in that the interpretation the correlation's strength depends both on the connection between the variables and the context. To illustrate, the same strength of correlation as found by Ludwig, namely $r^2 = .04$, would carry more weight if the connection between variables was more established, such as for instance the consumption of a particular product and the development of an illness. However, Ludwig's study was one of the

first to establish such a correlation between creativity and success, therefore such a connection had not been previously established and should be considered weak.

Moreover, correlational studies are often used when certain beliefs are involved. In the same way that the belief that manic phases in bipolar depression are linked to creativity could indicate manic phases as a potential variable to predict career success, some arthritic patients strongly believe their condition to be influenced by the weather (Strusberg, Mendelberg, Serra & Strusberg, 2002), making the weather a likely predictor variable for onset of arthritic symptoms. Redelmeier and Tversky (1996) studied arthritic patients for a year and found no significant correlations between these two variables. To further test their hypothesis regarding people's propensity to perceive correlations where there are none, Redelmeier and Tversky (1996) tested college students by asking them to look at arthritic pain occurrences and barometric pressure, and to rate them positively or negatively. They found that 93% of the time college students consistently rated two uncorrelated pairs as correlated, based on the belief that change in the weather and pain in arthritis were linked.

Dysfunctional belief systems that lead to stigma and prejudices, such as the creative mystique, are often perpetuated when science has solid arguments against them as laid out in paragraph 2.3.1, but they particularly thrive the more fluid their concepts become, such as as the concepts of weather, wellbeing or creativity. Scientists have tried to operationalise the term creativity, but there is no uniform defintion. Dorsch found that creativity was not a concept that one could sharply define (Becker-Carus, 1994), while Kaufmann and Sternberg (2010) distinguished between day-to-day creativity, exceptional creativity and how creativity applies to different professions. However, the fact remains that there is no obvious, standardised definition for this concept (Thys, Sabbe & Marc De Hert, 2014). By using various definitions of creativity, from Ludwig's creative achievement to Kyaga et al.'s holding a creative profession, the fluidity of the creativity concept has provided various opportunities to link it to the creative mystique.

Contemporary studies that investigated creativity and depression, defined creativity as 'creative thinking' such as defined by the Torrance test of Creative Thinking, (L. S. Almeida, Prieto, Ferrando, Oliveira & Ferrándiz, 2008) and did not support the creative-mania idea. These studies found that bipolar depression, or rather its manic phase, was not conducive for creativity (Lauronen et al., 2004; Chávez-Eakle, 2006; G. F. Miller & Tal, 2007). Chávez-Eakle found high negative correlations of creative thinking with depression and anxiety. They considered this a 'relevant finding considering how entrenched the idea is, even among creators, of madness as a necessary condition'. In conclusion, there is some evidence pointing towards a link between creativity and mental disorders. There are however no indications that the severity of the illness or phases of mania increase creativity as the 'creative mania myth' suggests. On the contrary, the more severe the symptoms of depression were, the less likely creative expression was. In summary, I can conclude that a causal link between creativity and depression, if it exists in the sense of the creative mystique at all, has little to no basis in evidence. Nevertheless, it is anchored in musicians' minds as a predictor to potential musicianship and career success, which means it has be taken into account from conceiving prevention strategies to treatment options. This belief will also make it much more likely that musicians who do reach out for help, will have a greater level of suffering from depression symptoms compared to those who do not believe that depression to be essential for their career success.

5.4.2 First outlook at prevention strategies

Exploring the 'creative-mania myth' in the section above in more depth was done in order to be able to present results that would benefit musicians in a more comprehensive way, for instance in form of recommended prevention. strategies. It was therefore necessary to explore in more depth how a profession - in this case the music profession - perceives depression, and what (mis)conceptions and myths exist and persist in this particular environment (K. Henkel & Schneider, 2014; Hennig, Breido, Brüßler & Reichert, 2017).

Prevention strategies for multifactorial conditions also need to operate on a multidimensional level as laid out in paragraph 2.3.1. Furthermore, prevention strategies fall into two categories: (a) universal and (b) selective ones (Hahlweg & Bodenmann, 2003; Lösel et al., 2006). Universal prevention strategies, as the name says, include everyone in a group for instance the entire class, while selective ones target a specific at-risk group, specific problems, or dysfunctional ideas or strategies. While there are arguments for both types of strategies, prevention programmes with a universal character, especially for adolescents, have shown to be significantly less effective compared to selective prevention programmes (Horowitz & Garber, 2006; Calear et al., 2009). Musicians in Study III, and especially singers, would have preferred the offer of selective strategies to suit their specific needs such as being affected on a basic/voice level with pre-audition nerves.

This is understandable when one considers the obvious fact that a singer's voice is, for better or worse, always part of their body. Thus, any physical change, for instance based on a hormonal change (e.g. by pregnancy or taking contraceptions), or psychological stress can have a potential (negative) effect (Spahn & Voltmer, 2011). These are specific challenges that neither a violinist nor a pianist will face.

Universal strategies for all students on the other hand, have already been put into practice in many places, such as reminding students during exam times to find people to talk to in these especially stressful times, and connecting them to for instance Get Connected UK or Nightlines. Based on this, and on Study III results, I would therefore like to focus on selective strategies targeting music students or student musicians.

Two factors should make it easier to target the current student population. Firstly, the age and secondly as pointed out in this study, the closely knit network of musicians. As documented at several points throughout my thesis, starting in paragraph 2.2.5, age is a crucial factor in depression: this is not only the case because depression peaks at various points during a life time, but also because there is a pronounced shift between generations. The younger generation has, in contrast to older generations, accepted that psychological illnesses are part of

life. It is more ready to talk about it and is therefore also more likely to seek help (Nanke & Rief, 2003).

Even though this sounds like a simple step, the high ratio of individuals that do not seek medical help should not be underestimated (H.-U. Wittchen & Jacobi, 2005).

The closer social networks, as shown in Study III results, point towards a group that has good access to personal and social resources. In times of crisis, such as when experiencing depression, this makes it more likely to find support and reach out for help (Hass & Petzold, 1999). Based on this, one prevention strategy goal therefore pivots from convincing individuals to seek help to instead establishing points of contact between the group and professional medical help.

In the same way that depression is a multifactorial illness, successful depression prevention strategies in adults and adolescents should not only be selective i.e. target focussed, but also approached in a multifactorial way. Successful prevention strategies cover two of three parts of the multifactorial depression mode for instance cognitive and social aspects (Pössel et al., 2003; Holsboer, 2011). Programmes building on this approach doubled the power of their results compared to those using a one-sided approach (Durlak & Wells, 1997). The one sided 'top-to-bottom' approach, for instance teaching health and wellbeing classes, which is currently being employed by music colleges, does not seem to have achieved good results in terms of lowering depression prevalence (Clarke, Hawkins, Murphy & Sheeber, 1993). Literature recommends to shift from a passive approch towards an active approach, such as learning new skills. Unrealistic and/or self-derogatory ideas as well as limited social competence are here seen as central risk factors for depression rather than helping to prevent it (Martin Hautzinger, 2002).

Functional ideas are significant protective factors against stressful life events that lead to depression. To translate this knowledge into possible prevention strategies for music students, using only the results from Study III, one could for instance address cognitive dysfunctional ideas such as the creative mystique, and replace them with functional/realistic/science-based thoughts, while targeting the social component with (a) a focus on students networks, and (b) by introducing ways to

connect to professional medical help. Addressing student networks could either mean strengthening the internal network within the group, or opening it up so that music students could connect with students from other disciplines. It could also mean, as suggested in Study III, connecting music students with successful professional musicians who have experienced depression. In regards to the pronounced need for anonymity, students would be more likely to accept ideas/help from this source rather than from college staff. Music students would be introduced to the idea that a musician could be successful *despite* and not because of depression. This would be in accordance with Lightsey's theory that functional/realistic ideas need to replace dysfunctional ones and mirror how sports psychologists approached the subject by creating awareness through successful athletes (Schneider, 2013).

Study III also drew out a need to consider the optimal location for delivering effective preventive strategies: a place where individuals could feel safe and not feel subjected to stigma because of attending such an event/meeting/class, remains an open question - not just for the work with this particular group, but for depression prevention among adolescents more generally (Nixdorf, Beckmann & Nixdorf, 2019). Based on Study III responses about the environment music college, the reluctance to make use the offer of health and wellbeing classes, and the dislike of recommending any of these structures to current/future music students, puts at least a question mark on the location music college. Sports psychology faced a similar problem, but forged a way by putting different ideas, anchored in scientific findings, into practice. Here, sports professionals, scientists and clinicians agreed to outsource diagnostics, treatment, and prevention to outside entities, e.g. charities and medical professionals, who were not economically or in any other way linked to the (athletic/football) clubs (Frank & Nixdorf, 2013). This safeguards the anonymity of athletes. Such an option could be one to contemplate for music students going forward in depression prevention.

In summary, depression prevention strategies selecting one focus point (i.e. a more at-risk group, a dysfunctional idea or structure) have shown to be more effective compared to universal ones. Study III results uncovered a few crucial points

in that context. Firstly the creative mystique, the idea that bipolar depression spikes creativity and thus success, as a dysfunctional idea for this group. Secondly, in terms of safe location for delivering prevention, music colleges performed poorly in the eyes of Study III participants as they did provide a safe environment for students to accept or ask for help. In combination with the current one-side approach in the form of passively teaching prevention, rather than actively trying to replace dysfunctional ideas is not conducive to reduce depression prevalence. Mirroring sports psychology and enabling a connecting with outside entities such as mental health charities, could improve results. As various problems with anonymity showed in this study, outsourcing this aspect of mental health could also take care of students fearing negative consequences if they fully participated and/or took advantage of current preventative structures available at music college.

5.4.3 Limitation

While Studies I and II provided quantitative results that allowed for a certain amount of distance between the researcher and the participants, Study III posed an additional challenge. It was, however, at times difficult to disregard off-the-record remarks from these pre-test interviews and follow-up emails in the analysis. In such off-the-record remarks and emails, I was told stories by participants not officially wanting to enquire about possible 'backup career options' outside of classical music performance, for instance in music therapy. In their opinion such questions would have resulted in not being taken seriously as a performer and in losing (solo) performance opportunities, not being suggested for international competitions or not being given gigs outside of college. This was also true for expressing the wish to change teachers due to various problems (technical or personal) as noted officially by one participant. Furthermore, this applied to disclosing medical conditions or being blackmailed into providing physical gratification in exchange for desired auditions in first class opera houses, orchestras or for record contracts.

I made a conscious effort to disregard these remarks as well as my personal knowledge of the business, but cannot guarantee that this knowledge might not have

affected the analysis and discussion in any way, and so may have introduced a bias towards wanting to give participants an opportunity to voice their struggles. While the sample size was modest it was in line with qualitative studies investigating similar concepts such as grief in depression and chronic pain (Smith & Osborn, 2007; Ghesquiere, 2014; Kirkham, Smith & Havsteen-Franklin, 2015). Even though changing from face-to-face interviews to an online questionnaire was the only way forward to collect useful information in the time frame set for this thesis, it made it impossible for me to broach some subjects by probing with further questions. As a result of this interpreting some answers without additional explanations proved challenging. While every was taken to stay true to participants' intentions, it is possible that my interpretation may not fully reflect what each participant ultimately intended to say.

5.5 Conclusion

Results from Study III allowed a more in depth look at musicians who have suffered from mental health problems (depression) in their past. Contrary to the belief that musicians with mental health problems would not reach out for help, all participants reported seeking medical help, and to have followed the treatment advised by these professionals. No participant used any help structures commonly recommended by music colleges, nor did they recommend their use to current music students. Most mental health problems participants considered as specific to the music profession (e.g. lack of nerves, loss of voice), could in actuality apply equally to other freelance professions (e.g. financial stress, pressure to compete). Participants reported to have suffered from a lack of creativity during periods of depression and from the stress of having to remain competitive despite mental health problems. However, the belief in the 'creative-mania myth' was also present despite these personal experiences. Seeing this study as a third building block for the overarching research questions, the important preliminary conclusion was that musicians, despite using standard outreach methods and coping strategies, they perceived themselves to be a different or unique (patient) group in terms

of depression symptoms or even disposition for depression. These findings have implications for depression prevention strategies for musicians and music students. Selective prevention programmes should target dysfunctional ideas, such as the creative mystique, and should provide safe locations to deliver depression prevention strategies. Prevention strategies for mental and physical health are important for music students and should be offered in music colleges. Student musicians' bodies and minds are intrinsically part of their livelihood, and therefore should be looked after in the best way possible. However, future studies need to determine how to integrate these within the curriculum in ways that music students feel safe and will fully engage. Based on Study III, such focused programmes, or even peer support from professional musicians as suggested by participants here, could see better results than the ones currently on offer, driving up the adoption rate and thus the reach and potential benefit to student musicians.

6
Completing the picture

Contents

6.1 Introduction

In this thesis, I set out to research if music students were more affected by depression symptoms compared to students who were not musicians. Is being a musician/music student a significant predictor for depression as suggested by literature (Kenny & Ackermann, 2015)?

To delve into this issue, I looked at depression and depression predictors such as anxiety, depersonalisation (emotion processing), pain catastrophising, and coping

strategies. My study participants were university music students, music college students, and university students who were not musicians (Studies I and II). Part of the novelty of my study was the choice of target population for this area of research, comparing student musicians to non-musicians, and also university music students/musicians to music college musicians. Furthermore, the choice of longstanding validated depression scales, such as the HADS, was new for a student musicians' population in the UK. Lastly, the choice of adding depersonalisation and pain catastrophising was not, to the best of my knowledge, previously explored in a musicians' population.

After comparing groups using the individual variables, I pooled the data into one analysis to further explore if being a musician could be considered a 'risk factor' in depression using the cumulative weight of variables. In order to so, I first used the linear regression from Study I as a basis, and conducted a hierarchical linear regression using the variable 'professional identification' (here: MIMS total score) as the 'musicians' risk factor'. However, linear regression implies a functional (or linear) relationship between variables, while there is no certainty in depression research that this is the case. As a reminder, the depression model by Wittenborn et al., used in the introduction as well as throughout this thesis, illustrates the complexity of the subject and drives the point home that it would be better to exercise caution when implying a (simple) linear relationship of variables in depression. Therefore, and in addition to the linear model, I conducted a similar analysis using tree models. Tree models do not imply a functional relationship between variables and are more robust, and therefore more suitable for the exploratory nature of this study. I used the insights gained from Study III to interpret the results of these two linear and non-linear models. In conclusion, both models, the hierarchical multiple regression and the tree model, did not find that professional identification with being a musician was a significant or relevant factor for depression. Both models found that anxiety was the best predictor in that respect. However, in the reverse model, using a tree model to predict anxiety, self identification and clinically significant levels of depression were found to be relevant for anxiety. Anxiety here

is understood as a long-lasting problem/condition, as defined by the HADS. This rules out selective anxiety such as performance anxiety, as this should be considered an intermittent stress and not a longer lasting problem.

Based on the quantitative results from Studies I and II, a qualitative study was then designed to investigate how professional musicians experienced depression (Study III). Results from Studies I and II were - to some extent - at odds with existing literature, finding slightly lower depression and anxiety prevalences in the musicians' groups, compared to non-musicians. The depression predictors depersonalisation and pain catastrophising were significantly lower in musicians, while coping strategies were at similar levels.

6.2 Lower depression in music students - an error in measurement or a real possibility?

This exploratory project intended to investigate mental health in music students in comparison with students from other study subjects. The research was broadly guided by three overarching research questions (see paragraph 2.4, p. 82).

1. Do more music students suffer from depression or depressive symptoms than students of other subjects and can therefore being a music student be a significant predictor for depression? The reason why I separated depression from depression symptoms here in my original research question is that I wanted to keep an open mind to what I would discover. As a reminder, depression is essentially a collection of symptoms, and a population can be distinguished from another based on the distribution of their symptoms. From a certain amount of symptoms present, an individual is considered to be affected by depression. For this project, using the HADS questionnaire, this point was reached at the cut-off value of ≤ 9. It is highly likely that an individual with this amount of depressive symptoms suffers from depression from this point on. When the HADS is used in primary care, the questionnaire recommends to refer individuals with this level of symptoms to a specialist.

Experiencing a significant amount of depression symptoms, or suffering from depression, is essentially the same, but the choice of words can have different emotional connotations. A quantitative depression investigation's aim is not to definitively diagnose depression, which can only be done by a specialist on a one-to-one basis, but to determine the need for further investigation, interventions, and /or prevention strategies. With this in mind, and in view of the number of participants who were impaired by the amount of symptoms they reported in this project, using the term depression is appropriate.

2. When looking at depression amongst music students, are there any recognisable patterns of symptoms, both in quality and quantity, that single them out from other students?

3. How does the life of a music student and how do the demands of the music discipline/profession impact depression in terms of the following selected factors: professional identification, practice time (daily time and amount of years) or instrument played, pain catastrophising and, to some extend, anxiety (general and performance anxiety), depersonalisation, coping skills, burnout, sleep and/or stigma.

I looked at depression scores and a number of predicting variables for depression in a university and music college environment, using standard (medical) questionnaires. The predictor variables were anxiety, depersonalisation, pain catastrophising, and pain perception (to some extent), as well as coping strategies, professional identification with being a musician, burnout, stigma knowledge, and sleep problems. A follow-up qualitative investigation looked at how professional musicians, who had experienced depression, coped with the illness, which strategies they employed (finding help, treatments, etc.), and which of their acquired knowledge, based on their experience, they wanted to transmit to current music college students.

Customarily, this is the moment in a research thesis to evaluate the original research question(s) and apply the insights gained in this research in a discussion that pulls all strands together. While this chapter will do so, I found that adhering

to the structure in a rigid way did not represent my findings and insights correctly. I will therefore first focus on my second and third overarching research questions and then bring the discussion back to my first overarching research question, thus spanning the arc of the thesis back to the very beginning of my research.

Overarching research question two asked if there were any recognisable patterns of symptoms, both in quality and quantity, that singled out music students from other students. To briefly recapitulate, the idea behind this specific question was that a true at-risk group for depression might also present with a particular pattern of symptoms that distinguished it from other groups (see literature review p.92 for at-risk groups). In other words, we were investigating whether music students, as a group, could be distinguished from other students not only by showing a higher depression prevalence, but also by exhibiting a particular symptom or pattern of symptoms. This could, for instance, be a higher total anxiety score or a single depression or anxiety symptom that distinguished them. As a reminder, the HADS questionnaire measures the main depression (and anxiety) symptoms, dedicating one question to each symptom (see p.101 for more details regarding the HADS). Studies I and II showed a significant difference in depression prevalence between groups, with the music college musicians' depression prevalence significantly higher compared to that of both other groups (university musicians and university non-musicians). However, music college musicians showed a proportionately higher level of all symptoms, and no individual symptom or distinctive pattern of symptoms was found to significantly increase the total score (see Fig.A.1 as an illustration of symptoms shown by Study I participant groups). If one solely looked at the significantly higher depression prevalence in music college musicians compared to university musicians and university non-musicians, one might be tempted to conclude that music college musicians were the only at-risk group. Furthermore, since the variable 'music' or 'being a musician' is the one that mainly distinguished the groups in Studies I and II, one might be tempted to infer a causality for the observed correlation between 'being a musician' and depression prevalence. However, there are good reasons to consider a different conclusion based on a

review of the individual variables found to contribute to higher depression scores (resource eroding) and variables that contribute to lower depression scores (resource building), which will be presented and discussed in more detail below. Since this thesis investigated both quantitative and qualitative depression data, the last step here towards answering this overarching research question is to consider the qualitative results. Qualitative data will provide information on how individuals perceive the illness. This is important in an illness such as depression, which, in essence, is still diagnosed verbally in a dialogue between patient and physician (see paragraph 2.2.6, p. 20). Results from the qualitative study, Study III, in this thesis showed that musicians perceived and defined themselves as being unique based on being musicians. To elaborate, participants perceived themselves as belonging to a different or unique (patient) group as musicians. This applied to how they experienced depression symptoms and how they were disposed towards contracting depression in general (e.g. 'creative myth'). While the quantitative data from Studies I and II provided little to support this perception, it is nevertheless an important point to consider in the design of prevention and treatment options for this group. For instance, it would probably not be advisable, or even sensible, to include musicians in a 'musicians' group' during a depression treatment, as is offered frequently as depression treatment option, because music is their profession. This is only one exemplary point that demonstrates that in depression, quantitative and qualitative data should be analysed in context. This applies to research as well as to practical approaches in prevention and treatment plans.

Rather than looking at group differences, it was found to be important to look at underlying contributing factors as addressed in the third overarching research question. In order to answer this question, how does the life of a music student and how do the demands of the music profession impact depression in terms of the (following) selected factors, we need to take look at the individual variables that the studies took into account, to arrive at a differentiated answer: professional identity, practice time, pain catastrophising, anxiety, coping skills, depersonalisation,

burnout, sleep, and knowledge of stigma and mental health. Each variable added a unique contribution to answering this question.

(1) Professional identity (MIMS), practice time, and instrument played: professional identification levels were significantly higher in music college musicians compared to university musicians. To briefly summarise, a high level of professional identity was hypothesised to be congruent with high depression prevalence. MIMS identified not only how strong the identification with the profession was (MIMS total score), but also gave valuable insights into how vulnerable or resilient an individual was to depression (individual subscales). To take one example, the drive to practice, combined with the subsequent choice to isolate oneself from social contacts, was seen as a predominant factor to establish music students as a true at-risk group for depression. In essence this combination of attitudes (long practice paired with social isolation) translates into a dysfunctional coping mechanism with an origin in professional identity, increasing depression vulnerability as it erodes social resources. However, the same drive to practice, while keeping (diverse) social connections alive, would buffer the individual from depression and help to build up resources. While music college musicians showed both a significantly higher depression prevalence and a significantly higher professional identity score, an attribution of causality to this correlation might have led to the conclusion that professional identity with being a musician could be one reason for the significantly higher depression prevalence. However, the significant difference in professional identity was not based on a uniform or linear difference between groups in all MIMS subscales. As a reminder, MIMS consists of four subscales, two look at resource building factors for depression and two at resource eroding factors. However, only the subscales looking at resource building factors showed significantly higher scores, while the two subscales that focused on resource eroding factors did not differ by much between these groups (see fig. 4.4). That means that a high professional identity score does not automatically translate to a depression risk factor. Rather, such a conclusion needs to be based on the scores from the individual subscales. Years of practice did not correlate with depression prevalence. When the data from both musicians' groups was analysed

together, the results showed that the significant difference between music college musicians and university musicians could be found in the daily hours of practice, and not the accumulated years of practice. Furthermore, the level of professional identity was dynamic in terms of time elapsed. This means that professional identity increased only after at least two consecutive years of daily practice (see fig. A.6 and fig A.7). This development over time was found to be independent from the study institution attended. Lastly, there was a trend that high string players showed higher professional identity levels compared to other instrument groups or voice.

While the latter relationship between factors was only observed as a trend, which is as such difficult to comment on, the same relationship had been previously observed by (Gembris, 2008),is therefore mentioned here. It further adds to the body of knowledge indicating that high string players could possibly be more exposed to the risk of depression than other musicians. This variable will be scrutinised in more detail in paragraph 6.2.2 below.

(2)Pain catastrophising: despite anticipating a high level of dysfunctional pain processing, such as pain catastrophising, based on the pertinent literature (see paragraph 2.3, this variable declined in its significance as a depression predictor for musicians from Study I to Study II. Moreover, the significant difference in high pain catastrophising (≥ 130) between music college musicians and university non-musicians showed that this was rather an issue for university non-musicians. This is particularly notable, because music college musicians reported the longest occurrences of pain (12 months and longer) out of all participants. This clearly shows that pain perception and pain processing are two separate variables that should not be conflated, underlining what general pain literature has pointed out for some time (see paragraph 2.2.10, p. 45 for more details on this subject). Consequently, these results show that the variable pain perception has little validity on its own as a depression predictor, if at all. For the variable pain to play a significant role in depression, the pain has to be dysfunctionally processed as discussed in paragraph 4.4.

(3) Anxiety (including coping skills): in accordance with the literature (World Health Organization, 1992), this was by far the most important depression predictor for all groups. There was, however, no uniform distribution of anxiety between groups. 55.5% of university non-musicians reported clinically significant anxiety, music college musicians reported 43.7%, and university musicians 40.6%. The general anxiety scale showed that music college musicians were most likely reporting high anxiety scores because of a stressful environment, rather than based on psychiatric illnesses. Moreover, results from Study III indicated that participants did not consider their (former) music colleges to be particularly trustworthy or helpful in view their own mental health problems. As mentioned above, the culture of teaching institutions needs to be taken into account as it may play a vital role in the experience of depression. Why did music college and university musicians show lower anxiety levels than university non-musicians? There could be various reasons based on pertinent medical literature. Firstly, there is a possibility of habituation. Musicians could have grown accustomed to stressful situations and developed a better coping routine (Grayson, Foa & Steketee, 1982; Peterman, Carper & Kendall, 2019). Anxiety may only peak in high-stress situations, such as right before a performance, and then descend to a lower anxiety base level after such a situation - a working hypothesis that could be tested in the future. This theory is supported by the findings in Studies I and II, that on the whole, musicians showed better active and functional coping strategies compared to non-musicians. Secondly, it is possible that due to the years of playing successfully in concerts and auditions, musicians evaluate anxiety-inducing situations differently than others, and dispose of greater self-efficacy compared to non-musicians (World Health Organization, 1992) - another hypothesis that is suited to further testing and investigation. Furthermore, the possibility that making music could have a long-term therapeutic effect on active musicians should also not be discounted. Making music, similarly to listening to music, might offer an outlet and the possibility to channel anxiety (Hessenberg & Schmid, 2013; Spintge & Droh, 2012).

Depersonalisation emerged from the literature as a predictor for both depression and dysfunctional coping in adolescents, and thus is not only a short-term depression predictor, but also a life-time predictor (see, for instance, paragraph 2.4). Results of both Studies I and II showed a difference in the quality of depersonalisation between groups, with music college musicians experiencing the longest durations and the lowest frequency of episodes, and university non-musicians the shortest durations, but highest frequency of depersonalisation episodes. Dysfunctional coping strategies significantly increased the overall risk of depersonalisation phases in all groups. Successfully learning how to manage emotions was key for this age group in terms of predicting future depression over the course of a life time. In this respect, both musicians' groups in Studies I and II showed better results than their university non-musician counterparts. Moreover, if results from Studies I and II can be replicated, the results could produce an answer to why depression declined in older musicians while it increased in groups from other stressful professions, as shown by Voltmer, Schauer et al. (2008). It is possible that having learned an instrument/to sing, and keeping up practicing/playing an instrument or singing, might have an impact on depersonalisation phases, emotion regulation, and thus depression. As Studies I and II were, so far, the first studies to look at the impact of this combination of variables in a musicians' context, the resulting hypothesis needs to be seen with a critical eye. It should nevertheless be followed up upon in future studies. This could help to establish a different layer of understanding regarding the impact of learning an instrument/to sing, particularly with a view towards prevention of mental health problems.

Burnout and sleep (including coping skills): in accordance with the literature (World Health Organization, 1992), sleep also showed to be a significant depression predictor. Sleep and coping strategies were congruent with the depression score, that means individuals with low scores of dysfunctional coping strategies, high active functional coping, high cognitive functional coping and who are good sleepers (scores below 5) also had low depression scores. High depression scores were reflected in the inverse scores on the aforementioned variables. However, as music college

musicians were mostly good sleeper, a lack of sleep could not account for the high depression scores. Burnout, especially low burnout with professors was found by the tree model to be a significant predictor for depression. This reflected the findings of recent studies with elite college athletes (Frank & Nixdorf, 2013; Nixdorf, Beckmann & Nixdorf, 2019). Moreover, studies with elite college athletes found stress to be the significant predictor for burnout and, more specifically, sports-related stressors were positively linked to burnout (Frank et al., 2017). Adolescent college elite athletes' perceptions of conflicts with coaches have been identified as significant predictors for burnout, and coaches with a 'disempowering or controlling motivational style' increased the likelihood that their athletes experienced burnout (Appleton & Duda, 2016). For musicians, such a motivational style, also referred to by some as 'an imperative or Russian teaching style', has been found to be used especially for string players (Gasenzer & Parncutt, 2006) and could have a similarly negative impact. This might be one explanation why in our study teacher/professor burnout had a greater impact as depression predictor than personal burnout, work burnout or burnout with fellow students. It is also a further indication for the importance of the environment in both burnout and depression. Drawing from the parallels between elite college athletes and musicians in training, these findings and this line of thinking will help as we advance research into musicians experiencing burnout and depression.

Stigma is and has been a problem for the diagnosis and successful treatment of depression. This reaches from the self-stigma of patients to an impediment for sufferers from reaching out for help and treatment, as expressed in paragraph 2.2.2. University musicians demonstrated a significantly better knowledge of mental health facts compared to their non-musician peers (see paragraph 3.3, p. 125 for more details on the results from Mental Health Knowledge Schedule (MAKS)). However, results from all three studies raise grave doubt whether this knowledge translates into positive action, or in other words it is unlikely that musicians reach out for help faster than non-musicians. In fact, the fear of being identified, which was demonstrated by participants consistently throughout this research, together with the special stigma attached to depression as documented here ('creative myth')

and in literature across various professions, makes it reasonable to assume that musicians are indeed slower than non-musicians to reach out for (medical) help when affected by depression. This not only shows that there is room for improvement in the area of mental health and stigma education for both student musicians and professional musicians, but also that primary prevention strategies need to be carefully conceived and evaluated in light of these findings, in order to have any long-term effect (see paragraph 2.3.1 and paragraph 5.4.1. As discussed in paragraph 5.4.1, some of the research and practical approaches from sports psychology to stigma in elite athletes could be useful and helpful for music psychology. While stigma is individual to every group, the heightened need for anonymity for both elite athletes and musicians is similar. To give a brief summary, both groups cannot only suffer from self-stigma, but also from stigma that is applied from the outside, for instance by clubs, employers, colleagues and fans. For members of either group, a bad performance, be this a missed goal for a footballer or a cracked top note for a singer, might turn out to be detrimental for their career if it was labelled or traced back as an issue arising from depression. Sports psychology's practical approach was to create anonymous helplines credited out to professionals (psychologists/psychiatrists) to be used only by athletes. These have been widely accepted by athletes. The motive here was to build up trust on various levels: firstly the motive was to ensure that the individuals's condition would stay private, even when they decided to seek help in person. Secondly, the motive was to find solutions that assured as much privacy as needed during treatment and beyond, so that athletes would not be additionally subjected to more stigma in their surroundings (e.g., by their fans or the public). Such an approach could conceivably also be a solution for musicians and music students.

Returning now to the first of my overarching research questions with the benefit of the results from all three studies, the answer remains challenging. Do more music students suffer from depression or depressive symptoms than students of other subjects and can therefore being a music student be a significant predictor for depression? While there was a significant difference in depression prevalence

between music college musicians, university musicians and university non-musicians, there was no significant difference in depression prevalence between university musicians and university non-musicians. In fact, university non-musicians showed, on average, a 12% higher depression prevalence than university musicians, which is seemingly at odds with the literature. These differences in depression prevalence alone already indicate that the variable 'being a music student or being a musician' is questionable as a depression predictor, and neither of the large models in Study II found this variable to be a reliable predictor for depression. Moreover, the variance in depression prevalence between groups suggests that, rather than profiling by profession or study subject, the cultures of teaching institutions need to be taken into account as they may play a vital role in students' experience of depression (please see underlying factors as discussed above). However, a quantitative study has limits when investigating the 'suffering' from depression. Turning therefore to Study III will help to shed light on how some classical musicians experienced depression. Here the participants, professional musicians who had in the past been diagnosed with depression by a medical doctor, believed that they represented a unique patient group. Moreover, they considered themselves to be more predisposed to depression because they were musicians (see paragraph 2.3.1 and 5.4.1). While the numbers from the two quantitative studies do not support profiling by profession, the perceived suffering of former patients showed the need for a different practical approach in terms of therapies and prevention strategies for musicians.

6.2.1 Expectations versus findings

Based on previous literature, there were reasonable grounds to expect that music students would show a higher depression score when compared to non-music students (Rosset i Llobet, 2004; Ackermann et al., 2012; Hildebrandt et al., 2012). However, there were also arguments to suggest the contrary. Voltmer, Schauer et al. (2008), for instance, reported that depression scores declined for musicians with age. This was in contrast to engineers (aircraft manufacturers), where the depression score increased with age. Also, literature showed high job satisfaction for professional

musician and, at an amateur level, it showed beneficial effects of listening or making music on (mental) wellbeing (Kivimäki & Jokinen, 1994; Young, 2017). If music making inherently carries factors that have beneficial effects on mental wellbeing, are music students/professional musicians on the opposite side of the spectrum of amateur musicians, or are some variables that promote mental wellbeing still applicable for this group?

Study I, set in a university environment, did not confirm the musicians-more-at-risk hypothesis. Even though depression scores for all students were high, university non-musicians (students for whom music only played a small part in life see paragraph 3.2.2), had a 10.1% higher depression prevalence compared to university musicians. This result, not congruent with the majority of the existing literature in this area, which generally puts music students more at risk for depression, first initiated the idea of an error in measurement. However, all variables for depression were consistently lower for university musicians compared to non-musicians. This included anxiety and pain catastrophising. These variables are considered solid predictors for depression (Lieb & Frauenknecht, 2012), and so far, results were in line with medical literature (see paragraph 2.2.6, p. 20 for depression and paragraph 2.2.10, p. 44 for pain as a comorbidity to depression). Furthermore, Study II's depression results, concluded that while music college musicians had higher depression scores, depression predicting variables were not significantly higher. Both groups, of university musicians and non-musicians did not show a difference in individual depression symptoms as measured by deconstructing the HADS (see Appendix for Study I Fig. A.1). Power calculations concluded that both quantitative studies had a reasonable effect size, considering the amount of participants and predicting variables (see paragraphs 3.3, p. 107 and paragraph 4.3, p. 172). Moreover, the consistency in both study results makes an error in measurement less likely, not only for the actual depression scores, but also for variables predicting depression.

A few reasons for the disparity in depression levels could apply here: Firstly, the age group studied (adolescents) is generally more at risk for depression. However, this peak also depends on cultural background and emotional maturity (see age as a predictor for depression in paragraph 2.2.5, p. 17 and Fig. 2.2). Secondly, depression rates among students of other (non-music) study subjects might have been underestimated, especially as there was no UK comparison, and/or thirdly, preventative properties of music making, used for instance in music therapy to mitigate depression, may apply to music students.

Age There is a growing body of evidence that depression peaks during adolescence (Schoenbach, Kaplan, Wagner, Grimson & Miller, 1983; Radloff, 1991; H.-U. Wittchen, Jacobi, Klose et al., 2010). However, more recent studies discovered that depression is not uniformly distributed in adolescence. There is solid evidence that there are differences between genders and also differences between racial and ethnic backgrounds (Petersen, Sarigiani & Kennedy, 1991; Twenge & Nolen-Hoeksema, 2002; Hankin, Mermelstein & Roesch, 2007; Danneel et al., 2019). For instance females tend to report more depression compared to males, who tend to report their depression more as aggression, independent of their age (Rice, Fallon, Aucote & Möller-Leimkühler, 2013; Di Pentima, Toni & Attili, 2019). African-American, Hispanic, Asian and White adolescent depression peaks occur at different times during adolescence (Petersen et al., 1991; Gore & Aseltine Jr, 2003). For instance, Asian adolescents' depression peaks fairly late compared to that of other racial groups, due to their cultural upbringing and parental expectations of obedience (R. M. Lee & H.-T. T. Liu, 2001). To further illustrate this point of cultural differences in depression, one participant in Study III highlighted the issues of Asian students in Europe, thus demonstrating that these changes need to be taken into account. However, looking into these details went beyond the scope of this thesis, as I deliberately excluded racial and gender demographics in order to ensure anonymity. It is therefore possible that there was a gender and/or ethnic bias in the participating groups in view of age and different peaks in depression.

Environment and study subjects contribute to depression scores. University students are more affected by depression compared to non-students of the same age group, which was discussed in detail in Study I (see paragraph 3.4, p. 142. As one short reminder and summary, Andrews and Wilding's findings following UK dentistry students pre, during, and post study time, are most notable in this area. This longitudinal study showed not only a high depression prevalence in non-music students, but also that depression peaked during university time and declined in the first year of work. Moreover, recent studies showed that the expectation for depression was largely underestimated in some study subjects (Rotenstein et al., 2016). Medical students, for instance, suffered more from depression than previously believed. It is therefore possible that the university environment contributed to more stress, and that non-music study subject have previously underestimated the depression rate of their students. With a high percentage of student participants studying natural sciences in Study I, it should be interpreted in the light of these findings. Lastly, up to Study II, there was no comparison data available between music college students and university students on depression, anxiety and (chronic) pain in the UK to the best of my knowledge. The ones that compared data were done in other European countries for instance by Spahn, Burger et al. (2005) or Steinmetz (2015). In contrast to (UK) music colleges, universities have had a long track record in researching depression in various study subjects in single studies and by comparing meta-data and longitudinal studies (Rotenstein et al., 2016).

Even though the studies by Spahn, Burger et al. and Steinmetz and the ones undertaken by the music colleges own research departments give us some ideas and expectations for this environment (see paragraph 2.3, p. 58 for more details), the lack of comparative data in this case is make the environment music college largely an unknown variable.

Making music together was, so far, a variable in improving depression that has only been taken into account in an amateur music environment or for non-musicians, but not for musicians (see paragraph 3.4, paragraph 4.3 or paragraph 5.3.6). The term 'making music together' was understood as casually making

music, not practicing for a performance or playing/singing during a performance. Considering the lower depression prevalence in university musicians, it is conceivable that music making together acts as a buffer from depression, even in this setting. The main argument for this theory is that lower depression scores were not only found in students with the main subject music, but also students identifying as musicians who read a different main study subject. Based on Study I results, university musicians, who did not study music as their main subject compared to university musicians who did study music in terms of the level of identification with the profession (see paragraph 3.4). Moreover, professional identity levels for music college musicians only significantly increased on the preventative depression scales, such as self identity, and not on the ones promoting depression such as negative affectivity. This not only means that music college musicians had more protective resources against depression in the moment, but also against future depressions (Tibubos et al., 2019). This could be one explanation for Voltmer, Kötter and Spahn's results that older musicians were less prone to depression compared to older doctors or aircraft engineers (see paragraph 6.2.2 for more detail on professional identity and depression for musicians) Furthermore, Study III results showed that the idea of making music together was something that professional musicians believed to be a variable that would at least have preventative properties for depression.

The limited availability or complete lack of comparable data on all three of these variables above, especially in the music college environment, also means that it remains difficult to weight these variables in term of their predictability for current and possible future depression episodes. From pre-test feedback on all three studies and Study III results it would seem that the environment music college is a considerable stressor, but it remains to be seem in future comparison studies how this or the variable 'study subject' (other than music in a university) impact current depression and help to predict possible future depression.

6.2.2 Professional identification - a resource building variable against depression for student musicians?

Professional identity has been a standard variable in sports psychology research, in combination with depression, but has not been considered in a similar way in music psychology (Dibben, 2006). The literature on how to measure identity and its relationship with depression in the present study was derived from sports psychology. Given the similarities but also differences between music and sports, it was initially unclear how this scale would perform when used with student musicians. Since being conceived, the identity scale by Brewer, Van Raalte and Linder had evolved from a first hypothesis, where a high total score was seen as a solid depression predictor, to a more nuanced one that differentiated positive/negative impact based on the individual four subscales. The current theory is that some subscales promote the development of depression, while others act as a buffer (see paragraph 3.4, p. 132 for more details). For instance, high scores for the subscale negative affectivity have been associated as a resource eroding variable promoting depression development, while high scores of social identity have been associated with resource development or a buffer against depression. Individuals with high negative affectivity and low social scores can have the same total score results as individuals with opposite subscale scores. However, how these two individuals react would be very different: individuals with high social/low negative affectivity scores should dispose of more resources and be more resilient to stressors, and therefore less affected by (or more protected against) depression, while the opposite would be true for an individual with low social/high negative affectivity scores.

Based on Studies I and II results, university musicians' identity levels closely reflected the newer model for college athletes (see paragraph 3.4, p. 138 for more details). Identity levels in both cases are closely linked to how much time is invested in the subject, in this case sports or music. University musicians spent less time practising their instruments compared to music college students, and therefore had a lower total identification score (paragraph 4.3, p. 180). However, diving into the

subscales, higher identity scores for music college students resulted in significantly higher scores on those subscales acting as depression buffer (see Fig. 4.4, p. 182). Resource eroding or depression promoting subscales remained almost the same. High values in resource development or depression buffer subscales translated into tighter networks amongst students and a healthy way of evaluating oneself, but interestingly also more openness and ability to transfer into different musical jobs with more ease than previously anticipated. This line of argument is based on the close similarities between the identity subscales for musicians with those of professional athletes who successfully started a different career (see paragraph 3.4, p. 138). In terms of depression scores, this means that student musicians are arguably less at risk for depression than previously thought. Furthermore, it means that when individuals are affected by depression, there is a higher chance of mitigating stressful effects, finding help faster and, if necessary be more treatment compliant. Resource development is here achieved from a tight and trusted network. These results were supported by participants' responses in Study III, who commented that making music together on a professional level can act as a depression buffer that would be more difficult to achieve for soloists:

> ' ... It is important that students find other students to make music with. I can imagine that soloists have a harder time than those of us who work constantly in duos and ensembles. ...'

It might be worth to point out here that the soloists this participants referred to, based on their on level of work, referred to internationally performing soloists, who, by the nature of their performance level, had not only more international travel, but were also subject to more publicity and pressure than a soloist performing at lower levels.

However, if music college musicians dispose of greater resource developing assets in terms of identity for current and future depression, it simultaneously means that the variable music college environment increases as a stressor for depression, when compared to university musicians and non-musicians.

While results from Studies I and II reflect this particular pattern in professional identity in terms of depression buffer/resource development variables, it must be said that this was the first time a study used this scale with musicians. Based on the similarity of the results in musicians and athletes, it is reasonable to expect similar results in future studies with musicians as those already published in sports psychology. This means that high professional identity in musicians with a high practice record can also be broken down to show high resource development or depression promoting subscales and low resource eroding or depression buffering subscales. While a lot of practice as a musician or an athlete may result in a high total score of professional identification, only a closer look at the subscales can determine if this high total score actually helps to buffer depression or not. Therefore, a simple conclusion that more practicing equals higher professional identity and results in raising the depression buffering subscales, should not be drawn.

Further analysis of professional identity subscales revealed yet more similarities between musicians and athletes. Subscale scores were closely linked to the amount of daily practice for both musicians and athletes. However, the amount of years practiced only played a very minor role, if any, compared to the hours invested in daily practice. Furthermore, the level of identity was not linked to the type of study institution. An observable trend towards an increase in depression promoting subscales among student musicians was in accordance with the literature that views players of high string instruments as more at risk for depression (Kreutz et al., 2008). Although depression risk is usually tied to higher levels of musculoskeletal pain and the drive to practice more, and the increase in negative identification subscales, can serve as an additional resource eroding variable and explanation for depression in high strings.

Considering the similarities of sports and music in this area, there is one points more to make for depression in the area of depression prevention strategies. College athletes with a similar distribution of subscales have been found to be more approachable for depression prevention strategies, and also transfer more easily out of professional sports when injuries or age require them to (see paragraph

3.4, p. 138). However, UK music college musicians were found to be less open to prevention strategies (Williamon & S. Thompson, 2006). Results from Study III and pre-test feedback for all studies show that this attitude is not so much based on musician identity, but rather on fear of the music college environment. All Study III participants concluded that the music college environment was not the right place for mental health prevention. There are reasonable grounds to expect that student musicians would react similarly to college athletes if the approach to offering prevention opportunities was changed appropriately (see paragraph 5.3 , p. 241).

Not only did subscales of professional identity allow for an explanation for depression levels on an individual basis, they were also used as predicting variables in the depression models (i.e. resource developing or eroding variables, see above). In the hierarchical linear depression model , the total identity scores was used the 'at-risk' or erosion variable (see paragraph 4.3, p. 198). While professional identity improved the model, it did not improve it significantly. Furthermore, the negative relationships between professional identity and other variables within the model added an additional layer to the theory that some identity subscales are resource eroding, while others develop resources.

To summarise the insights gained here, professional identity levels helped to interpret the diverse levels of depression across studies. Professional identification with being a musician carries both resource developing and eroding or depression promoting and depression buffering properties. In terms of depression research, this makes an investigation into professional identity subscales imperative, rather than taking the full score into account. Identity levels were independent of the study subject or the higher education environment. They depended on the hours the individuals invested into daily practice: more hours practiced translated into higher professional identification and thus, also, on a logical basis, determined the level the individuals were able to perform at. Despite showing higher depression levels, music college musicians were, based on their identity levels less at risk of depression based on 'being a musicians, for current and future depression. Moreover, making music together at any level - student, amateur or professional - as a leisure

activity, boosts self and social identification levels, and consistently emerged as a depression buffer variable throughout the entire thesis.

6.2.3 Anxiety - the strongest depression predictor

While the section above looked at musicians' specific depression buffers, the overall high levels of depression among all student participants made it necessary to take a closer look at other resource eroding variables for depression.

Independent of age or environment, anxiety has been identified to be a solid predictor for depression (see paragraph 2.2.9, p. 42 and Fig. 2.10 for more details). The hierarchical linear regression model found that anxiety accounted for 54% of the overall variance, and the tree model for clinically significant depression found anxiety to be one of the two predictors (see paragraph 4.3 , p. 198). Fear and anxiety to loose anonymity and being identified with a mental health disorders, whether perceived as such or real, was not only something described in literature, but prominently featured in pre-test feedback to all studies and in Study III (Rosset i Llobet, 2004; Greene-Shortridge et al., 2007; Dyrbye et al., 2015; Gold et al., 2016). Looking at Study III results, fear and anxiety were omnipresent in the music college environment: fear of disadvantage and negative consequences when admitting to weakness, for instance mental health problems, fear of not being competitive, or fear of being left alone with a wide variety of problems such as changing teacher, challenging professors/authorities (see paragraph 5.3, p. 241).

On this level, and particularly in terms of transferring theoretical insights into practical applications, sports psychology is still very much ahead of music psychology. For instance, Frank and Nixdorf (2013) reported how fear and anxiety about exposure of mental health issues in the athlete's environment had been taken into account, and consequently some sport clubs had outsourced all areas of mental health care (e.g. check-ups, prevention), thus respecting the athletes' feedback. Moreover, as laid out in paragraph 5.1, on a practical level neither psychiatrist treating professional (elite) athletes or physicians treating musicians did advocate disclosing their conditions, in case of musicians physical or mental health.

In summary, my research did not only identify music specific depression buffers, or resource building variables, in professional identity subscales, but also pinpointed a depression promoting, or resource eroding variable in anxiety. Since anxiety was measured by the HADS, symptoms would have been present for a minimum of a week. Evidence in general literature suggests that this would be general anxiety disorders rather than specific phobias such as performance anxiety, which should be selective.

6.2.4 Prevention strategies - Where does it leave us?

How can this knowledge about musicians and mental health be applied practically to help musicians? Three important prevention strategies emerged through this research that can be applied on a broader basis. Firstly, making music together: while ensemble playing forms part of the curriculum for most music students even musicians who study non-music study subjects at university, can benefit from the music-specific buffers against depression, by taking part in ensemble music activities. For instance, they can play with the university orchestra or sing in the choir. Musicians preparing for a career as solo performers should always make sure they allow time to make music with their fellow musicians. Secondly, enlarging one's social network beyond the music world: it is apparent that the university environment offers several natural advantages over the music college environment in this respect. Here, musicians who major on music studies are given the opportunity to reach across to students of other faculties to enlarge their personal network with friends from across the university, for instance by making music together. They also can discover other study subjects while majoring on music. This is harder for music students in music colleges, since the environment doesn't naturally lend itself to such connections. Thirdly, musicians' health and wellbeing should be a point of focus. Based on existing literature and this research, and irrespective of the type of higher education institution, prevention strategies for student musicians should be implemented with two important factors in mind: they should form part of the curriculum, and at the same time be outsourced to specialists who don't report back to the education institution, as discussed in Study III (see paragraph 5.4.2, p. 257).

How such a point-focussed program could look like has been demonstrated by a two-year pilot project of the Universität and Hochschule in Vienna, a cooperation between the sports and the music department (Diketmüller, 2010). It was implemented within the curriculum for all students during these years, and offered a wide choice of different classes for music students. Temper noted that on average 330 students filled out both questionnaires at the beginning and end of the semesters. These ranged from 'Spiraldymanik' (a version of Alexander technique), to Pilates, power training and/or body fit classes, as well as several workshops (e.g. dance) over the year. Students were free to choose which classes they wanted to attend. Once students had chosen, attending was mandatory for the semester. Additionally, students were given the option to have physiotherapists assess them during their lessons, in cooperation with their instrumental teachers. This option was surprisingly well received by both students and teachers. Coincidentally, this was also a model that had been suggested in my pre-study feedback. Students reported that they had learned how to improve posture and minimise pain with exercises that were designed specifically for their needs. Diketmüller reports that 94% of students felt at ease with the outside staff and well taken care off. 67% of students reported a physical improvement that they noticed while playing/singing, as well as in daily life, and 60% reported a decrease of pain when playing/singing. Furthermore, post-study feedback was that 93% wanted the project to be implemented as regular mandatory part of the curriculum and 69% would have been willing to financially contribute to the project. The only aspect that did not improve as anticipated, was performance anxiety. However, there was no class that was specifically designed for that purpose. It is worth noting at this point, that the need for specifically designed classes to address performance anxiety and pre-audition nerves, led by sports psychologists, was brought up as a requirement during Study III.

On a smaller scale, but also using a point-focussed and multifactorial strategies, Spahn, Walther and Nusseck (2016) investigated performance anxiety only. Thirteen students were offered specific training (video feedback, body awareness, etc) over a period of fourteen weeks. Participants of the intervention group showed a significant

improvement from the first audition at the start of the intervention to after the fourteen weeks. The points that improved noticeable were the feeling more in control on stage such as vanishing anxiety on stage and the trembling of hands while performing, but also the impression of being pleased with the performance.

In summary, these studies showed that prevention strategies for music students targeting mental, but also physical health are possible. In order to be successful, they were multifactorial, mirroring the condition they wanted to target. Consequently this means that they were time and resource consuming and also need to be evaluated regularly, if they want to be implemented in a way that benefits the students in real terms. A point that was implemented taking from sports psychology was that all health course were outsourced to professionals. Sports psychology showed this a a crucial point for successful implementation of prevention strategies as athletes felt safe to talk about 'weak points' and could be sure that they nothing would be reported back to their employer or, for music students, to their department. The only difference for music students was the offer of physiotherapists visiting the students' instrumental or vocal lessons. However, the study made clear that this particular offer was only done when both, the student and the teacher were comfortable to be evaluated by the physiotherapists. It was as much a learning aspect for students as it was for instrumental/vocal teachers. Studies also showed that enlarging the social network through these courses was a point that helped mental health. In terms of my studies, the university environment has a natural advantage over music colleges that has tendencies to close on itself. The university environment allows musicians to build a network across faculties and join together in making music irrespective of study major, if the opportunity to join the music department's orchestra/choir/ensemble is open to all students with a certain level of musical skill. The natural idea of improving mental health in university, for the majority, tends to believe that sport brings students together. However, while the university musicians reported to be much more active in sports compared to university musicians, their depression prevalence was higher. Bringing students across study courses together to make music and foster a larger network might

not seem to be small steps, when compared to the the complex studies resented above. However, if these points are implemented regularly and accepted by students, studies I and III showed that they make a difference, while studying and in later life.

6.3 Limitations

While the limitations for individual studies are outlined at the end of each chapter, a number of problems arose along the way that affected all studies across the board, and these should therefore be pointed out here. Reflecting on the entire thesis, there were a few points that limited the scope of this investigation. The choice of a quantitive investigation of depression is difficult. Even though it is especially useful for an exploratory study such as this one, it should not be forgotten that a significant depression score in a depression questionnaire does not equal a diagnosis of depression. Depression questionnaires are mainly conceived as tools for general practitioners to help with referrals. While it is highly likely that a high score in a depression questionnaire indicates depression, the opposite cannot be assumed for a low score. Assuming that every participant answered truthfully, it is also very possible that a subclinical score in a depression questionnaire already indicates a level of depression and/or anxiety that seriously impairs a person's life (Judd, Rapaport et al., 1994; Judd, H. S. Akiskal, Maser et al., 1998; Hetrick et al., 2008; Balázs et al., 2013).

A related matter is that of the use of cut-off scores. The literature is not consistent in what it considers a remission or an improvement of symptoms, or where to put the cut-off point for significant depression (H.-U. Wittchen & Pfister, 2007). Using a more conservative cut-off value of 9 points for the depression questionnaire compared to 8 in Andrews and Wilding or Quince et al., could reflect in results being too conservative. This means that some students who suffer from depression, would not be recognised as such, because their score was under the cut-off value, yet still suffer significantly from depressive symptoms. Despite the HADS being a resilient questionnaire that should not be affected by age or environment, the high depression

prevalence of UK students compared to other EU students left me, and the advising consultant psychiatrist, wondering which additional variables could contribute to this result. We concluded that the financial burden would weigh more heavily for UK students, especially when compared other EU students, who pay considerably less for their studies. It is also likely that I have not considered all variables that can lead to depression. Furthermore, the exclusion of ethnic background and gender from all questionnaires could have introduced a bias towards one or more groups.

In retrospect, based on the surprising results in pain catastrophising, questionnaires about pain perception and/or other chronic pain mechanisms, could have helped with the interpretation of this data. Without further evidence we, the advising consultant anaesthetist and (chronic) pain specialist on this thesis and I, were only able to infer the presence or absence of one or several of these variables, leading to the inevitable conclusion of low pain catastrophising in music college students. The need to change the approach to Study III was particularly disappointing, as it required me to drop one research question, relating to depression symptoms, altogether. The new set-up for Study III also eliminated the possibility to analyse non-verbal communication or clarify answers by asking additional questions. It is therefore possible that my interpretation of written answers was different to the intentions of the participants. Lastly, it is always possible that the timing of the study during the exam period and/or nature of this study particularly attracted students with problems in mental health, and introduced further bias into the results.

6.4 Conclusion

In this thesis I set out to investigate if music students would be more affected by depression than students who were non-musicians. The lower depression prevalence I found in university musicians in Study I, at odds with the literature, may first suggested an error in measurement. However, the congruence of low depression prevalence with low scores in depression promoting variables, and the findings of my two complementary statistical models, did not support this supposition.

Rather, these results pointed towards professional identity of musicians as being a dual variable that can both prevent and promote depression, depending on the professional identity subscales (MIMS). This was further corroborated by the congruence of results between music students and those students who identified as musicians, but studied a non-music main subject. Subsequently, professional identity or 'being a musician' should not be seen as a (blanket) depression risk factor in itself, but rather we need to dive into subscales promoting professional identification, in order to properly identify depression risk factors. Moreover, this hypothesis is also supported by professional identity results in studies with athletes. Similar to the original AIMS subscales for athletes, the MIMS subscales negativity and exclusivity carried properties such as dysfunctional coping strategies - but here tied to the life of a musician - that have been identified as general risk factors for depression in depression literature.

Both larger statistical models in this thesis identified anxiety as the main factor contributing to depression, which, again, is congruent with existing literature as presented in the introduction (see paragraph 2.2.9, p. 42). Based on these findings, depression research in music students should investigate why anxiety, which was the most important depression predictor throughout my studies on this topic, is so predominant in music students' lives. It is important to note here that the HADS, used in Studies I and II investigates a longer period of anxiety, which - by definition - should not account for performance anxiety. However, the current hypothesis for music students' anxiety problems is largely focused on performance anxiety and rarely takes into account other sources of anxiety. Moreover, findings from Study III suggest that for music students the environment, in this case music colleges, should be more closely investigated as a source for anxiety. With this in mind, I would now like to turn to the variable pain catastrophising in depression research, as well as look at prevention strategies for both depression and pain. While the low scores for pain catastrophising with high pain perception are difficult to interpret, they do demonstrate, in accordance with depression/chronic pain specific literature, that music students should be much more approachable and receptive to prevention

strategies than previously believed by Williamon and S. Thompson. Furthermore, based on these results and the experience in sports psychology the question why a particular strategy failed or is accepted by students is then not because students are unwilling, but because the strategy was flawed. This was exemplary in critically evaluation of non-acceptance or decline in the study by Diketmüller. Successful depression and/or pain prevention solutions proposed by relevant literature differ in two main aspects from the majority of music psychological findings from English speaking countries: firstly, successful models accept that depression and pain are multifactorial concepts, and therefore solutions should be built with a multifactorial approach. Secondly, and this is where an anxiety-promoting environment comes back into play, they have to be delivered in a safe space for the individuals they want to target. The literature is clear that even the best prevention strategies will fail if the location of delivery is considered as 'unsafe' by the target individuals. This means that if music students perceive the music college environment as unsafe, but this is the space where prevention measures are offered, they will most likely not accept or participate voluntarily or truthfully, as suggested by results from Study III.

Lastly, research on cross-over topics in the field of music psychology and psychiatry and medicine, such as depression and pain in music students, should reflect current medical knowledge. This is necessary for two reasons. Firstly to ensure the internal validity of results in music psychology, and secondly for external validity and thus to enable the transfer of knowledge from these studies to the medical world. While point the first has been discussed at various places throughout this thesis, the second point only became apparent towards the end of the thesis in discussion with my medical advisers. It had not occurred to them that some findings about depression and pain in musicians that was taken for granted in their work environment was rather unsubstantiated. Study concepts were not based on current medical and internationally agreed knowledge as defined by the literature (World Health Organization, 1992), but rather promoted mono-causal (outdated) models. This made results from these studies questionable from a medical perspective, and means that these findings on depression and pain can in practice

resonate negatively for musicians instead of being implemented more positively in musicians' lives as well as in medical practice and research.

6.5 Future studies

As stated above and based on the results from these three studies, a wide variety of new hypotheses and studies present themselves. I will limit suggestions to two ideas, both focusing on musician and student musician populations: (1) further depression studies, (2) mental health prevention methods. While investigations into pain catastrophising are needed, they also require a cross-disciplinary design approach. I see studies in this area as important successor studies, based on my findings, but will refrain from developing a more detailed study design at this point as it would require considerable input from medical specialists in the area of chronic pain.

1. **Depression studies**: If I could be my own successor, I would endeavour to re-run Studies I and II with a larger pool of participants, especially a much larger group of university musicians and non-musicians, to build on the promising findings from these exploratory studies. University musicians with other study majors have been especially useful in interpreting the data and building a bridge between music and non-music students. Based on my findings in pain catastrophising, I would add questionnaires for super-sensitive personalities such as the HPI Andresen (2002)[1] and/or add other questionnaires for chronic pain management. Super-sensitivity, as per definition by the literature (World Health Organization, 1992), can promote more personality disorders that go hand in had more anxiety or being more susceptible to every input from the environment[2]. This would help to better interpret the high pain perception/low pain catastrophising data, also in terms of depression research. In addition, further future depression studies should consider anxiety as a factor beyond performance anxiety. This should already be reflected in the study design. In order to overcome the fear of loss of anonymity, I would propose the use

[1] For an overview of super-sensitivity see Böker and Northoff (2016)
[2] see World Health Organization (1992), F.60

of a slightly different approach by employing a semi-structured depression questionnaire. Even though I did not find a difference in symptoms between university musicians and non-musicians, Kessler et al. (2009), showed that depression symptoms are different in specific populations: for instance, older adults complain less about sleeping problems in depression research compared to adolescents (see paragraph 5.1, p. 228 for more details). It is possible that the HADS, while useful for its brevity within a larger set of questionnaires, was too broad to pick up more sensitive changes in symptoms. Since most standard depression questionnaire are for primary care use, they do not extensively cover depression symptoms. I would propose the use of the DIA-X/CIDI in cooperation with a psychiatrists. The DIA-X/CIDI covers even minor depression symptoms such as sleep or memory problems extensively (e.g. by testing short term memory). Since there were noticeable differences between music and non-music students, for instance in emotional control in Study I, it is likely that there might also be a difference in minor depression symptoms. As hypothesised previously, minor depression symptoms, such as (short term) memory problems, would affect music students who have to perform by heart regularly, more than non-music students. Such insights, if confirmed, could help shape prevention strategies or simply empower music students. If sleep problems (early wakening) or memory problems could be identified as part of a symptomology, they could subside with proper treatment of their origin. In this regard, it should be remembered that depression, if diagnosed early, does not have to require extensive treatment. Using semi-structured interviews in depression research, such as the DIA-X/CIDI, will promote better understanding of depression in a musician population. To further help overcome limitations faced in my research, I would also propose that the study design should reflect either a more clinical set-up (e.g. as part of a lab outside of a the normal study institution) and/or be undertaken in cooperation with medical professionals who are not tied to an (music college) institution.

2. **Prevention strategies**: Even though Diketmüller's study about prevention was a large undertaking with an extraordinary success rate, there are aspects that I would like to further investigate, which have been neglected as highlighted by suggestions of Study III participants. This investigation, however, requires a larger scale set-up and cooperation. Nevertheless, I believe this to be an important area of research for both music students and professional musicians. I am also persuaded that Diketmüller's study can be improved based on their own review, as well as on suggestions by participants of my Study III. Spahn, Hildebrandt and Seidenglanz (2001) pointed out that prevention strategies, if they are to be effective throughout the course of a lifetime, need to be introduced as early as possible. This is congruent with literature on chronic pain, where children that have been introduced to effective pain coping strategies are more likely to employ them successfully throughout life (Pfingsten et al., 2001; Goubert et al., 2006). One way to improve the Vienna study could be to offer classes targeting performance anxiety or pre-audition nerves specifically. These should be offered by sports psychologists, professional musicians, or specialist doctors (e.g. experienced ear-nose and throat surgeons for singers) in addition to the strategies the Vienna study already employed. Reflecting on my research findings on how prevention strategies should be offered, they should run in environments that are perceived as safe by music students. Such environments obviously depend on the culture of the target population (geography, type of study institution, etc.) and require some ground work investigation to determine the optimal set-up. However, this could significantly further improve the acceptance and success rate. The goal should be to close a knowledge gap for students, specifically giving them the insight of professional musicians regarding problems concerning (mental) health, giving students the tools to deal with (potential) current or future health problems. While prevention strategies are also useful for professional musicians, as shown at London's Royal Opera House (for hearing protection in cooperation with the Royal College of

Music) and the Opera House Münster (for wellbeing during Wagner's Ring performances), starting prevention strategies in music college or even at junior music college would further improve musicians' mental and physical wellbeing. Diketmüller's study showed rare success in this area. So far, prevention programmes targeting mental and/or physical wellbeing in music students have been limited in their success and the question remains if this is due to the overall concepts of programmes or their delivery, or both. Without further investigation in this field we will not be able to create successful prevention models that can be tailored to their environment, and implemented to benefit music students.

6.6 Final conclusion

In his closing remarks on the introduction of his new concept of visual perception in the brain, Lichtheim (1885) wrote that he presented his findings despite their faults and flaws - the ones he was aware of, and the ones future researchers would find. He believed that his work was not only useful because of its findings, but because of its mistakes, and that progress in science can only be achieved in a communal effort. I conclude my thesis in a similar vein. This exploratory research was guided by the main question of how depression prevalence in music students compared to that in non-music students. While the distribution of depression prevalence was uneven between university and music college students, the low scores in depression resource promoting variables were congruent in both studies and should prevent future depression in music college students despite the currently high prevalence. Furthermore, music students showed higher scores in active and functional coping, and lower scores in dysfunctional coping strategies, compared to their non-musician counterparts. This active coping style further helped to prevent depression or, where participants were affected by depression, promoted faster recovery. University musicians additionally showed better knowledge about stigma attached to mental health, implying that they would reach out for help faster in case of being affected by depression. Moreover, two complementary statistical models, (a) a hierarchical

linear regression and (b) a tree model, did not find that professional identity of a musician constituted a risk factor in the development of depression. Both models found that anxiety was the best predictor for depression. It was also the factor that repeatedly came up in Study III results, in pre-study feedback. It is important to note here that the anxiety measured by the HADS is not a short term anxiety, such as performance anxiety, and should therefore not be confused with it. This subclinical level of anxiety was close enough to the cut-off for being clinically significant, to assume that already at this level it would impair students' lives.

Based on these results, it is highly likely that the MIMS professional identity subscales can be divided into depression resource developing and resource eroding, reflecting similar results from sports psychology. High levels of self and social identification can be considered as resource developing, while high levels of negative affectivity and exclusivity erode resources and promote the possibility of depression.

Making music together at any level was found to be an effective strategy, or buffer, against depression, and should be encouraged and facilitated. An example of successful facilitation is access to university orchestras/choirs for students with other main study subjects, who might otherwise not have access to participate in music ensembles. Further prevention strategies targeting music college students or university music students should be simultaneously outsourced to professional independent staff, yet still be implemented within the curriculum of the college or university. This way, knowledge of individual students' (mental) health problems remains outside of the education institution, and students are encouraged to take part in (mental) health classes as part of their weekly time table without having to fear stigma or repercussions.

Appendices

La melancolìa altera la salud

Melancholia affects health

— Lope De Vega, 1631

A Appendix

Contents

A.1 Study I

A.1.1 Procedure

Terminology *gender* versus *sex*: based on that section 5.5. of American Psychological Association (2020) specifies that *gender* and not *sex* is correct for a bias-free approach mitigating ambiguity e.g. sex could mean sexual behaviour. Moreover, as this thesis is undertaken from a psychological point of view the word gender is appropriate as it refers to the behavioural components between men and women

in depression, and not to biological construct originating from genetics, anatomy, physiognomies, etc., (Eagly & Wood, 2016).

Ethical approval was granted on the 15th November 2015 by the University of Sheffield, Department of Music. The reference no is 006853. Prior to the submission of the ethical application, the entire document was reviewed by Dr. Williamson as the main supervisor, which was acknowledged during the online submission. Dr. Timmers was consulted via email, also prior to the submission, for some additional questions the application.

Participant information

Dear Participant,

I am a first year PhD student looking at health and wellbeing of students in the 21st century. My goal is to learn more about the challenges that students are facing, and how such challenges are met, and I am therefore looking for volunteers to take part in my online study. I greatly appreciate your interest in my study and hope you will take part in it!

Completing the online questionnaire will take approximately 15-25 minutes. It works best on intuition; therefore, don't feel you have to linger too long over any one question.

Your participation is voluntary and completely anonymous. Neither your IP address nor your browser recognition will be saved, so that no conclusion can be drawn about who fills out the questionnaire. Consequently, I won't be able to let you know your individual scores or results, but if you are interested in the overall results of this research you can leave your email address in a separate section at the end of the questionnaire. You may withdraw from the study at any point either by closing your browser or by clicking the 'leave and delete my data' button.

If you have any questions before you begin, then please don't hesitate to contact me by email at: mkorte1(at)Sheffield.ac.uk

This study has been approved by the Ethics Committee at the University of Sheffield (UK) and is supervised by Dr. Victoria Williamson (v.williamonson(at)Sheffield.ac.uk).

Your data may be used in academic papers or selective press releases as part of our overall findings, however at no stage will any personally identifying data be made available. All data will be held in accordance with the Data Protection Act 1998 and destroyed within 5 years.

If you have specific questions regarding physical pain or psychological problems, the Student Health Centre would be a good first point of contact. A list of other possible contacts will be available at the end of the questionnaire.

Also at the end of the questionnaire you will find a link that will allow you to participate in a draw for Amazon vouchers, if you would like to. You will have the chance to win one of four Amazon vouchers (1 x £50, 1 x £20, 2 x £10).

Before we proceed, please tick the following box to declare that you are over 18 years old and that you understand and agree to the terms set out on this page.

I hereby declare that I am over the age of 18 years old and that I understand and agree to the terms set out above.

Checkbox [Yes/No] - in case of a "no" the questionnaire jumped to the last page thanking participants for taking part. This page also gave contact details for University Counselling Service (UCS),Royal College of Psychiatrists, NHS Direct, Mind, the Samaritans, Get Connected UK, Nightlines and British Association for Performing Arts Medicine (BAPAM) - at least one of them was reachable 24/7 all year including bank holidays.

[Disclaimer: This list contains links to the websites of third parties ("external links"). As the content of these websites is not under my control, I cannot assume any liability for such external content. The external websites are liable for the content and accuracy of the information provided. When the links were placed, no infringements of the law were noticeable.]

Questionnaires: Questions in the demographics were taken from the EPI questionnaires by (Spahn, Hildebrandt & Seidenglanz, 2001) and the GOLD-MSI subscale by (Müllensiefen et al., 2014), which included questions:

- Age

- Family status (stable relationship/married or not in a stable relationship/single/divorced)
- At University (undergraduate, postgraduate)
- Which department are you studying in?
- Are you employed? (part-time, full time, freelance/self-employed, not at all)
- What is the highest educational qualification you have attained?
- If you are playing an instrument or singing, are you currently suffering from any complaints, which adversely affect your playing/singing? (musicians only)
- If you are you currently suffering from any complaints affecting your playing/singing, which of the following areas are affected (mainly psychologically, mainly physically, both)
- How long have these complaints been lasting? (a few days, a few weeks, a few months, one year, several years)
- How strongly was your playing/singing affected during the last seven days by the complaints? (slightly, strongly, playing/singing not possible)
- At present (during the last 7 days), have you been suffering from symptoms that impair your music-making?
- Do you feel that psychosocial factors (e.g., stress and frustration, lack of self-confidence, etc.) played a role in the cause or in the development of your symptoms?
- How severe was the psychological stress due to your somatic symptoms and their effect on your activity as a student? (Definitively not stressed, not stressed, hardly stressed, somewhat stress, stressed, crucially stressed)
- Did you ever take one of the following substances as a result of problems to your activity as a musician/student? analgesic/ painkillers, tranquilizer/

sedatives, ß-blocker, other psychiatric drugs, alcohol, other recreational drugs, nicotine, none (multiple choice)

- Which of the following activities do you carry out regularly (as a minimum once or twice a week over 2 month)? Physical training (e.g. sport, yoga, pilates, etc.; Relaxation technique (e.g. meditation, autogenic relaxation, visualization, etc.; Body methods (e.g. Feldenkrais method, Alexander Technique, dispokinesis, etc.; Talking therapies, with the aim to better handle the symptoms (e.g. counselling, psychotherapy, CBT (multiple choice possible)
- I have attended ... live music events as an audience member in the past twelve months.
- I listen attentively to music for ...per day.
- I engaged in regular, daily practice of a musical instrument (including voice) for ... years.
- At the peak of my interest, I practiced ... hours per day on my primary instrument.
- I have had formal training in music theory for ... years
- I have had ... years of formal training on a musical instrument (including voice) during my lifetime.
- I can play ... musical instruments
- I engaged in regular, daily practice of a musical instrument (including voice) for ... years.

Please note that this is a simple re-construction of the questions. Sosci software allowed for numerous in-built features (colour, different fonts) to highlight words or guideline to answer questionnaire.

Other questionnaires cannot be provided in full as they are legally purchased from their publishers and are subject to copy-write. Each of the questionnaires

are described in terms of their basic purpose and typical use, and a background literature is provided to show that their use is standard. Furthermore, in line with a request from the Ethics Chair (9th January 2017), for each of the questionnaires I provide an example of two questions.

1. Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983)Sample questions from the questionnaire:
    - I can laugh and see the funny side of things.
    - I feel as if I am slowed down.
2. Athletic Identity Measurement Scale, here Musician Identity Measurement Scale (MIMS) (Brewer, Van Raalte & Linder, 1993)
    - I consider myself a musician.
    - Music is the most important part of my life
3. Cambridge Depersonalisation Scale (CD-9) (Sierra & Berrios, 2000)
    - I have the feeling of being outside my body.
    - It seems as if things that I have recently done had taken place a long time ago. For example, anything, which I have done this morning, feels as if it were done weeks ago.
4. Orebro Musculoskeletal Pain Screening (Linton & Boersma, 2003)
    - Is your work heavy or monotonous?
    - If you take into consideration your work routines, management, salary, promotion possibilities and work mates, how satisfied are you with your job?
5. Brief COPE (Carver et al., 1989)
    - I've been getting emotional support from others.
    - I've been criticizing myself.

6. Copenhagen Burnout Inventory (CBI) (Borritz & T. S. Kristensen, 2015)
    - How often do you feel tired?
    - Do you have enough energy for family and friends during leisure time?
7. The Mental Health Knowledge Schedule (MAKS) (Evans-Lacko et al., 2010)
    - Most people with mental health problems want to have paid employment
    - People with severe mental health problems can fully recover

Statistics For the calculation of statistic the following extra packages from the software R 1.2.1335 (R Core Team, 2017) were used:

- dplyr (Wickham, François, Henry & Müller, 2018) for data manipulation, for instance to select variables, columns, filter rows, etc.
- reshape2 (Wickham, 2007) for data manipulations, for instance to melt data for graphic visualisations
- ggforce and ggthemes by the same authors as ggplots (Wickham, 2016) to accelerate the program and the availability of themes
- ppcpr (Kim, 2015) for correlations and to show significant correlations in the correlation heat maps
- RcolorBrewer (E. Neuwirth & M. E. Neuwirth, 2011) for colour schemes in graphs
- lmerTest (Kuznetsova, Bruun Brockhoff & Bojesen Christensen, 2019) for linear regression in order to plot graphs
- sjPlot (Lüdecke, 2018), sjlabelled (Lüdecke, 2019) and sjmisc (Lüdecke, Giné-Vázquez & Bartel, 2019) to plot graphs for the multiple linear regressions

A.1.2 Participants

Of the 317 students who participated in the study, 195 completed the questionnaire. The questionnaire was filled out by students from a wide variety of departments (see table below). However, as table A.1 illustrates, responses were received from many departments other than music, and the number of self–identified musicians who responded was also relatively low, despite focused recruitment of musicians. I therefore adopted a post hoc analysis strategy in order to identify musicians, and compare musicians and non-musicians, namely by using the MIMS and GOLD-MSI questionnaires. MIMS opened only for participants who gave a positive answer to the question if they perceived themselves as a musician, irrespective of the instrument or study course. A negative answer resulted in skipped MIMS entirely. Subsequent MIMS scores served as a natural selection for the musicians' group. The GOLD-MSI scores for these participants, identified as musicians, also reflected that music occupied a large space in their (daily) lives in the form of practising, listening to music, going to concerts, etc. In order to identify non-musicians for whom music did not play any significant role in their lives, the absence of a MIMS score as well as the indication from the GOLD-MSI were used (e.g. did not identify as a musician, never played an instrument, rarely engaged with music on any level). Three participants who considered themselves musicians, but ranked low in the GOLD-MSI (e.g. reported not to play an instrument/sing or have any (formal) education in music, and also did not regularly engage with music) were excluded.

Table A.1: All participants by Department, Study I

Department	**No of Participants**
Psychology	17
Medical School	14
Animal and Plant Sciences (APS)	12
History	13
English	12
Biomedical Science	11
Politics	11
Geography	10
Sociological Studies	9
Engineering	8

Continued on next page

Table A.1 – continued from previous page

Department	No of Participants
Management	8
Music	7
Law	6
Molecular Biology, Biotechnology	6
Philosophy	6
School of Health and Related Research	6
Archaeology	5
Chemistry	5
Physics and Astronomy	5
Economics and Politics	4
Information School	4
Other	112
Total number of disclosed department of study	285
Not disclosed or abandoned questionnaire	32
Total number of participants	317

A.1.3 Results

While there was no difference on a symptomatic level (see fig. A.1 in the Appendix), the differences between groups could be found in the relationships formed by anxiety and depression with the other variables. Rather than reporting all correlations, I will mainly focus on moderate and strong correlations, e.g. above the level of .4 (accounting for 16% of the overall variance), and taking this as a guide for the linear regression that follows further below.

Anxiety: For both groups there were positive correlations of anxiety with depression: ($r_s(29)$=.606, $p < .001$ - musicians; $r_s(33) = .406$, $p = .01$ - non-musicians.

For musicians, anxiety strongly correlated with personal burnout ($r_s(29) = .852$, $p <.001$), work burnout ($r_s(29) = .632$, $p <.001$) and with fellow student burnout ($r_s(29) = .614$, $p <.001$). Anxiety also correlated moderately with the MIMS subscale negative affectivity ($r_s(29) = .541$, $p = .002$) and practice time (years) ($r_s(29) = .412$, $p = .02$).

The strongest correlation for non-musicians was burnout with their fellow students ($r_s(33) = .589$, $p <.001$).

Depression: For musicians, depression strongly negatively correlated with personal burnout ($r_s(29)$ = -.605, $p < .001$), fellow student burnout ($r_s(29)$ = -.722,

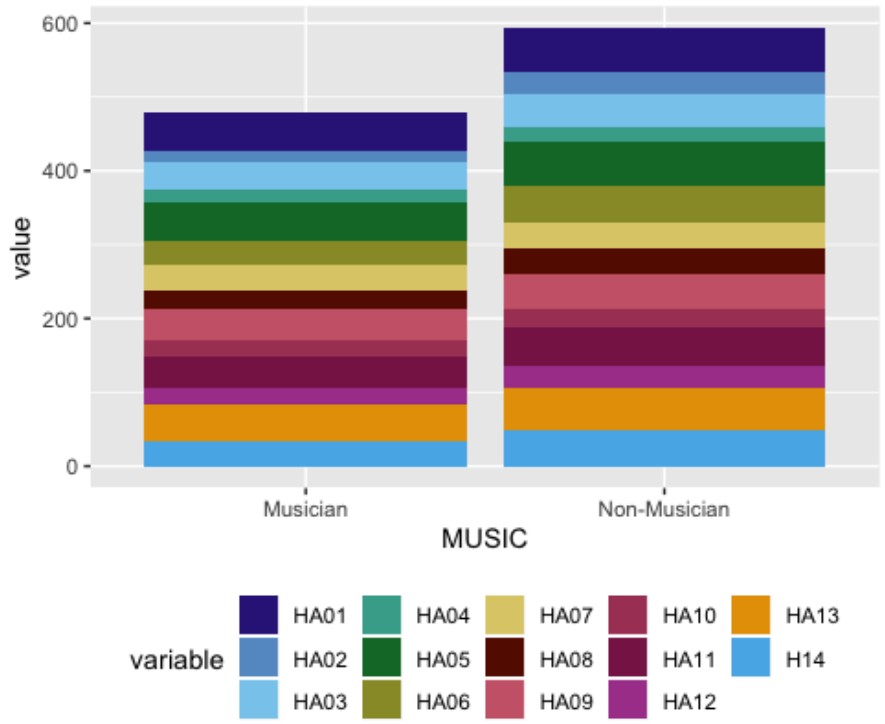

Figure A.1: Comparison of total HADS scores and the individual symptoms, as measured, between university musicians (musicians) and university non-musicians (non-musicians), Study I. Each (main) symptom is addressed by a single questions in the HADS questionnaire, and represented in the above figure by numbers HA01-HA14. The figure shows that while (university) non-musicians showed a 10.1% higher HADS total score, their individual symptoms were proportionally higher. No group was significantly affected (or distinguished) by a single depression or anxiety symptom as had been hypothesised.

$p < .001$) and university teaching staff burnout ($r_s(29) = -.509$, $p = .003$).

The picture for non-musicians was slightly different as it showed only one correlation above weak level, with a negative moderate correlation of depression and personal burnout ($r_s(33) = .437$, $p = .009$).

Professional Identification, MIMS

The **MIMS full score** correlated moderately with OREBRÖ (pain) ($r_s(29) = .489$, $p = .005$) and practice time (years) ($r_s(29) = .466$, $p < .001$), and strongly with personal burnout ($r_s(29) = .555$, $p = .001$) and practice time (daily) ($r_s(29) = .607$, $p = .001$).

Self-identity and social identity both had similar correlations: both correlated strongly negatively with work burnout ($r_s(29) = .526$, $p = .002$ - self-identity;

$r_s(29) = .437$, $p = .01$ - social identity) and both practice times, although the correlation for social identity and practice was only moderate (years: $r_s(29) = .678$, $p < .001$; daily: ($r_s(29) = .613$, $p < .001$ self-identity, and years: $r_s(29) = .481$, $p = .006$; daily: ($r_s(29) = .464$, $p = .009$).

Negative affectivity and exclusivity both correlated moderately with pain catastrophising ($r_s(29) = .488$, $p = .005$ - negative affectivity; $r_s(29) = .475$, $p = .007$ - exclusivity). Negative affectivity also correlated moderately with anxiety ($r_s(29) = .541$, $p = .002$), and it strongly and negatively correlated with personal burnout ($r_s(29) = .661$, $p < .001$). The correlation with exclusivity and personal burnout was weak. Both subscales correlated moderately and negatively with student burnout ($r_s(29) = .443$, $p = .01$ - negative affectivity; $r_s(29) = .400$, $p = .02$ - exclusivity). Negative affectivity also correlated moderately with practice time (years: $r_s(29) = .549$, $p = .001$) and strongly with daily practice time ($r_s(29) = .625$, $p < .001$), while exclusivity correlated moderately with daily practice time only ($r_s(29) = .488$, $p = .005$).

Depersonalisation, CD-9: For university musicians, there were three moderate to strong correlations for the CD-9: cognitive functional coping ($r_s(29) = .40$, $p = .02$), dysfunctional coping strategies ($r_s(29) = .50$, $p = .003$), and the stigma-related knowledge about mental health ($r_s(29) = .67$, $p < .001$). University non-musicians showed a similar trend with cognitive functional coping ($r_s(33) = .453$, $p = .006$) and dysfunctional coping strategies ($r_s(33) = .556$, $p < .001$) and the stigma-related knowledge about mental health ($r_s(33) = .405$, $p = .01$). In this group, the age variable was significant with a moderate correlation ($r_s(33) = .453$, $p = .02$).

Coping strategies: University musicians: Cognitive-functional and dysfunctional coping strategies correlated with both subscales of depersonalisation, as we as the total depersonalisation score, as already mentioned above. Active-functional and cognitive-functional coping strategies only produced a couple of weak correlations (e.g. daily practice with active functional; cognitive functional with burnout measures). Only dysfunctional coping strategies showed a moderate correlation with

pain catastrophising ($r_s(29) = .414$, $p = .02$), and a strong correlation with stigma-related knowledge ($r_s(29) = .674$, $p < .001$). Participants from this group with higher dysfunctional coping levels could be more likely to opt out of mental health care, or fail to participate once begun. They could also be less open to accepting treatment for chronic pain. Unlike their non-musician counterparts (see below), they are more likely to choose active methods to help with episodes of depersonalisation.

University non-musicians: As reported in the results for CD-9 above, all coping strategies correlated with depersonalisation, although the correlation with cognitive functional coping was weak ($r_s(28) = .36$, $p = .003$). Active functional coping correlated with stigma-related knowledge ($r_s(28) = .561$, $p < .001$), while cognitive functional coping strategies correlated with pain catastrophising ($r_s(28) = .648$, $p < .001$) and stigma-related knowledge ($r_s(28) = .462$, $p = .005$). Dysfunctional coping strategies correlated with pain catastrophising ($r_s(28) = .482$, $p = .003$), stigma-related knowledge ($r_s(28) = .478$, $p = .004$), and substance intake ($r_s(28) = .442$, $p = .008$).

Pain catastrophising: University musicians: Catastrophising pain correlated with the full scale of professional identity, and especially with the subscales associated with negativity: negative affectivity and exclusivity (negative affectivity: $r_s(29) = .488$, $p = .005$; exclusivity: $r_s(29) = .475$, $p = .007$). It correlated moderately with dysfunctional coping strategies ($r_s(29) = .414$, $p = .02$). Compared to non-musicians (see below), the process of catastrophising pain entered different relationships with the variables listed above, which indicates that this group processed pain differently.

University non-musicians This group displayed different relationships with pain catastrophising compared to the musicians' group. Pain catastrophising correlated strongly with both active functional and cognitive functional coping strategies, and moderately with dysfunctional coping strategies (active: $r_s(28) = .600$, $p < .001$; cognitive: $r_s(28) = .648$, $p < .001$; dysfunctional: $r_s(28) = .548$, $p < .001$). It also correlated moderately with stigma-related knowledge ($r_s(28) = .553$, $p < .001$) and − albeit only weakly − with depersonalisation ($r_s(28) = .372$, $p = .002$). Even though the correlation with depersonalisation was weak, it underscored the overall

trend that catastrophising pain is a complex process that involves trying to cope with the situation and also distancing oneself emotionally in order to carry on.

Burnout: University musicians Here anxiety correlated strongly and negatively with all but one burnout scale: personal burnout ($r_s(32)$ = -.852, $p < .001$); work burnout ($r_s(32)$ = -.632, $p < .001$) and student burnout ($r_s(32)$ = -.614, $p < .001$). Burnout with teaching staff was not significant. Depression correlated strongly with personal ($r_s(32)$ = .601, $p < .001$) and professor burnout ($r_s(32)$ = -.722, $p < .001$). Professional identity correlated with burnout measure. Personal burnout also correlated moderately with practice time (years: $r_s(32)$ = -.457, p = .01) as well as negatively with work burnout ($r_s(32)$ = -.510, p = .003), which also correlated with stigma related knowledge ($r_s(32)$ = -.433, p = .01). Anxiety and depression symptoms are generally worsened by burnout/stress. Interestingly professional identity appears to act as a buffer against stress, and seems to accumulate over the years.

University non-musicians: Anxiety and depression correlated with all burnout scales, though only anxiety and student burnout ($r_s(33)$ = .589, $p < .001$) and depression and personal burnout ($r_s(33)$ = .437, p = .009) respectively reached a moderate level. No other correlation were found. Even though both groups displayed similar correlations, compared to their musicians counterparts, these connections were not as distinct.

Mental Health Knowledge Schedule For university musicians, stigma related knowledge correlated with both subscales and subsequently the full depersonalisation score ($r_s(28)$ = .671, $p < .001$) and dysfunctional coping strategies ($r_s(28)$ = .674, $p < .001$). For non-musicians stigma related knowledge correlated with all subscales and therefore also the full depersonalisation score, ($r_s(27)$ = .405, p = .01) and all coping strategies (active: $r_s(28)$ = .561, $p < .001$; cognitive: $r_s(27)$ = .648, $p < .001$; dysfunctional $r_s(27)$ = .482, p = .004). All correlations for musicians were stronger than for university non-musicians.

Multiple linear regressions

Regression table output for both groups (university musicians and university non-musicians) and all 14 variables ([HADS] anxiety, depersonalisation [full score], active-functional, cognitive functional, dysfunctional coping strategies, pain catastrophising, personal, work, student and professorial burnout, stigma knowledge and attitude [MAKS full score] age, family and identifying oneself as a musician [Musician]) used in Study I:

Table A.2: Model Summary for both groups and all 14 variables

Model	R	R^2	Adjusted R^2	RMSE
1	0.743	0.552	0.328	2.636

Table A.3: ANOVA, for both groups and all 14 variables

Model		Sum of Squares	df	Mean Square	F	p
1	Regression	239.9	14	17.136	2.467	0.020
	Residual	194.5	28	6.947		
	Total	434.4	42			

Table A.4: Coefficients, for both groups and all 14 variables

Model		Unstandardized	Standard Error	Standardized	t	p
1	(Intercept)	21.111	7.750		2.724	0.011
	HADS anxiety	-0.008	0.210	-0.009	-0.036	0.972
	Depersonalistion full score	-0.036	0.047	-0.144	-0.756	0.456
	Active functional Cope	-0.162	0.112	-0.278	-1.453	0.157
	Cognitive functional Cope	0.089	0.108	0.147	0.819	0.420
	Dysfunctional Cope	0.399	0.190	0.339	2.100	0.045
	Pain catastrophising	0.020	0.020	0.172	0.992	0.330
	Personal Burnout	-0.626	0.949	-0.164	-0.660	0.515
	Work Burnout	-0.726	1.276	-0.145	-0.569	0.574
	Student Burnout	-0.702	0.749	-0.223	-0.937	0.357
	Prof Burnout	-0.639	0.831	-0.173	-0.768	0.449
	MAKS full score	-0.059	0.061	-0.151	-0.968	0.342
	Age	-0.278	0.113	-0.427	-2.460	0.020
	Family Status	-0.747	0.985	-0.116	-0.758	0.455
	Musician	0.677	0.900	0.106	0.752	0.458

Table for university musicians using MIMS subscales and anxiety

Table A.5: ANOVA for university musicians only

Model		Sum of Squares	df	Mean Square	F	p
1	Regression	145.8	5	29.155	4.194	0.007
	Residual	173.8	25	6.951		
	Total	319.5	30			

Table A.6: Coefficients, for university musicians

Model		Unstandardized	Standard Error	Standardized	t	p
1	(Intercept)	1.119	1.462		0.765	0.451
	Self Identity	-0.312	0.220	-0.402	-1.421	0.168
	Social Identity	-0.122	0.211	-0.126	-0.580	0.567
	Negative Affectivity	0.227	0.241	0.319	0.939	0.357
	Exclusitiy	0.095	0.142	0.145	0.669	0.510
	HADS anxiety	0.473	0.147	0.587	3.215	0.004

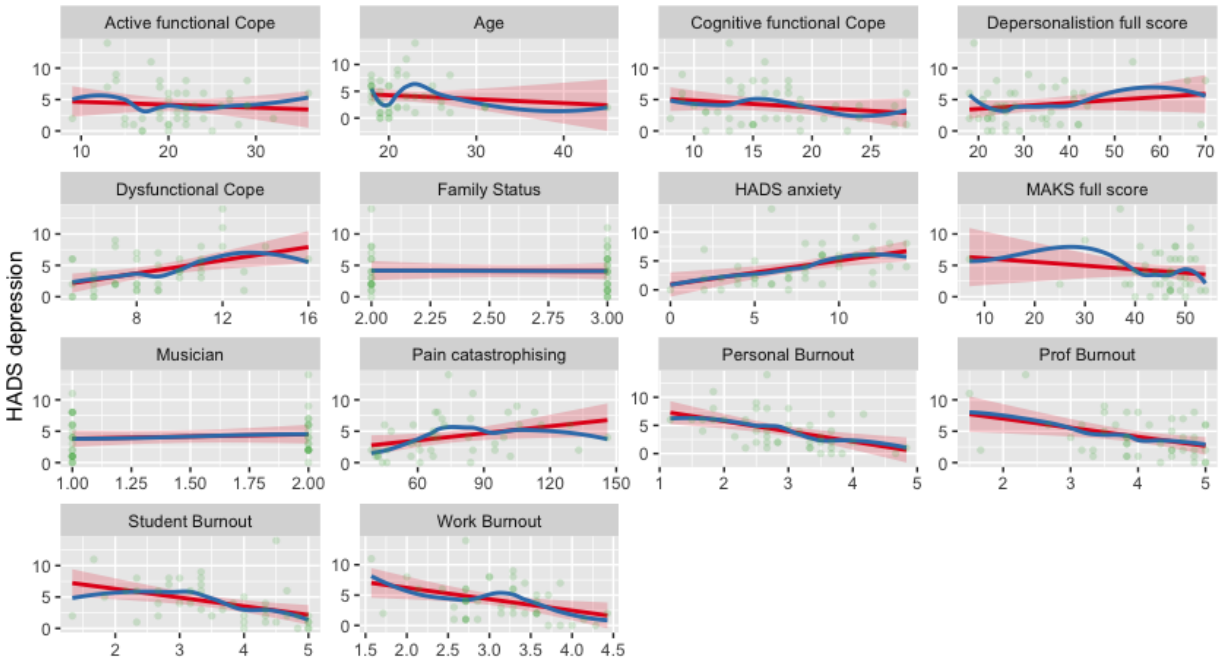

Figure A.2: Prediction slope plot for all variables when prediction depression for both groups (university musicians and university non-musicians) and all 14 variables ([HADS] anxiety, depersonalisation [full score], active-functional, cognitive functional, dysfunctional coping strategies, pain catastrophising, personal, work, student and professorial burnout, stigma knowledge and attitude [MAKS full score] age, family and identifying oneself as a musician [Musician]), including a regression line (red) confidence internal and distribution of the data (blue line) and the actual distribution (green dots), Study I

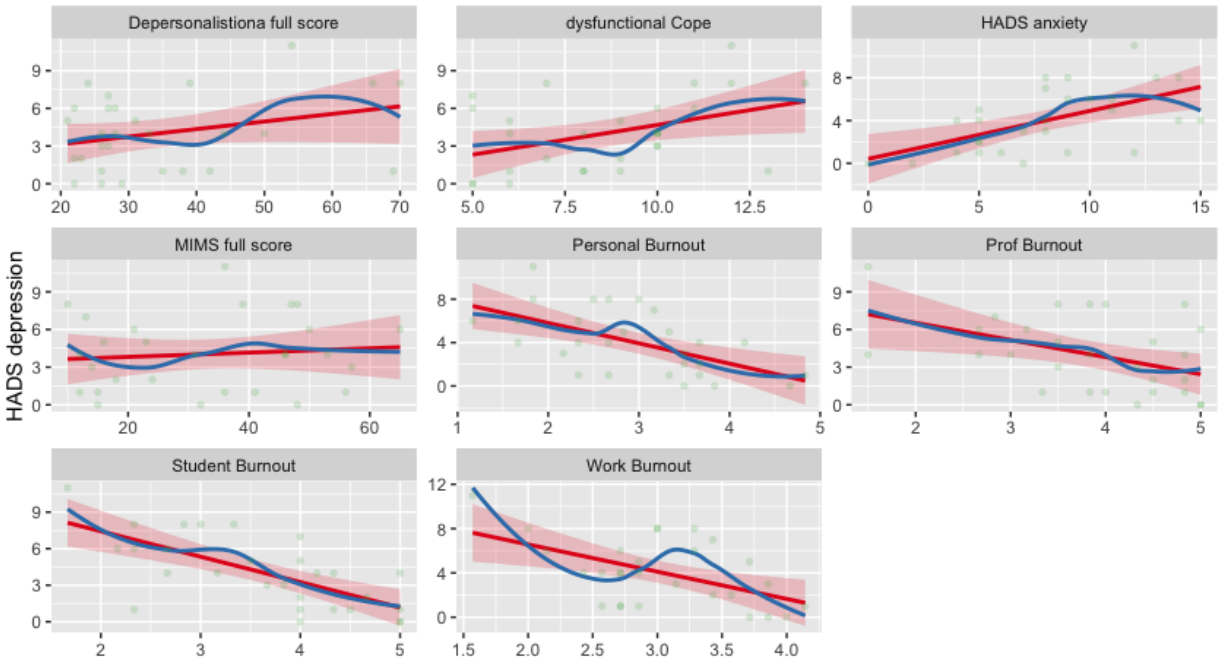

Figure A.3: Prediction slope plot for depression based on the multiple linear regression for university musicians for 8 variables ([HADS] anxiety, depersonalisation [full score], active-functional, dysfunctional coping strategies, pain catastrophising, personal, work, student and professorial burnout and professional identification [MIMS full score]), including a regression line (red) confidence internal (red shape), distribution of the data (blue line) and the actual distribution (green dots), Study I

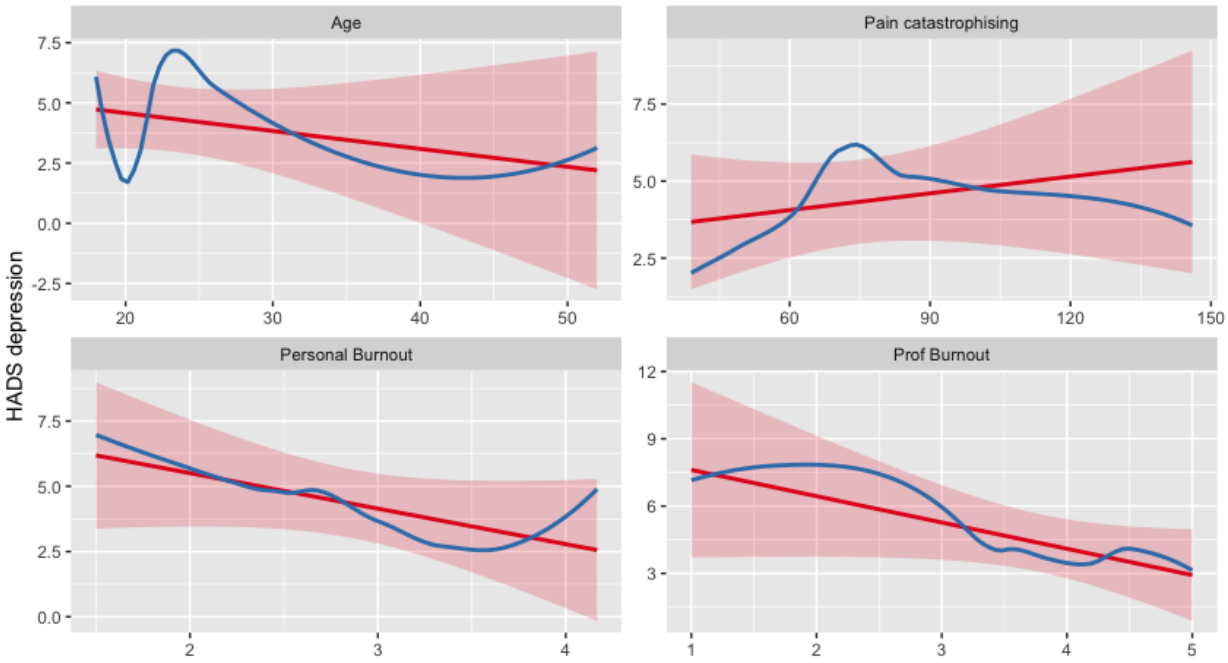

Figure A.4: Prediction slope plot for depression based on the multiple linear regression for university non- musicians for 8 variables ([HADS] anxiety, depersonalisation [full score], active-functional, dysfunctional coping strategies, pain catastrophising, personal, work, student and professorial burnout and professional identification [MIMS full score]), including a regression line (red) confidence internal (red shape), distribution of the data (blue line) and the actual distribution (green dots), Study I

A.2 Study II

A.2.1 Procedure

Ethical approval was granted on the 19th January 2017 by the University of Sheffield, Department of Music. The reference no is 012258. Prior to the submission of the ethical application, the entire document was reviewed by Dr. Williamson as the main supervisor, which was also acknowledged during the online submission.

Participant information

Dear possible Participant,

Thank you for your interest in my study. I am a PhD student from the University of Sheffield (UK) and am looking for volunteers to take part in my online study about the health and wellbeing of students in the 21st century. My goal is to learn more about the challenges that students are facing, and how such challenges are met. I greatly appreciate your interest in my study and hope you will take part in it.

How long will it take? Completing the online questionnaire will take approximately 15-25 minutes. It works best on intuition; don't feel you have to linger too long over a question. After completion you will have the chance to win one of four Amazon vouchers (1 x GBP50, 1 x GBP20, 2 x GBP10).

A few words about what I do to safeguard your anonymity: Feedback from my previous study and pre-tests has shown how important anonymity is, especially to music students. Your participation is voluntary and anonymous. The server I have chosen to host my questionnaire has been evaluated by an outside audit and been awarded a very high security standard rating. By default, it does not use cookies or store your IP address or browser recognition; neither can it artificially reconstruct this information using time stamps and server log files. This means: I cannot draw any conclusions about you or where you are. According to German data protection law no third parties have access to the server and nothing will be passed on to a third party (Bundesdateschutzgesetz §11). If you want to be part of the raffle, your email will be stored in a separate database with no possibility to consolidate

your email address with your data. Feel free to read up on all the different security features in more detail here (insert link). Consequently, I won't be able to let you know your individual scores or results, but if you are interested in the overall results of this research you can leave your email address at the end of the questionnaire.

Lastly, you may withdraw from the study at any point, either by closing your browser or by clicking the 'leave and delete my data' button.

[LINK TO QUESTIONNAIRE]

Who is behind it? If you have any questions, please do not hesitate to contact me by email at: mkorte1[at]Sheffield.ac.uk or my supervisor v.williamonson[at]Sheffield.ac.uk

This study has been approved by the Ethics Committee at the University of Sheffield (UK) Your data may be used in academic papers or selective press releases as part of our overall findings, however at no stage will any personally identifying data be made available. All data will be held in accordance with the Data Protection Act 1998 and destroyed within 5 years.

Collecting consent Before we proceed, please tick the following box to declare that you are over 18 years old, currently studying music, have a good working knowledge of English and that you understand and agree to the terms set out above.

I hereby declare that I understand and agree to the terms set out above

Checkbox [Yes/No] - in case of a "no" the questionnaire jumped to the last page thanking participants for taking part. This page also gave contact details for the following English websites: Royal College of Psychiatrists, Mind Centre for Disease Prevention and Control, Beyond Blue and NHS direct.

Links to websites with similar information in German, French and Spanish.

Links to websites for musicians specialist clinics available as outpatients and/or offering (open) counselling hours in Hannover, Freiburg, UDK Berlin, Munich and Luzern

[Disclaimer: This list contains links to the websites of third parties ("external links"). As the content of these websites is not under my control, I cannot assume any liability for such external content. The external websites are liable for the

content and accuracy of the information provided. When the links were placed, no infringements of the law were noticeable.]

Questionnaires: Questions in the demographics were taken from the EPI questionnaires by (Spahn, Hildebrandt & Seidenglanz, 2001) and the GOLD-MSI subscale by (Müllensiefen et al., 2014), which included questions:

- Age
- Family status (stable relationship/married or not in a stable relationship/single/divorced)
- At University (undergraduate, postgraduate)
- Which department are you studying in?
- Are you employed? (part-time, full time, freelance/self-employed, not at all)
- What is the highest educational qualification you have attained?
- If you are playing an instrument or singing, are you currently suffering from any complaints, which adversely affect your playing/singing? (musicians only)
- If you are you currently suffering from any complaints affecting your playing/singing, which of the following areas are affected (mainly psychologically, mainly physically, both)
- How long have these complaints been lasting? (a few days, a few weeks, a few months, one year, several years)
- How strongly was your playing/singing affected during the last seven days by the complaints? (slightly, strongly, playing/singing not possible)
- At present (during the last 7 days), have you been suffering from symptoms that impair your music-making?
- Do you feel that psychosocial factors (e.g., stress and frustration, lack of self-confidence, etc.) played a role in the cause or in the development of your symptoms?

- How severe was the psychological stress due to your somatic symptoms and their effect on your activity as a student? (Definitively not stressed, not stressed, hardly stressed, somewhat stress, stressed, crucially stressed)
- Did you ever take one of the following substances as a result of problems to your activity as a musician/student? analgesic/ painkillers, tranquilizer/ sedatives, ß-blocker, other psychiatric drugs, alcohol, other recreational drugs, nicotine, none (multiple choice)
- Which of the following activities do you carry out regularly (as a minimum once or twice a week over 2 month)? Physical training (e.g. sport, yoga, pilates, etc.; Relaxation technique (e.g. meditation, autogenic relaxation, visualization, etc.; Body methods (e.g. Feldenkrais method, Alexander Technique, dispokinesis, etc.; Talking therapies, with the aim to better handle the symptoms (e.g. counselling, psychotherapy, CBT (multiple choice possible)
- I have attended ... live music events as an audience member in the past twelve months.
- I listen attentively to music for ...per day.
- I engaged in regular, daily practice of a musical instrument (including voice) for ... years.
- At the peak of my interest, I practiced ... hours per day on my primary instrument.
- I have had formal training in music theory for ... years
- I have had ... years of formal training on a musical instrument (including voice) during my lifetime.
- I can play ... musical instruments
- I engaged in regular, daily practice of a musical instrument (including voice) for ... years.

Please note that this is a simple re-construction of the questions. Sosci software allowed for numerous in-built features (colour, different fonts) to highlight words or guideline to answer questionnaire.

Other questionnaires cannot be provided in full as they are legally purchased from their publishers and are subject to copy-write. Each of the questionnaires are described in terms of their basic purpose and typical use, and a background literature is provided to show that their use is standard. Furthermore, in line with a request from the Ethics Chair (9th January 2017), for each of the questionnaires I provide an example of two questions.

1. Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983)Sample questions from the questionnaire:
    - I can laugh and see the funny side of things.
    - I feel as if I am slowed down.
2. Athletic Identity Measurement Scale, here Musician Identity Measurement Scale (MIMS) (Brewer, Van Raalte & Linder, 1993)
    - I consider myself a musician.
    - Music is the most important part of my life
3. Cambridge Depersonalisation Scale (CD-9) (Sierra & Berrios, 2000)
    - I have the feeling of being outside my body.
    - It seems as if things that I have recently done had taken place a long time ago. For example, anything, which I have done this morning, feels as if it were done weeks ago.
4. Orebro Musculoskeletal Pain Screening (Linton & Boersma, 2003)
    - Is your work heavy or monotonous?

- If you take into consideration your work routines, management, salary, promotion possibilities and work mates, how satisfied are you with your job?

5. Brief COPE (Carver et al., 1989)
    - I've been getting emotional support from others.
    - I've been criticizing myself.
6. Copenhagen Burnout Inventory (CBI) (Borritz & T. S. Kristensen, 2015)
    - How often do you feel tired?
    - Do you have enough energy for family and friends during leisure time?
7. The Mental Health Knowledge Schedule (MAKS) (Evans-Lacko et al., 2010)
    - Most people with mental health problems want to have paid employment
    - People with severe mental health problems can fully recover

Statistics For the calculation of statistic the following extra packages from the software R 1.2.1335 (R Core Team, 2017) were used:

- dplyr (Wickham et al., 2018) for data manipulation, for instance to select variables, columns, filter rows, etc.
- reshape2 (Wickham, 2007) for data manipulations, for instance to melt data for graphic visualisations
- ggforce and ggthemes by the same authors as ggplots (Wickham, 2016) to accelerate the program and the availability of themes
- ppcpr (Kim, 2015) for correlations and to show significant correlations in the correlation heat maps
- RcolorBrewer (E. Neuwirth & M. E. Neuwirth, 2011) for colour schemes in graphs

- lmerTest (Kuznetsova et al., 2019) for linear regression in order to plot graphs
- sjPlot (Lüdecke, 2018), sjlabelled (Lüdecke, 2019) and sjmisc (Lüdecke et al., 2019) to plot graphs for the multiple linear regressions

A.2.2 Participants

Participants were invited via email to the student presidents at the conservatoires UK, to the British Association for Performing Arts Medicine (BAPAM) and Musicians' Union, to just name a few. Invitation to the questionnaire were also distributed via the central online distribution for conservatoires for Germany and also using the Music and Wellbeing network.

Table A.7: All participants by nationality, Study II

Nationality	No of Participants
USA	7
German	9
UK	7
Switzerland	6
Other	6

Table A.8: All participants place of residence, Study II

Place of Residence	No of Participants
USA	6
Germany	13
UK	3
Italian	2
Other	12
Missing	2

Table A.9: All participants Subject of Study, Study II

Subject of Study/Department	No of Participants
Classical music	13
Music education	3
Jazz	2
Voice	9
Piano	6
Flute	5
Violin	3
Oboe	2

Continued on next page

Table A.9 – continued from previous page

Subject of Study/Department	No of Participants
Double bass	2
Drums	2
Other	6

A.2.3 Results

Depression and anxiety

As mentioned at several points literature has established that students worry about the possibility of being identified as having a mental disorder, because they may experience (academic) disadvantages due to the stigma attached to such a condition. This fear alone, whether perceived or based on experience of such disadvantages, can dissuade individuals from participating in studies of mental health (Storrie et al., 2010; Gebauer, 2014; Hall, 2018). In contrast to university musicians in Study I, music college musicians in Study II were more careful with the information they disclosed. These were almost all questions about mental health (HADS) and all questions geared to towards pain while playing and substance intake. In order to mitigate this for the HADS, I calculated separate scores for both anxiety and depression (above and below the cut-off score), based on the complementary depression predictors according to the literature (World Health Organization, 1994). For depression, this meant that high scores in trait anxiety, pain catastrophising, sleep dysfunction, dysfunctional coping and negative identification (MIMS), combined with low scores of active and cognitive coping, projected a depression score of ≥ 9 . The reverse predicted a depression score ≥ 9. In the two cases where the sum of negative variables was between scores, questions from Spielberger's trait anxiety and the Pittsburgh Sleep Quality Index, that directly related to depression such as early morning wakening, were also taken into account. A trait anxiety score of 50+ translated into a score of ≥ 9 in HADS anxiety, congruent with literature findings.

Professional identification

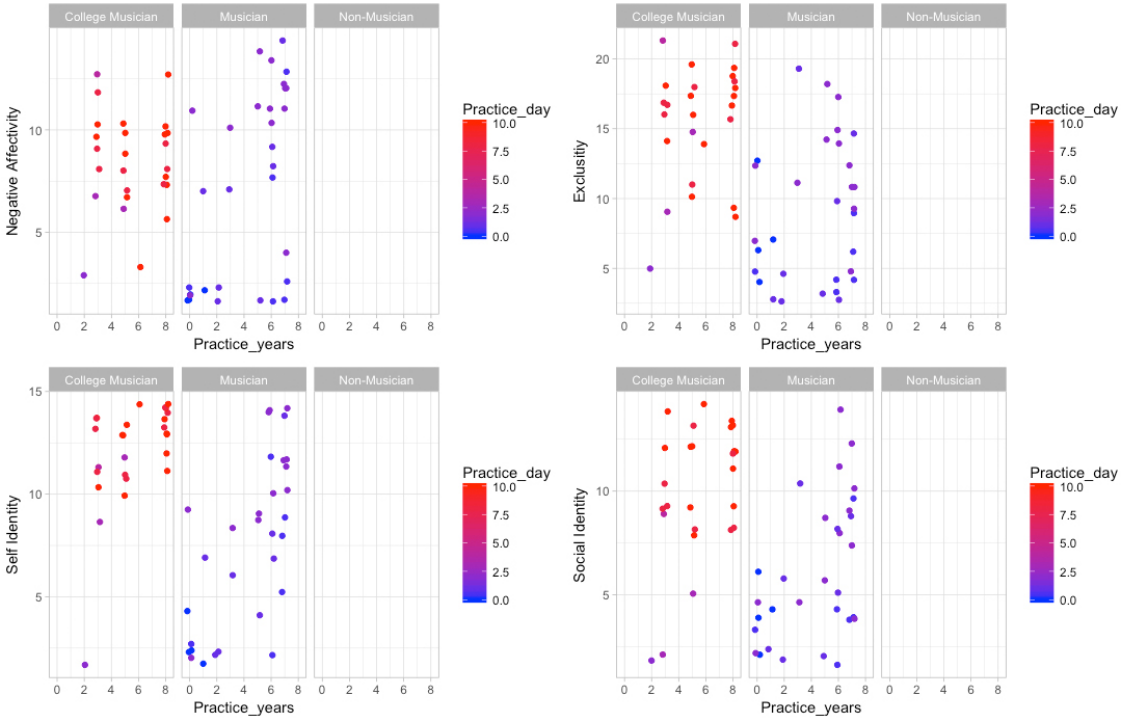

Figure A.5: shows all MIMS subscales [self-identification, social identification, negative affectivity and exclusivity] divided by groups [music college musicians, university musicians and university non-musicians] and yearly practice time, weighted by daily practice time, Study II

Note:that university non-musicians who did not play an instrument are shown here as empty

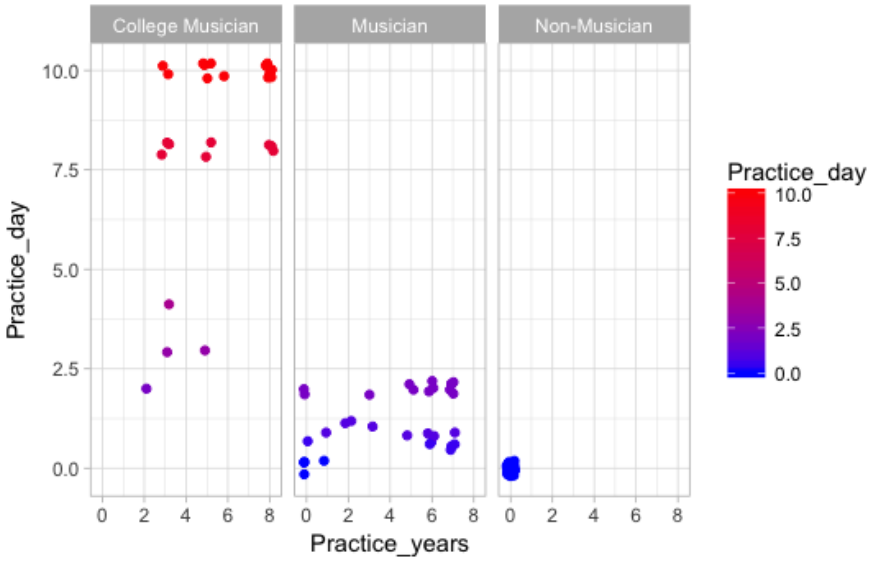

Figure A.6: compares practice time from Studies I and II, in years and weighted by practice per day divided into groups [music college musicians, university musicians, university non-musicians], Study II

Note: that university non-musicians who did not play an instrument are shown here as empty

Note: GOLD-MSI only gives a time reference, not the accurate time i.e. 0 = 0-2 year;, 2 =2-4 years etc., 0 practice time = 0-0.5 hours per day, etc.

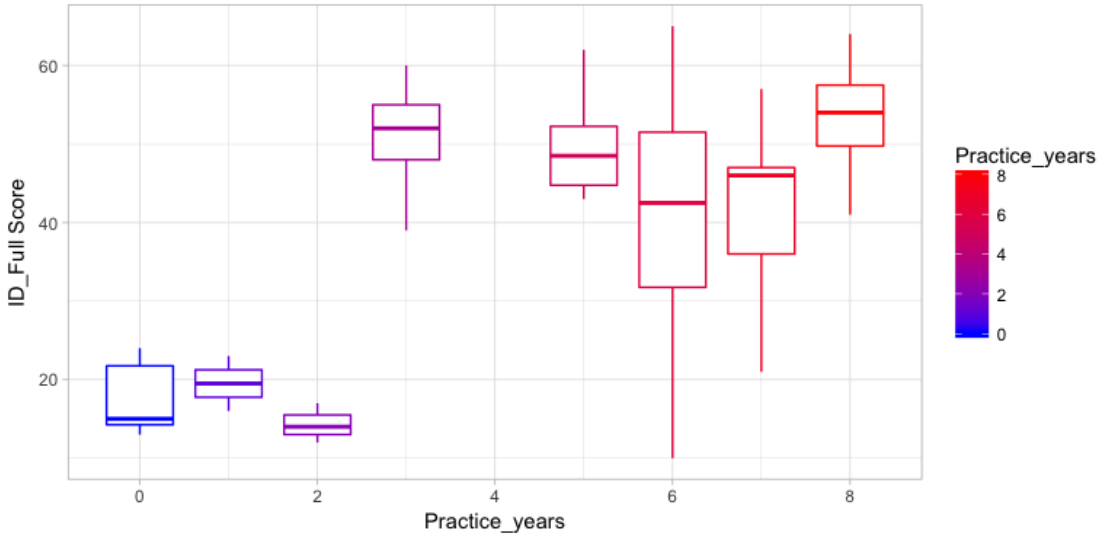

Figure A.7: Practice time per day and the full MIMS combining music college musicians and university musicians, Study II

Depresonalisation

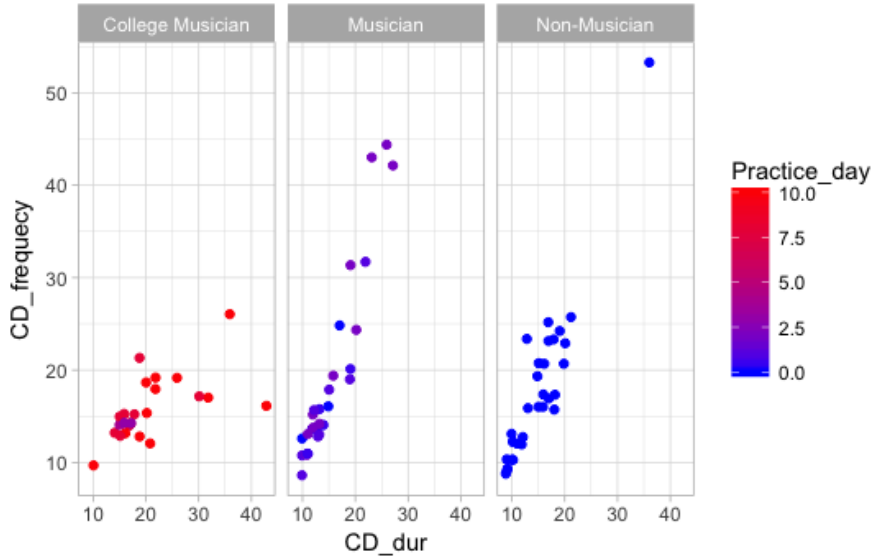

Figure A.8: Depersonalisation duration and frequency weighted by daily practice [blue = 0-15 min daily practice, red= 6-9 hours daily practice], all groups, Study II

Pain catastrophising

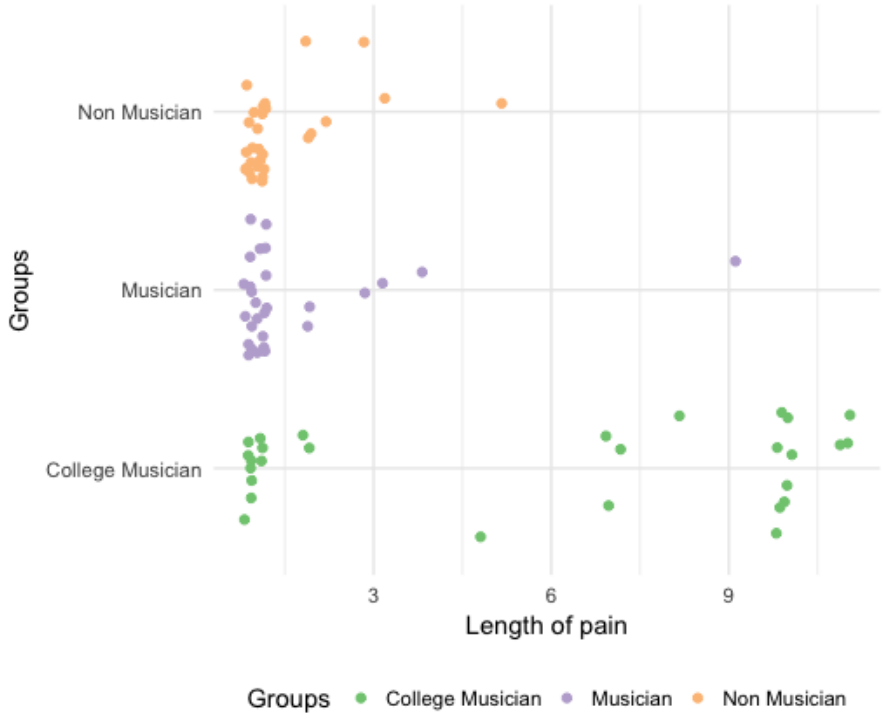

Figure A.9: Jitter plot showing the length of perceived pain in months [3 -9 months], lengths increases from left to right, for music college musicians, university musicians and university musicians, Studies I and II

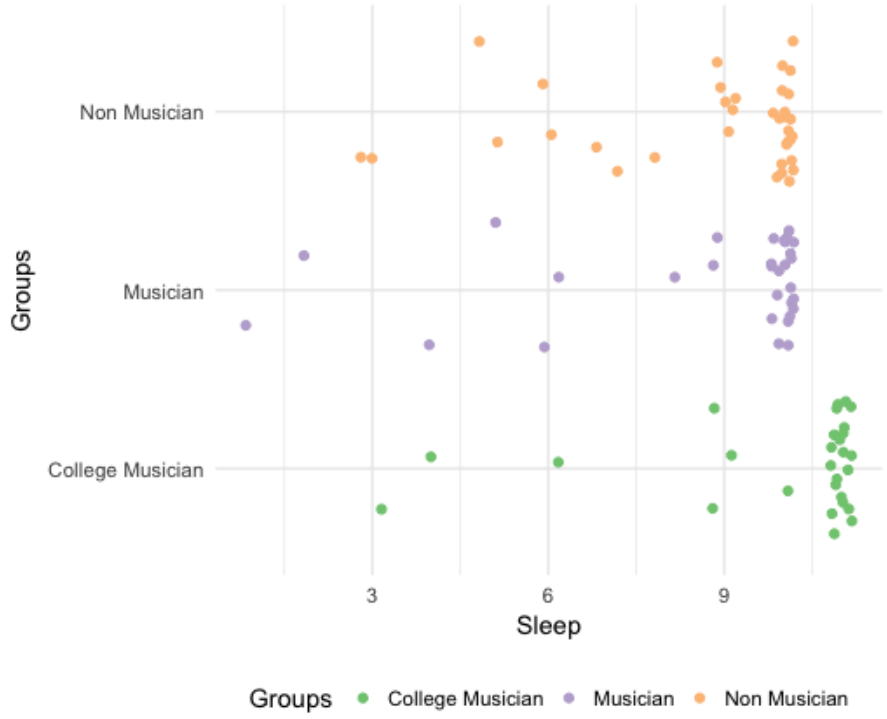

Figure A.10: Jitter plot showing the length of perceived length sleep, length increases left to right days,for music college musicians, university musicians and university musicians, Studies I and II

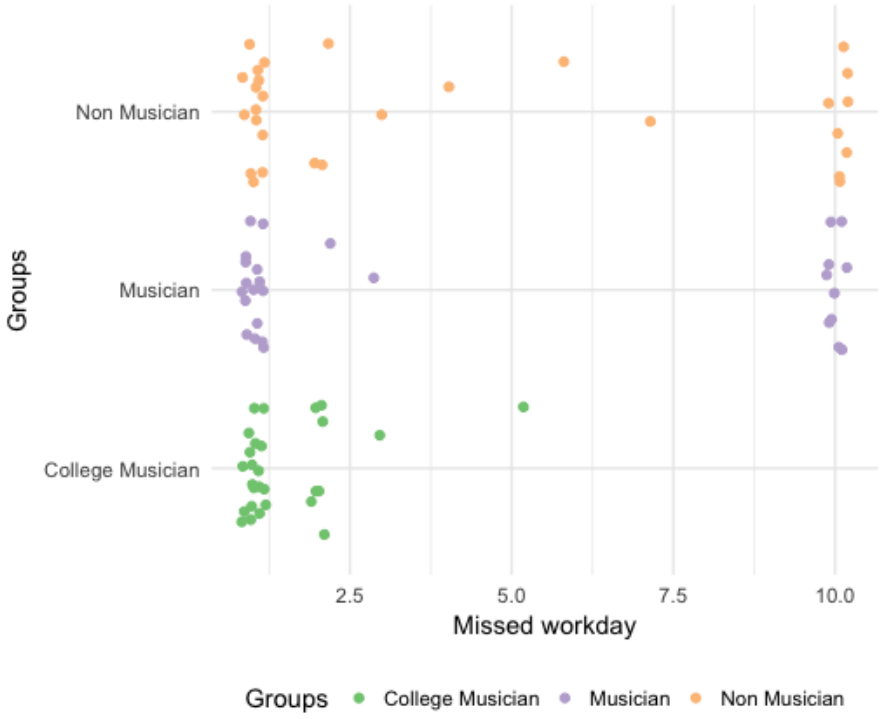

Figure A.11: Jitter plot showing missing days at work, days increase left to right for music college musicians, university musicians and university musicians, Studies I and II

A.3 Study III

A.3.1 Method

The copywrite for the DIAY is held by the Hogrefe Verlag. Depending on the focus of the investigation, specific sections can be added or removed. Questions are generally either rated on a 3 or 4-point-likert scale for instance about the social environment (i.e 'I have people I can talk with about my day-to-day problems' or 'I appear to catch illnesses faster than anyone else in my surronding') or as yes/no questions (i.e. 'Have you smoked?' or asking for specific illnesses such as hypothyroidism). It also provides the opportunity to ask follow-up questions for instance depression ('Most people feel sad, subdued or feeble at times for instance after the loss of a loved one or when problems appear at work/school etc. Did you feel overwhelmingly sad, weak or without motivation for the past 2 years- that is 50% of those 2 years or longer?') A similar question for anxiety is ('Could you describe a situation in the past .... weeks where you felt particularly anxious').

A.3.2 Procdure

Ethical approval was granted on 2nd June 2017. The reference no is 014450. Prior to the submission of the ethical application, the entire document was reviewed by both supervisors, Dr. Williamson and Dr. Timmers, which was also acknowledged during the online submission. Interviewing friends was acknowledged several times in the application form for instance in methodology and mitigating risks. A minimum of six participants was agreed for this study (see meeting notes 22nd February 2017.

An amendment to the ethics application 014450 was requested following the process in the Music Department, and was granted by Prof. Simon Keefe on 1st February 2018.

Participant information / consent

Consent: to be emailed ahead of the interview and signed on the day of the interview.

Please read carefully; only sign this form when we meet, before the start of the interview

Thank you for agreeing to answer a few questions for me. I am part of the Music and Wellbeing group at the University of Sheffield, and I am researching mental health and depressive symptoms experienced by musicians in training. I am interested to hear about your experiences – they will help me to find out more about professional musicians' wellbeing and mental health, depressive symptoms they may experience, coping methods they try and may or may not find to be effective, and their views on issues around symptom prevention.

Finally, before we start: I would like to record this interview, because then I can listen to what you are saying and conduct a reasonable conversation instead of having to pause frequently to write everything down. You will remain completely anonymous in the study; I will not refer to you by name and the recording will be transcribed with no reference to your personal details. Do I have your permission to record this interview? And are you happy for your anonymous responses to be included in my research?

Research questions

Demographics

1. What is your current primary instrument?

2. How were you first introduced to this instrument? Why did it appeal to you?

3. How many years have you trained to be a musician?

4. Different schools? Different teachers?

5. How many years have you been working freelance, on probation and/or fest ? [Fest = *Fest angestellt* meaning having a contract for at least 12 months, usually with an (German) orchestra or opera house. In contrast to freelance, where the fee is paid according to the number of performances agreed/performed, musicians on a fest-contract are almost comparable to office

workers. They benefit from regular monthly salaries and a fixed number of working hours. Even though there are variations and loopholes for employers, this type of contract gives musicians benefits their freelance counterparts don't have, e.g. sick leave or being able to take time off while still being paid regularly

6. Favourite performance events? / people to work with?

Section 1: Depression diagnosis

1. Roughly for how long would you say that you have suffered from depressive symptoms altogether?

2. To what extent would you say you suffered from...

   (a) ...lack of motivation?

   (b) ...memory problems?

   (c) ...anxiety problems (if performance anxiety, significantly more than before)?

   (d) ...feeling of not being quite oneself?

   (e) ...more pain than before?

   (f) ...different sleeping pattern?

3. Whom did you first approach to discuss your symptoms?

   (a) professional help

   (b) self-test

   (c) internet

   (d) friends

4. At what point, if at all, did you receive a formal diagnosis? By whom? (GP, specialist, psychiatrist, other)?

Section 2: Coping with depression

1. Who did you turn to for support once you were sure of your diagnosis?
2. What difficulties, if any, would you say that you as a musician encountered that you suspect might not be difficulties for non-musicians?
3. To what extent did you try to keep your symptoms to yourself / from friends / colleagues?
4. For what reason?

Section 3: Life as a musician with depression

1. How did your depression impact your social life, if at all?
2. Which steps did you undertake to try to get better? Which of them worked for you and would you be able to say why?
   (a) Self-help groups
   (b) Trying to structure the day
   (c) Sport/workout/going for walks/physical activities
   (d) Changing diet
   (e) Talking to friends/family/colleagues
   (f) Changing/adjusting life goals
   (g) Faith/prayer/meditation
   (h) Other

Section 4: Prevention

A. Personal

1. What kinds of strategies did/do you use to minimise the chance of a relapse?
2. What structures did you find helpful? Any turning points?

3. In retrospect, what kind of structures would you have found helpful (that didn't exist or weren't available to you at the time)?

B. The profession

1. Based on your experience...

   (a) ... how much would say your education prepared you for mental health challenges?

   (b) ...what kinds of questions or difficulties do you foresee if or when mental health classes are taught in music colleges or music faculties?

   (c) ...what would you like current music students to know about mental health and depression?

Section 5: Closing Time for some random thoughts – is there anything you would like to say at this final point, relating to the issues that we have raised in our conversation today, that you feel hasn't been mentioned

Die Wahrheit ruht in der Tiefe, danach zu forschen ist nicht jedermanns Sache.

Truth rests in the depths, searching for it is not for everyone.

— Johann Wolfgang von Goethe, 1823

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