

Juggle or Struggle: Vulnerability to Developing Symptoms of Burnout and Depression in Elite Athletes

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Abstract

Elite athletes are caught in a dilemma between extreme physical and psychological demands, which often push the border of individual limits. At the same time, it is necessary for athletes to attain and maintain physical and mental health as a prerequisite to performance capability and functionality. This balancing act paired with the elite sport's culture of risk creates the hazard of overload and consequential ill-health. Compared to physical issues, psychological exhaustion is less visible and more difficult to diagnose. In recent years, especially the burnout syndrome has become increasingly popular in the occupational context as well as in elite sports. However, there is still a lack of agreement regarding the risk and protective factors of athlete burnout. Moreover, the respective research in this field entails several theoretical, conceptual and diagnostic issues. Even after 40 years of burnout research, an agreed-upon definition with specific diagnostic criteria is still lacking. This problem is exacerbated by the fact that the overlap of burnout with recognised clinical disorders, such as depression, is still to be determined, even though these syndromes are often referred to synonymously.

Therefore, the present dissertation aims to address the following questions: (1) Which predictors of burnout and depression are identifiable in elite sports and how do the two syndromes differ in this regard? (2) Is there a conceptual overlap of burnout and depression? To what extent do burnout and depression instruments measure the same construct? (3) Based on athlete data, is it possible to identify typical characteristics of athletes with particularly high burnout scores to form risk profiles?

These questions are addressed on the base of a systematic review (study I) and studies II and III utilised data from the GOAL study („The German Young Olympic Athlete's Lifestyle and Health Management Study“) with 1,138 youth elite athletes from all Olympic disciplines. In study II, we analysed the conceptual overlap of burnout and depression by comparing four factor models with structure equation modelling. In study III, a classification tree analysis was employed to form groups with extremely high and low burnout symptomatology.

The results of the review show that the predictors assessed in athlete samples in current literature differ between burnout and depression (Study I). Conceptually, results of the structural equation modeling show that burnout and depression share a common underlying factor (Study II).

Further, results of the classification tree analysis indicated that burnout symptomatology is associated with specific combinations of risk characteristics (Study III).

The present dissertation aims to contribute to deciphering the phenomenon of athlete burnout. Collectively, the conducted studies illustrate that previous research has evolved in two separate research traditions for burnout and depression in sport. However, this strict separation is not sufficiently supported by theoretical considerations. Therefore, the present dissertation aims to provide a first base for a potential joint perspective and to contribute to a constructive development of the field. Furthermore, on the base of our findings, guiding principles for future research and practice are derived.

Zusammenfassung

Spitzenathleten befinden sich in einem Spannungsfeld aus extremen physischen und psychischen Anforderungen, die regelmäßig an und nicht selten auch über persönliche Belastungsgrenzen gehen. Gleichzeitig ist die Aufrechterhaltung der körperlichen und psychischen Gesundheit eine Grundvoraussetzung für Leistungsfähigkeit und Funktionalität während der Sportkarriere und darüber hinaus. Dieser Drahtseilakt, gepaart mit der Risikokultur des Spitzensports, birgt das Risiko der Überlastung bis hin zu Überlastungserkrankungen. Im Vergleich zu physischen Überlastungen, sind psychische aufgrund ihrer „Unsichtbarkeit“ schwieriger zu identifizieren. Hierbei fällt auf, dass das Burnout-Syndrom in der Allgemeinbevölkerung ebenso wie im Spitzensport enorm an Popularität gewonnen hat. Unklarheit besteht jedoch auch nach zahlreichen empirischen Untersuchungen hinsichtlich der Frage nach den Faktoren, die zu einer Burnout-Erkrankung von Spitzenathleten führen oder sie davor schützen können. Zudem zeigen sich bei genauerem Hinsehen gravierende konzeptuelle, theoretische und diagnostische Mängel in der Burnout-Forschung. So gibt es auch nach 40 Jahren Forschung keine allgemein anerkannte Definition, die konkrete diagnostische Beschreibungen der Symptomcharakteristika, -schwere und -auftrittsdauer enthält. Diese Problematik wird dadurch verstärkt, dass mögliche Überschneidungen des Burnout-Syndroms mit dem klinischen Krankheitsbild der Depression weiterhin ungeklärt sind, obwohl diese beiden Störungsbilder häufig synonym verwendet werden.

Die vorliegende Dissertation untersucht daher die folgenden Fragen: (1) Welche Risiko- und Schutzfaktoren für die Entwicklung von Burnout und Depression werden im Leistungssport identifiziert und inwiefern unterscheiden sich die beiden Syndrome dahingehend? (2) Inwiefern überlappen Burnout und Depression auf konzeptueller Ebene? Messen die zugehörigen Erhebungsinstrumente eventuell ein gemeinsames Konstrukt? (3) Lassen sich anhand von Athletendaten Risikoprofile für Burnout identifizieren? Welche Charakteristika sind für Athleten mit besonders hohen Burnout-Werten typisch und welche für Athleten mit besonders niedrigen Burnout-Werten?

Als Datengrundlage für diese Fragen dienen zunächst ein systematischer Literaturreview (Studie I) sowie Daten der „GOAL“-Studie („The German Young Olympic Athlete's Lifestyle and Health Management Study“) mit 1.138 Spitzenathleten sämtlicher olympischer Sportarten. Für Studie II wurden mittels Strukturgleichungsmodellen verschiedene Modelle miteinander verglichen um potentielle Überschneidungen in der Faktorstruktur von Athletenburnout und Depression zu überprüfen. Für Studie III wurde eine Klassifikationsbaumanalyse zur Extremgruppenbildung hinsichtlich der Burnoutsymptomatik eingesetzt.

Die Studienergebnisse zeigen, dass sich die in der Literatur untersuchten Risikofaktoren für Burnout und Depression bei Athleten stark unterscheiden (Studie I). Konzeptuell lässt sich feststellen, dass Burnout und Depression einen gemeinsamen zugrundeliegenden latenten Faktor aufweisen (Studie II). Zudem zeigte sich, dass Burnoutsymptomatik von bestimmten Kombinationen von Risiko-Charakteristika begleitet wird (Studie III).

Die vorliegende Arbeit soll einen Beitrag dazu leisten, das Phänomen Burnout im Spitzensport besser zu verstehen. Die angeführten Studien verdeutlichen, dass in bisheriger Forschung zwei separate Forschungstraditionen für Burnout- und Depressionsforschung im Sport präsent waren. Diese Trennung ist jedoch nicht oder nur unzulänglich theoretisch begründet. Die vorliegende Arbeit betrachtet daher beide Forschungsstränge gemeinsam, um eine Basis für eine potentielle gemeinsame Perspektive und konstruktive Weiterentwicklung des Forschungsfeldes zu schaffen. Desweiteren werden aus den Ergebnissen Handlungsempfehlungen für zukünftige Forschung und die leistungssportliche Praxis abgeleitet.

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Disclaimer

The present dissertation particularly focuses on burnout in athletes. However, even though the topic of burnout has been widely studied in the elite sport context, the specific research questions targeted within this thesis are relatively new to athlete burnout research. Thus, in the present dissertation, a lot of the cited studies stem from general burnout research that has been conducted on non-athlete samples. In these cases, the simple term ‘burnout’ is used. In studies that explicitly assessed burnout in athletes, it will be referred to as ‘athlete burnout’. Findings that refer to both general burnout research and athlete burnout research will be labeled ‘(athlete) burnout’. This should be noted in order to avoid confusion about ‘burnout’, ‘athlete burnout’ and ‘(athlete) burnout’.

In agreement with the 2018 position statement of the Fédération Européenne de Psychologie des Sports et des Activités Corporelles (FEPSAC, Moesch et al., 2018), the present dissertation aims to advance research in the field of athlete mental health as a means to inform sport psychological and practical work within elite sports. Accordingly, study results are transferred to the applied context.

1. Introduction

„I had burnout. I was on the brink of saying: Okay, I’m gonna go to my parents and drop it all. (...) It was a really weird situation, in which I didn’t even recognize myself. I was so lost. I asked my manager to seal me off from everything for a couple of weeks, I didn’t do any interviews, nothing. No twitter, no emails. I simply couldn’t be bothered any more, not even to train. Everything was an agony, things that were easy before, didn’t work anymore. It was more than an ordinary low, where you’d simply say: Pull yourself together, you wimp!“¹

(Jan Frodeno, Interview with WELT online, published 2010)

This quote illustrates how Frodeno denoted his symptoms of loss of interest, depressed mood and loss of functionality as ‘burnout’. Like many other top level athletes, he chooses the term burnout even though the symptoms described would also fit those of a depressive episode. Do both terms actually refer to the same underlying mental health issue? What is the relationship between burnout and depression in athletes? And what are the respective risk factors to develop one syndrome or the other?

The present dissertation addresses these questions by first introducing the reader to the lifeworld of high level athletes (see 2.1), followed by an overview on mental illness and specifically burnout in athletes (see 2.2). Subsequently, previous and current definitions of burnout and depression are outlined and respective theoretical etiology models presented (see 2.3). The description of the shortcomings of existing research (3.1) provides the basis for the specific research questions with which this work aims to address those desiderates (see 3.2). Following a description of the data

¹ Original quote: „Ich hatte ein richtiges Burn-Out. Ich war kurz davor zu sagen: Okay, ich fahre jetzt zu meinen Eltern und schmeiße alles hin. (...) Das war eine ganz seltsame Situation, in der ich mich kaum wieder erkannt habe. Ich wusste überhaupt nicht mehr, wohin mit mir. Ich habe dann meinen Manager gebeten, mich für ein paar Wochen komplett abzuschotten, habe keine Interviews mehr gegeben, nichts. Kein Twitter, keine Mails. Ich hatte überhaupt gar keinen Bock mehr, auch nicht aufs Training. Das war alles Quälerei, Dinge, die sonst ganz einfach sind, haben nicht geklappt. Das war mehr als ein Loch wo man sagt: Weichei, reiß dich zusammen.“ (Kleinemas, 2010)

set used in the empirical studies (see 4.1), the three studies included in this dissertation are briefly described (see 4.2) and the corresponding manuscripts are presented in full length (see 4.3). Eventually, study results are discussed within the bigger context of athlete burnout research. On a practical level, findings are applied to the question of optimal athlete mental health care (see 5).

2. Theoretical Background

2.1 Lifeworld of the elite athlete

Elite sport is a highly demanding endeavour. Training loads of youth athletes have increased by nearly 25 % between 1979 and 2000 (Fessler et al., 2002). At the same time, optimal performance can only be achieved through a fine-tuned balance of strain and recovery (Kellmann and Kallus, 1999).

Athletes constantly have to push their limits in order to adaptively increase performance. However, pushing one's limits involves the risk of injury, which in turn holds the possibility of a temporary or long-term loss of functionality in the athletic context. This physical risk inherent to high-performance sport constitutes one of the balancing acts that athletes have to manage. While the physical demands of elite sport are naturally extensive and visible, the psychological, social and emotional demands are not as overt. The constant strive for excellence may lead to unhealthy levels of perfectionism and low self-esteem because it may seem that nothing is ever good enough. Many insecurities inherent to the lifeworld of elite sports, such as the prevailing fear of deselection, place elite athletes under high levels of performance and competition pressure (Brand, Wolff, & Hoyer, 2013; Neely, 2017).

Another balancing act on the psychological level can be observed with regard to athletic identity. Being involved and successful in elite sport requires a long-term, extensive and nearly exclusive focus on the sport. This intense focus is necessary but holds the risk of developing a unidimensional athlete identity (Coakley, 1992), whereby the individual is completely engulfed in the sports setting, their time is spent nearly exclusively on sports and sport-related factors, their self-worth is closely tied to athletic performance and they view themselves primarily as an athlete. This so-called 'identity tunnel' (Mitchell et al., 2014) can have detrimental effects when the

individual encounters stressful events. Here, the athlete lacks the self-complexity needed to buffer negative effects of such stressors (Gustafsson, Martinent, Isoard-Gauthier, Hassmén, & Guillet-Descas, 2018). A unidimensional athletic identity becomes especially problematic when the athlete retires or leaves the sport because they have not developed any alternative resources (e.g. relationships, careers, hobbies etc.) to fall back on (Cresswell and Eklund, 2007; Sanders and Stevinson, 2017).

These balancing acts between committing oneself to the sport entirely and potentially risking lasting physical or psychological functionality and well-being constitute a dilemma (Delenardo and Terrion, 2014). At the extreme, this dilemma can only be navigated by dropping out or accepting the culture of risk prevailing in elite sports (Nixon, 1992). This culture emphasizes a ‘no pain, no gain’ mentality, whereby problems are overcome by pushing through the pain (Malcolm, 2006). Consequently, it is not surprising that athletes may want to hide pain, injuries or ill-being by all means since those threaten their athletic functionality (Diehl, Mayer, Thiel, Zipfel, & Schneider, 2019). Within this mind-set, ill-health is often trivialized and the media exploit these sacrifices to construe heroic stories which in turn strengthens the ‘push through’ mentality.

In addition to demands directly related to the sport, elite athletes experience various organizational stressors: Elite sport is a very exclusive system, where only the absolute best get selected and still have no guarantee of remaining selected. The uncertainty of an athlete’s career paired with a rather low financial recognition of athletes in many countries forces them to have another back-up career, which in most cases leads to a double burden of education (e.g. school, university studies, vocational training) and sport (O’Neill, Allen, & Calder, 2013).

In this respect, time pressure and constraints are a major issue for elite athletes (Burlot, Richard, & Joncheray, 2018). Depending on the discipline (i.e. endurance athletes often have more training hours), elite athletes train three to five hours a day (Kenttä, Hassmén, & Raglin, 2001). Travel time to practices and competitions constitute a time factor that is often underestimated. Youth athletes have to attend school, student athletes have to attend classes and most adult athletes work in normal professions parallel to their athletic career. In addition, they have to find time for family and social life. As a young athlete from an interview study phrased it,

“Well, track takes a lot of time...so then I really put all my time for school and doing homework, and there is no time to do other things that I would like

to do, like be with friends and such. For that I have very little time, but on the other hand I have chosen sports and that is what I want to do, and I have gotten friends from there.” (Ryba, Stambulova, Selänne, Aunola, & Nurmi, 2017, p. 136)

This quote vividly demonstrates the high level of commitment and sacrifice on the part of the athlete. But also parents often sacrifice a lot to enable such a career (e.g. driving to practices, financing equipment, extra practices and coaches etc.), which in turn can evoke feelings of guilt in the athletes when their motivation or performance declines (Coakley, 1992). Moreover, young athletes often have to relocate away from their family in order to train at adequate facilities and training centres (Barker-Ruchti and Schubring, 2016). Here, coaches and team staff usually play a central role in the athlete’s life as they often function as substitute parents. In many cases, the young athletes initially decide whether they want to be involved in high performance sports, but when they eventually enter the path to elite sport, the majority of decision-making is often taken over by coaches to create an appropriate environment for the pursuit of this goal (Schubring, Bub, & Thiel, 2015). This external control constitutes a potential area of conflict: When athletes perceive a lack of control over their own life, their need for autonomy may be dissatisfied, which in turn can lead to a decrease in motivation and ill-being (Hodge, Lonsdale, & Ng, 2008).

As signified, youth athletes are exposed to several additional stressors compared to adult athletes: puberty constitutes a very demanding developmental phase in which young athletes already have to master certain so-called ‘normative developmental tasks of adolescence’ (e.g. identity building, detachment from parents, development of personal values and beliefs, Havighurst, 1956). Being an (aspiring) elite athlete additionally requires them to master certain sport-related developmental tasks, such as optimizing one’s athletic performance or coping with high expectations (Ohlert, 2013; Ohlert and Kleinert, 2014). Thus, the personalities of young elite athletes may still be rather fragile and not as stable and confident as those of adults, potentially making them more susceptible to psychological ill-being. Accordingly, the common age of onset for many psychological disorders is before 25 years of age (Beckmann, Elbe, Szymanski, & Ehrlenspiel, 2006; Pearson, Janz, & Ali, 2013; Smetanin, Briante, Stiff, Ahmad, & Khan, 2015). In addition, while increased sports professionalization and digitalization generate many opportunities for athletes, they can also add to the pressure: An increasing performance level often

goes hand in hand with increasing public visibility and public scrutiny, which increases social pressure (Schneider, Köhler, & Schumann, 2016) and pressure for external self-validation. Since social comparison plays an important role in identity building during adolescence, adolescents may be especially vulnerable to stressors associated with increasing digitalization.

All of these are stress factors unique to the elite sport environment, making athletes especially susceptible to chronic stress and mental illness (Hughes and Leavey, 2012; Rice et al., 2016).

2.2 Mental illness in athletes: Why burnout fits so well

As illustrated above, pursuing a career in elite sports can be considered a stressful undertaking. Despite, the popular view of the mentally strong and unshakeable athlete, prevalence rates of psychopathology in high level athletes are similar to those of the general population (Gulliver, Griffiths, Mackinnon, Batterham, & Stanimirovic, 2015; Yang et al., 2007). In recent years, numerous studies have assessed mental health issues in athletes, identifying depression, anxiety and eating disorders as the most common clinical disorders (review by Rice, et al., 2016). A French study showed a lifetime prevalence of psychopathology in athletes of 25.1 % (Schaal et al., 2011), whereas an Australian survey of elite athletes demonstrated that 46.6 % reported diagnostically relevant symptoms of at least one psychological disorder (Gulliver, et al., 2015), and a recent Swedish study even reported a 51.7 % lifetime prevalence (Åkesdotter, Kenttä, Eloranta, & Franck, 2020). Existing research conveys that depression can be found in up to 34 % of athletes (Hammond, Gialloreto, Kubas, & Davis IV, 2013). Eating disorders are prevalent in up to 22.8 % of athletes, and 14.7 % report anxiety (Gulliver, et al., 2015).

Since a history of mental illness is considered an established risk factor for future mental health issues, in a very recent study on the prevalence of mental health problems in athletes, Åkesdotter, et al. (2020) inquired about previous psychiatric diagnoses. Here, the athletes most frequently reported previous diagnoses of depressive disorders, eating disorders and burnout. The explicit mentioning of burnout is especially interesting as it is not recognized as a clinical picture and as such is usually not covered when assessing psychopathology in athletes. For lack of official classification, Åkesdotter et al. file it under ‘trauma and stress related disorders’. Interestingly, in a large German survey about dysfunctional aspects of elite sport, the mental health section inquired

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about experiences of depression, eating disorders and specifically burnout. 9.3 % of elite athletes claimed having experienced depression, while 11.4 % reported experience of burnout (Breuer and Hallmann, 2013).

These two findings draw attention to the alignment of burnout within the mental illness realm. Since in lay terms burnout is a popular, widely used and understood construct, especially in the elite sports environment (Lavalley, Goodger, Gorely, & Harwood, 2005), this calls for a stronger focus on this syndrome that is both, a widely used description of severe ill-being, but at the same time not formally acknowledged as a disorder. Therefore, within this dissertation, I want to focus on burnout in athletes. Second, since burnout outside of the sport context is often viewed as a less stigmatized term for depression, which in contrast is a recognized clinical picture, this dissertation also aims to investigate the specific relationship between athlete burnout and depression.

Today's society is often characterized as a meritocracy. Everything has to be optimised and efficiency is key. This trend has been the prevailing mindset in elite sports from the very beginning. Therefore, it is not surprising that the diagnosis 'burnout syndrome', which has shown a rapid increase in popularity within the general population (Bahlmann, Angermeyer, & Schomerus, 2013), has also increasingly been associated with the ultimate high performers: elite athletes. More than 100 empirical studies have been published on the subject of athlete burnout (Gustafsson, Hancock, & Côté, 2014) and an EBSCOhost search of the terms 'athlete burnout' and 'athletic burnout' resulted in 1,320 hits.

The popularity of this term as a label for psychological ill-being in athletes seems only logical: Burnout, with its connotation of having overworked and overcommitted oneself, seems to better fit the picture of the hard-working high performer than other exhaustion syndromes, such as depression, which conversely prompts the association of a fatigued, desolate individual without drive or motivation. Burnout could even be construed as a kind of virtue, since the athlete has demonstrated overconformity to the 'giving it all'-mentality of elite sport, which Poucher et al. 2019 summarize as follows: "Beliefs about mental toughness may reflect internalized cultural values, attitudes, and ideals related to hyper-masculinity, denial of vulnerability, self-sacrifice, and unrelenting standards and effort." (p. 5).

It is commonly known that mental illness is still tainted with stigma. This stigma is especially strong in elite sports (Kaier, Cromer, Johnson, Strunk, & Davis, 2015; Schwenk, 2000) due to the

prevailing mindset of having to ‘push through’ or ‘tough out’ any issues or obstacles in order to achieve excellence (Malcolm, 2006). Accordingly, elite athletes have been found to be less likely to seek help for mental health issues compared to the general population (Gulliver, Griffiths, & Christensen, 2012) and they point to stigma as the major barrier to help-seeking (Bird, Chow, Meir, & Freeman, 2018). Further, it has been shown that some athletes are afraid to communicate physical ill-being or injury because they fear deselection and being labeled as unable to withstand training stress (Roderick, Waddington, & Parker, 2000). Similarly, athletes may avoid communicating psychological difficulties out of fear of being considered mentally weak (Andersen, 2011), which in turn drastically reduces chances of a successful career path (Gulliver, et al., 2012).

Interestingly, a study outside of the sport context showed that due to its socially more desirable connotations ‘burnout’ is often assumed to be a cover term to avoid stigma attached to clinical pictures, most notably depression (Bahlmann, et al., 2013). In fact, health professionals have reported that many people who ‘self-diagnose’ themselves as burned out in fact meet criteria for other psychological clinical pictures (Maske, Riedel-Heller, Seiffert, Jacobi, & Hapke, 2016).

In summary, burnout is a phenomenon that is very frequently associated with and researched in elite athletes. Additionally, burnout may be a cover diagnosis to avoid stigma attached to psychopathology, such as depression, a stigma which is especially powerful in the elite sports environment. Therefore, we see the need to take a closer look at how athlete burnout is defined, distinguished from clinical depression, theoretically underpinned, explained and assessed in elite sports. In order to do so, we first focus on the current definitions of depression and general burnout, because research on athlete burnout largely builds on general burnout research. Following this, we address the construct of athlete burnout specifically (2.3.1). We then briefly outline the historical research background (2.3.2) in order to subsequently illustrate the current state of research on the differences and similarities between (athlete) burnout and depression (2.3.3).

2.3 Burnout and depression

2.3.1 Current definitions and measurement

When looking at the definitions of burnout and depression, the differing level of clarity is conspicuous: Depression is a mood disorder, that differs from everyday sadness and feeling 'blue'. The Diagnostic and Statistical Manual of Mental Disorders (DSM-V) regulates that in order to be diagnosed with depression, an individual must be experiencing ≥ 5 of the listed symptoms during a two week period, one of which needs to be one of the key symptoms

1. Depressed mood most of the day, nearly every day.
2. Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day.

Other potential symptoms include:

3. Significant weight loss when not dieting or weight gain, or decrease or increase in appetite nearly every day.
4. A slowing down of thought and a reduction of physical movement (observable by others, not merely subjective feelings of restlessness or being slowed down).
5. Fatigue or loss of energy nearly every day.
6. Feelings of worthlessness or excessive or inappropriate guilt nearly every day.
7. Diminished ability to think or concentrate, or indecisiveness, nearly every day.
8. Recurrent thoughts of death, recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.

Further, the individual must present clinically significant experience of distress or impaired functioning and it must be ruled out that the symptoms are the product of substance abuse or any other medical condition (American Psychiatric Association, 2013).

There are several instruments available for assessing depression (e.g. Beck Depression Inventory (BDI), Center of Epidemiologic Studies Depression Scale (CES-D, German version: Allgemeine Depressionsskala (ADS)), Hamilton Depression Rating Scale (HAM-D), Patient Health Questionnaire (PHQ)). These measures vary regarding elaborateness, but all screen for the above-mentioned formally acknowledged criteria. The level of disorder severity is indicated by how many criteria are met (DGPPN et al., 2015). Additionally, several specific subforms of depression are formally recognized, such as melancholic depression, atypical depression, catatonic

depression, depression with anxious stress, depression with peri-partum onset or seasonal affective disorder (American Psychiatric Association, 2013). Depressive conditions are considered non-specific to context and therefore respective instruments can be administered to any type of population².

For burnout, the case is a little different: even though some countries have autonomously decided to acknowledge it as a disorder (i.e. Italy, Latvia, Sweden, Eurofund, 2018), burnout is not formally recognized as a distinct clinical picture by the World Health Organization (WHO). However, in the most recent version of the International Classification of Diseases (ICD-11), burnout is recognized as an add-on diagnosis (*Z73*), which has no clinical value of its own but is considered an ‘occupational phenomenon’. The ICD-11 stipulates: “Burn-out is a syndrome conceptualized as resulting from chronic workplace stress that has not been successfully managed. It is characterized by three dimensions: feelings of energy depletion or exhaustion, increased mental distance from one’s job, or feelings of negativism or cynicism related to one’s job, and reduced professional efficacy. Burn-out refers specifically to phenomena in the occupational context and should not be applied to describe experiences in other areas of life.” (World Health Organization, 2018). This specificity to the working context is one of the most commonly mentioned and assumed distinct features of burnout.

As a consequence to the WHO’s lack of recognition of burnout as a distinct clinical picture, there are no binding and agreed-upon diagnostic criteria for burnout (Korczak, Huber, & Kister, 2010). Still, outside of research, burnout is a frequently used ‘diagnosis’. For example, physicians report increasing numbers of patients presenting with self-diagnosed burnout (Maske, et al., 2016) and Bahlmann, et al. (2013) mention that in a representative population-based sample the frequency of labeling a depressive episode as ‘burnout’ increased from 0.3% in 2001 to 10.2% in 2011. This discrepancy between lay and scientific understanding of the burnout construct also manifests on a conceptual level: In lay-terms, ‘suffering from burnout’ is mostly used to describe the final stage of a process which commonly goes hand in hand with total exhaustion and collapse, associated

² with the exception that for children there are other more specific measures (e.g.).

with critically impaired functioning. However, from a scientific perspective, most current burnout definitions do not consider burnout as this final stage but instead view it in accordance with Schaufeli and Enzmann (1998):

“Burnout is a persistent, negative, work-related state of mind in ‘normal’ individuals that is primarily characterized by exhaustion, which is accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work. This psychological condition develops gradually but may remain unnoticed for a long time for the individual involved. It results from a misfit between intentions and reality at the job. Often burnout is self-perpetuating because of inadequate coping strategies that are associated with the syndrome.” (p.36).

Over the years, many burnout measures have been developed (e.g. Maslach Burnout Inventory (MBI), Burnout Measure (BM), Shirom Melamed Burnout Measure (SMBM), Shirom Melamed Burnout Questionnaire (SMBQ)) based on adaptations of this conceptual understanding. Due to burnout’s presumed specificity to the working context, items in all of these measures are phrased in a way that is job-related. Among these instruments, the Maslach Burnout Inventory (MBI by Maslach, Jackson, & Leiter, 1996) is the most frequently used measure within general, non-athlete populations (Bianchi, Schonfeld, & Laurent, 2015a), but has also been administered to athletes (e.g. Holden, Keshock, Forester, & Pugh, 2014).

As briefly mentioned, burnout instruments lack diagnostic cut-off criteria. This constitutes a major issue, because it inhibits being able to differentiate between individuals with and without burnout and thus impedes the estimation of prevalence rates. Cut-off development and assessment of construct validity have mostly failed to gain acceptance within the scientific community due to the lack of an acknowledged clinical burnout measure for comparison (e.g. Schaufeli, Bakker, Hoogduin, Schaap, & Kladler, 2001 who equated clinical burnout with job-related neurasthenia (F48.0)). The only instrument with reasonably grounded clinical cut-offs is the SMBQ, for which Lundgren-Nilsson, Jonsdottir, Pallant, & Ahlborg (2012) compared symptoms of clinical patients with working employees and established a score of 4.40 (on a 7 point scale) as clinically relevant, with a sensitivity of 83.4 % and a specificity of 86.5%. However, in order to achieve this, four items had to be removed from the original measure.

Contrary to depression, which is considered universal and is sought to affect all areas of an individual's life, burnout is typically viewed as triggered by the working context and specifically affecting work functionality (Maslach, Jackson, & Leiter, 1997). Since different occupations entail different types of challenges and stressors, many burnout measures are adapted to the sample of interest (e.g. MBI-ES for educators). Similarly, Raedeke and Smith (2001) have developed the Athlete Burnout Questionnaire (ABQ) which is the most widely used questionnaire for the assessment of athlete burnout (Eklund and DeFreese, 2015; Gustafsson, et al., 2014). The ABQ was developed on the base of the MBI and the Eades Athlete Burnout Inventory (EABI by Eades, 1990) and the final and current version consists of three subscales which are sought to represent distinguishable symptoms: 'Emotional and physical exhaustion', 'sport devaluation' and a 'reduced sense of accomplishment'. Answers are given on a 5 point rating scale. Based on suggestions of the MBI authors, it is recommended that subscales should not be combined to a composite burnout score but rather be analysed separately.

Equal to burnout, for athlete burnout, no formal clinical cut-offs are available (Gustafsson, Lundkvist, Podlog, & Lundqvist, 2016; Raedeke and Smith, 2009). Here, researchers in the field have turned to creating their own (Ingrell, Johnson, & Ivarsson, 2019). However, the variety of these cut-off criteria creates the problem of prevalence numbers that are not at all comparable. For example previous studies have tried varying approaches:

- a) Some researchers of athlete burnout have employed Maslach and colleagues (1996) procedure, who divided MBI scores of a population-based sample into tertiles and considered those groups as a 'low', 'medium' and 'high' level of burnout. Consequently, a 'high' level of burnout merely means that the individual has a level of burnout that is higher than two-thirds of the respective sample. The resulting cut-offs have no diagnostic meaning. Adopting this procedure and considering the phase model of Golembiewski, Bourdreau, Munzenrider, & Luo (1996), Gustafsson, Kenttä, Hassmen, & Lundqvist (2007) then classified athletes as severely burned out when they showed symptoms within the highest tertile on all three subscales.
- b) Some researchers have simply made up their own cut-offs, but mostly without theoretical grounds: Guided by Maslach, et al. (1996), Cresswell and Eklund (2007) classified athletes with ABQ subscale scores above the center point of the response scale (i.e. 3) as experiencing high

burnout. Hodge, et al. (2008) modified these cut-offs to that effect that the cut-off for the subscale ‘reduced sense of accomplishment’ was lowered to 2.7.

- c) The most promising attempts to determine a cut-off with clinical value were made by comparing ABQ scores with other measures, such as the SMBQ (Gerber et al., 2018), for which clinical cut-offs are available (cf. Lundgren-Nilsson, et al., 2012) or the PHQ-9 (see Åkesdotter, et al., 2020), a clinical measure for depression. Nevertheless, both studies revealed that the ABQ showed limited value in being able to differentiate between clinically relevant and subclinical symptom levels of burnout or depression, respectively.

Athlete burnout research has also struggled to agree whether athlete burnout represents a final stage of exhaustion or a dynamic process. In alignment with the more current theories, we favor the conceptualization as a continuous syndrome, whereby individuals can experience symptomatology in varying frequency or severity. However, the label ‘burnout’ in itself suggests a final stage. Along these lines, older but still relevant theories, such as Silva (1990) proposed that athlete burnout should be understood as representing only the final stage of a training stress syndrome that occurs due to excessive training with insufficient recovery. Even though this conceptualization of burnout is not adopted in the present dissertation, Silva’s theory emphasizes the idea of athlete burnout being associated with extreme training load and overworking oneself.

Overall, it becomes apparent that depression and (athlete) burnout differ strongly regarding their level of formal definition, clarity and conceptualisation agreement within the respective field of research. In order to understand these current differences, we first need to understand the historic development and backgrounds of the respective fields of research.

2.3.2 History of two separate research traditions

Origins of the concept of depression can be traced back to ancient Greece and the modern concept of depression has evolved with the 19th century’s rise of psychiatry. While the current conceptualization of depression has been evolving from the 1960s onwards (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), burnout research has been pursued for about 40 years. The idea of depression originated and evolved in medical science (Paykel, 2008), whereas the concept of burnout was first introduced by Freudenberger (1974), a psychologist who was experiencing the

symptoms that he summarized as burnout, himself. Freudenberger described that the burned out individual “looks, acts and seems depressed” (Freudenberger, 1974, p. 161). Thus, it is especially surprising that at that time the observed symptoms were not considered as a potential subform of depression. Instead, since these symptoms were found in health-care workers, the new concept was quickly connected to specificities inherent to those types of professions, such as emotional drain, self-sacrifice and (over)commitment. Viewed as a phenomenon specific to the working context, the idea of burnout was extended from helping professions to all sorts of professions characterized by high pressure, high commitment, and high performance expectations. Logically, this idea of exhaustion in high performers was later also transferred to the elite sport context (Fender, 1989) where the first studies were conducted with coach samples (Caccese and Mayerberg, 1984).

In contrast, depression was considered universal and not context-specific. Thus, the only reason to specifically assess athletes regarding depressive symptoms would have been if they were considered a particular risk group. However, at a first glance, depression does not associate well with elite sport:

“Competitive athletes are vigorous, energetic individuals who often participate actively in their respective sports and in the wide variety of academic, social, and community activities that are available to them. Discussion of depression or chronic fatigue in this population would seem ironic given the active lifestyles of competitive athletes and the energy with which they pursue their individual goals.” (Puffer and McShane, 1992, p. 327).

So therefore, many studies on depression in athletes are related to more obvious instances, such as concussion (i.e. depression as a side effect of concussion, e.g. Kontos, Covassin, Elbin, & Parker, 2012; Vargas, Rabinowitz, Meyer, & Arnett, 2015; Yang, Peek-Asa, Covassin, & Torner, 2015) or ill-success (e.g. Hammond, et al., 2013) or retirement (i.e. athletes losing a central aspect of their life and fall into depression, e.g. Gouttebargue et al., 2017; Weigand, Cohen, & Merenstein, 2013; Wylleman, Alfermann, & Lavallee, 2004). Still, with increasing numbers of famous athletes speaking out publicly about suffering from depression during their active career, respective research has increased (review by Wolanin, Gross, & Hong, 2015). To date, these different connotations connected to the two syndrome labels and the different historical origin have led to

two separate research strands, pursued by researchers from different backgrounds, that seem to co-exist but hardly acknowledge each other (Bianchi, Schonfeld, & Laurent, 2015c).

2.3.3 Burnout and depression: A joint inspection

Conspicuously, the differences between burnout and depression are mainly structural or at least stem from the difference in recognition: As mentioned, depression is well incorporated in the clinical diagnostic manuals (ICD, DSM), whereas burnout is not. This causes a discord and impedes reciprocal recognition. Hence, it is not surprising that research which assesses and analyses both burnout and depression is rather limited.

In medical or clinical psychological textbooks, burnout is at most mentioned as a more socially acceptable term for depression that is often used by patients. Since it is not recognized in the formal diagnostic manuals it does not seem to be of any further interest to the respective research community. As Nil et al. (2010) put it, “it is not regarded as a medical/psychiatric diagnosis as defined by the DSM-IV or ICD-10 manuals and has, therefore, not been the subject of psychiatric epidemiological studies” (p. 72). On the other side, burnout studies seldomly mention or differentiate the construct from depression. Within the research community of mostly health scientists and sport scientists, the burnout construct seems established and verified enough based on previous research to need further justification and delineation.

Nevertheless, there are some studies in which burnout and depression are assessed and analysed in conjunction. In the following, an overview of the state of research on the burnout-depression overlap or distinction respectively is given. Subsequently, the same is presented for the athlete burnout – depression overlap. For a more extensive literature review, readers should refer to the listed reviews.

2.3.3.1 Burnout and Depression

In this regard, four reviews are available that are specific to the burnout-depression overlap: A review by Glass and McKnight (1996) comprised 18 studies, in which they found that positive associations between burnout and depression dominated the literature. Further, their results showed that the two constructs shared variance but not enough to suggest isomorphism. Second, Bianchi,

et al. (2015a) conducted a review consisting of 92 studies, in which the authors infer that the idea that burnout is a construct distinct from depression is not firmly supported. Third, a systematic review and meta-analysis by Koutsimani, Anthony, & Georganta (2019) comprising of 34 studies, concluded that despite a certain overlap ($r = 0.520$, $SE = 0.012$, $95\% CI = [0.492, 0.547]$), empirical evidence points to the fact that the two constructs represent distinct constructs. And the fourth is a review by Orosz et al. (2017), who summarized studies assessing the overlap on a biological level. They found that the two constructs were not reliably distinguishable based on heart rate variability, brain-derived neurotrophic factor, and hippocampal volume.

When comparing symptoms, burnout and depression demonstrate strong similarities: One study showed that the overlap between the two syndromes was verified for eight out of the nine diagnostic criteria for major depression defined by the DSM IV (Bianchi, Boffy, Hingray, Truchot, & Laurent, 2013). Results of a cluster analysis demonstrated that burnout and depression clustered together forming three clusters of ‘low’, ‘medium’ and ‘high burnout/depression’. Further, increases of burnout symptomatology paralleled with increases of depressive symptomatology, and for decreasing symptoms likewise (Bianchi, et al., 2015c). Within the discussion of both studies, the authors question the added nosological value of the burnout construct and suggest that considering terms like ‘job stress-induced depression’ may be helpful to bridge the gap and “emphasize work-related depressogenic factors while benefiting from the DSM framework dedicated to depressive disorders” (Bianchi, et al., 2013, p. 786).

In a recent study, Schonfeld, Verkuilen, & Bianchi (2019) focused on the psychometrical properties of burnout (i.e. MBI), anxiety and depression measures (i.e. CES-D-10, PHQ-9, GAD-7). Exploratory structural equation modeling results demonstrated that the depression and anxiety items and the items of the burnout subscale ‘emotional exhaustion’ showed high loadings on a common general factor, which the authors labeled ‘non-specific psychological distress’. These results led them to conclude the following: “With respect to the debate surrounding burnout-depression overlap, our findings do not support the view that the burnout construct represents a syndrome that consists of EE (emotional exhaustion), DP (depersonalisation), and diminished PA (personal accomplishment) and excludes (or does not primarily include) depressive symptoms.” (p. 1073).

THEORETICAL BACKGROUND

Diagnostically, Bianchi, Schonfeld, & Laurent (2014) showed that in a working sample, 90 % of people who experienced burnout symptoms also met the criteria for a depression diagnosis. The vast majority of those presented with scores that indicated pharmacological or psychotherapeutic treatment. 63 % of participants showed symptom overlap with atypical depression, hinting that burnout may also be classifiable as a subform of depression. The authors further point out that previous research may have not found comparable overlap because cases of depression may have been mistakenly compared to mild cases of burnout, whereas only severe burnout may have disclosed the overlap. Similarly, Fitzpatrick, Biesma, Conroy, & McGarvey (2019) assessed a sample of medical students and found that participants with low burnout scores showed 13% overall prevalence of depressive symptoms, participants with intermediate scores had a 38% prevalence and those with high burnout scores had a 66% prevalence of depressive symptoms. Conversely, results of another study showed that an outpatient sample of individuals with depression also exhibited signs of burnout (Chiu, Stewart, Woo, Yatham, & Lam, 2015).

When investigating the temporal relationship of burnout and depression, Bianchi, Schonfeld, & Laurent (2015b) discovered that burnout was not a useful predictor for depression, implying that the idea that burnout is a risk factor or subclinical form of depression may be false.

Regarding the presumed work-specificity of burnout, Bianchi and Brisson (2019) discovered that comparable percentages of participants attributed their symptoms to work (44% for burnout and 39 % for depression) leading the authors to question the idea of burnout being a distinct construct due to its job specificity. A second study also showed that depression and burnout correlated with job-related variables (illegitimate work tasks, work-nonwork interference, and job satisfaction) to the same extent (Bianchi and Schonfeld, 2018). Additionally, the same study demonstrated strong factorial similarities since factor analysis showed that items of the two instruments (MBI-GS for burnout and PHQ-8 for depression) loaded on a single dimension. Contrasting these findings, Bakker et al. (2000) discovered that a lack of reciprocity in the partner relationship predicted depression but not burnout and a lack of reciprocity in relationships with students predicted burnout. On this foundation, the authors concluded confirmation of the idea that “burnout is work-related and depression is context-free” (p. 247). Beyond that, they conducted a confirmatory factor analysis and found the two constructs to be distinct from each other.

Further studies also displayed that the negative cognitive style found in depressed individuals was also shared by individuals with burnout (Bianchi, Laurent, Schonfeld, Bietti, & Mayor, 2018; Bianchi, Laurent, Schonfeld, Verkuilen, & Berna, 2018; Bianchi and Schonfeld, 2016).

As previously mentioned, burnout is often denounced to simply be a less-stigmatising term for depression (Bahlmann, et al., 2013). Bianchi, Verkuilen, Brisson, Schonfeld, & Laurent (2016) addressed this hypothesis by comparing public stigma and help-seeking behaviour associated with burnout versus depression. Results showed that the burnout label was indeed perceived as less stigmatising than the depression label, but it should be noted that overall stigma perception was surprisingly low for both syndromes. Further, their findings showed no differences regarding help-seeking behaviour.

Another language-related idea was introduced by Bianchi, Schonfeld, & Laurent (2019) who suggested that the lack of clarity in distinguishing the two concepts may stem from the so-called 'jangle fallacy', whereby dissimilarity is assumed purely because the constructs have different names (Fogarty and Perera, 2016). This is considered quite common in psychology when previous literature and related concepts are not sufficiently taken into consideration when introducing a new construct.

Overall, many studies demonstrate considerable overlap between burnout and depression in several occupational groups, as for example in physicians (Bianchi, Schonfeld, & Laurent, 2017; Wurm et al., 2016), teachers (Bianchi, Schonfeld, Mayor, & Laurent, 2016; Schonfeld and Bianchi, 2016), or population based samples (Ahola et al., 2005).

On another note, it is prominent that many of the referenced studies call attention to the aggravating issue of lacking formal diagnostic criteria for burnout. Emphasizing this point, Bianchi and colleagues state, "The burnout construct cannot be helpful in terms of public health and organizational policies if we are unable to clearly specify what burnout actually is (diagnosis) and, relatedly, the extent to which burnout differs from existing diagnoses such as depression (differential diagnosis)." (Bianchi, et al., 2014, p. 310).

2.3.3.2 Athlete burnout and depression

As for the specific overlap between athlete burnout and depression, the state of research is a lot scarcer. Some studies assess both burnout and depression in athletes within their study design but do not focus on potential overlap or deciphering similarities and differences between both syndromes (e.g. E. P. Smith, Hill, & Hall, 2018). To date, no reviews on the topic exist. However, there is a doctoral dissertation on the issue titled “Depression and burnout in (junior) elite athletes: Reviewing the state of knowledge and analysing their relationship” by R. Nixdorf (2018). It should be noted that only few of the studies that are mentioned here primarily and explicitly focus on the overlap or distinction between the two constructs. Nevertheless, these studies still report side findings that are relevant in this regard:

On a symptom level, a qualitative analysis revealed that athletes with high burnout scores on all dimensions described their experience as “feeling depressed, irritated and frustrated all at once” (Gustafsson, Hassmén, Kenttä, & Johansson, 2008, p. 810), suggesting similarity between subjective symptom experiences of the two syndromes.

Focusing on the assessment instruments, Cresswell and Eklund (2006) analysed the discriminant validity of burnout measures in an athlete population (i.e. MBI-GS and ABQ). Through employing a multi-trait/multi-method analysis, they found that athlete burnout instruments were able to adequately differentiate between the concepts of burnout and depression. Agreeing with older findings from general burnout research (Glass and McKnight, 1996; Leiter and Durup, 1994), the authors gathered that depression and burnout should be considered separate constructs.

As previously mentioned, lacking diagnostic cut-offs are a major problem in athlete burnout research. In order to determine clinical diagnostic accuracy of the ABQ, Åkesdotter, et al. (2020) compared ABQ scores with the PHQ-9, a measure for clinical depression. Even though, overall diagnostic accuracy was not great, the subscales ‘emotional and physical exhaustion’ and ‘reduced sense of accomplishment’ showed fair specificity. The fact that the authors chose to determine diagnostic cut-offs for athlete burnout on the base of a depression measure indicates that they consider depression to be the most suitable and nearest clinical picture.

Regarding the relationship between the two constructs, a cross-lagged panel analysis study (Frank, Nixdorf, & Beckmann, 2017) showed that burnout and depression predicted each other,

but no direction of this effect emerged as particularly stronger than the other. The authors concluded that a certain overlap should be acknowledged and future research should consider a transfer of knowledge. However, using the terms ‘athlete burnout’ and ‘depression’ synonymously should strictly be avoided. Further, results from a cross-sectional study by De Francisco, Arce, del Pilar Vílchez, & Vales (2016) demonstrated that burnout had a moderate direct positive effect on depression. Additionally, burnout and perceived stress jointly explained 50 % of variance of depression.

The only theory-related study on this topic was a very recent study by Nixdorf, Beckmann, & Nixdorf (2020) who focused on testing whether a diathesis-stress-model approach would be useful in predicting burnout and depression in athletes. For this purpose, they longitudinally assessed several diathesis factors (i.e. dysfunctional attitudes, coping resignation, coping flight, coping self-pity, coping positive self-instruction, cohesion, negative attribution after failure, perfectionistic expectations from outside and negative reactions to imperfection) and stress factors (chronic stress and recovery) in a process model. Analyses revealed that dysfunctional attitudes and coping strategies represented relevant vulnerabilities for predicting both syndromes. Moreover, lack of recovery appeared as a relevant stress factor for predicting depression, whereas chronic stress emerged as relevant for predicting burnout. Subsequently, the authors derived support for a sport-specific diathesis-stress model to explain the etiology of both, burnout and depression.

On an applied intervention level, the same author group further published a book chapter in which they explain and discuss joint prevention strategies for both burnout and depression in athletes (Nixdorf, Beckmann, & Nixdorf, 2019).

To sum up, the main differences between burnout and depression stem from the different level of formal acknowledgement, which results in an unclear diagnostic understanding. Aside from that the two syndromes show considerable overlap and similarities on many levels (see chapter 2.3.3.1). As demonstrated, the overlap between general burnout and depression is a lot more established and more frequently researched than the overlap of athlete burnout and depression. Nevertheless, since the idea of athlete burnout is based on general burnout research, accordingly, some athlete burnout researchers suggest further investigation into the association with depression in order to address persisting shortcomings of athlete burnout research (Nixdorf, et al., 2020).

To further understand these similarities and differences in athlete burnout and depression research conducted today, we need to consider the theoretical etiological models employed to predict and guide current and previous research. Further, with respect to the initial aim to advance useful knowledge for the applied context, ill-health can only be prevented or treated if there is knowledge about its causes. Therefore, it is essential to consider the etiological models employed in athlete burnout as well as depression research, which are introduced in the following subchapter.

2.3.4 Theoretical models to explain syndrome etiology

According to the bio-psycho-social paradigm (Engel, 1976) any event that an individual encounters triggers both physiological and psychological responses which develop in parallel. Here, health is not simply considered as the absence of disease or disorder, but instead as the organism's competence to cope with any stressor – physiological as well as psychological or eco-socio-cultural – with the means of one's own resources (Egger, 2005). Illness on the other hand occurs when this autoregulative competence is depleted and the individual is unable to cope efficiently with a stressor, which then results in limited functionality. Within this paradigm, illness and health are not considered as opposite states but as dynamic processes that are subject to constant changes. This paradigm evolved as a response to developments in psychological theories that began to challenge previously established primarily bio-medical theories. This development has largely influenced the view on pathogenesis, especially for psychological disorders, so that nowadays psychopathologies are commonly explained via diathesis-stress models that incorporate biological, social and psychological factors.

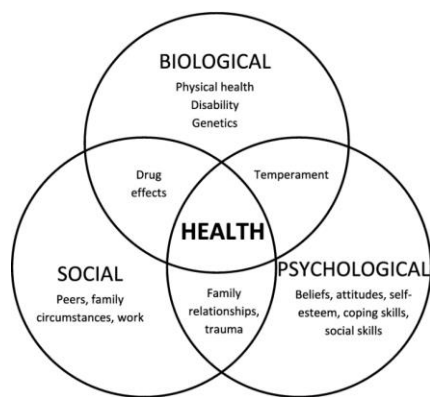


Figure 1. Illustration of the bio-psycho-social model from Wainwright and Wainwright (2019).

When looking more specifically at the available theoretical models to explain the genesis of athlete burnout and depression respectively, it becomes apparent that for depression most researchers have agreed on a vulnerability-stress approach. In contrast, for athlete burnout, there are various theories that share certain commonalities, but there is no agreement on a superior model of athlete burnout genesis. This ambiguity may in part derive from the fact that research on depression has been conducted many years prior to (athlete) burnout research. Also, the burnout construct in itself, on which athlete burnout is based, is more controversial and thus agreement on definition and conceptualization has not yet been reached.

In this subchapter, we give an overview on the theoretical models that have been or are currently used to explain first athlete burnout (see 2.3.4.1) and then depression (see 2.3.4.2), respectively. It should be noted that this list is not extensive but claims to cover the main and most frequently discussed or employed theoretical models. This overview is sought to illustrate the differences regarding the theoretical underpinning of athlete burnout and depression and the subsequent assumptions and study approaches that result from these theoretical differences.

2.3.4.1 Etiology models of athlete burnout

Cognitive-Affective Stress Model (Smith, 1986)

Following Smith's stress model, athlete burnout occurs when demands (e.g. external expectations) imposed on the athlete exceed his or her resources to cope with those demands. This process consists of four stages: (1) The athlete is presented with a demand. (2) A perceived overextension to cope with this demand leads to a cognitive appraisal of the demand as threatening, which in turn triggers (3) emotional (e.g. anxiety), physiological and (4) finally behavioral responses (e.g. decreased performance, drop-out). Additionally, this process is influenced by personal and motivational factors (R. E. Smith, 1986). Empirical assessment of this model can for instance be found in a study by Chyi, Lu, Wang, Hsu, & Chang (2018).

An adaptation of this model was developed by Gould, Tuffey, Udry, & Loehr (1996) who subdivided the burnout process into a social psychologically driven strain and a physically driven

strain. The psychological strain is then subdivided again into vulnerable personality dispositions and situational demands.

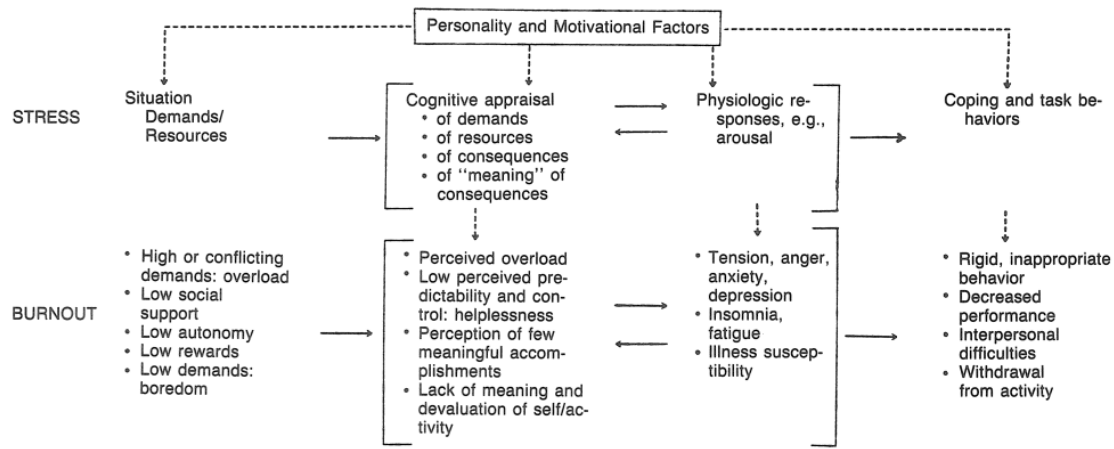


Figure 2. Original cognitive-affective stress model by R. E. Smith (1986) showing the parallel relationships assumed to exist among situational, cognitive, physiologic, and behavioral components of stress and burnout. Individual differences in motivation and personality are assumed to influence all of the components.

Commitment model (Schmidt & Stein, 1991)

A number of theoretical models focused on the type of commitment that the athlete experiences. This commitment can be adaptive, in which case the athlete is intrinsically motivated, is passionate about the sport and experiences high benefits and low costs from engaging in sport at that level. But commitment can also be maladaptive, in which case the athlete feels entrapped in the sport and feels like he or she has to maintain involvement (e.g. because of external expectations, previous investment or (perceived) lack of alternatives), but perceived benefits are decreasing and costs are increasing (Schmidt and Stein, 1991). Empirical assessment of this model can for example be found in a study by Raedeke (1997).

Investment Model Predictions of Two Types of Commitment and Dropout

	Commitment (enjoyment-based)	Commitment (burnout)	Dropout
Rewards	Increasing (or high)	Decreasing	Decreasing
Costs	Low	Increasing	Increasing
Satisfaction	High	Decreasing	Decreasing
Alternatives	Low	Low	Increasing
Investments	High	High (or increasing)	Decreasing

Figure 3. Investment Model by Schmidt and Stein (1991).

Self determination theory (SDT)

In recent years, self determination theory (Deci and Ryan, 1985) has been employed quite frequently to understand the development of burnout (meta-analysis by Li, Wang, & Kee, 2013). The underlying idea is that a non-satisfaction or frustration of basic needs (i.e. autonomy, competence, relatedness) leads to psychological ill-health. Basic needs (dis)satisfaction is also sought to be connected to different types of motivational regulation, which Vallerand (1997) used in the development of his hierarchical model of intrinsic and extrinsic motivation. Empirical assessment of the SDT approach can for instance be found in studies by Lemyre, Roberts, & Stray-Gundersen (2007) or Lonsdale, Hodge, & Rose (2009).

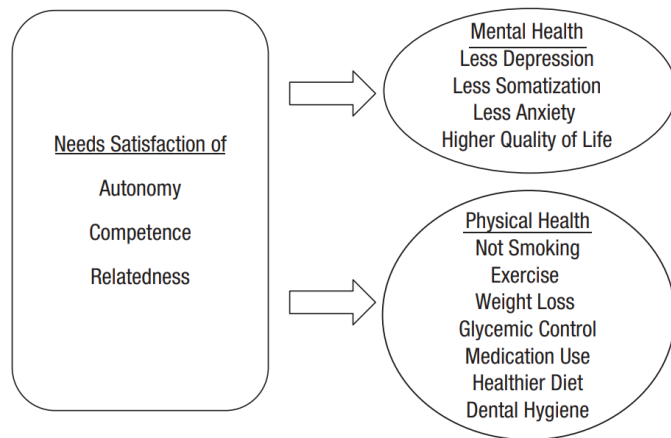


Figure 4. Self determination theory model of health behavior change adapted from Ryan, Patrick, Deci, & Williams (2008), as cited in Ng et al. (2012).

Negative-Training Stress Response Model (Silva, 1990)

Silva considers burnout as the final stage of a three step maladaptive process of training stress, which is preceded by ‘staleness’ and ‘overtraining’. According to his theory, afflicted individuals experience chronic exposure to excessive training stimuli and psychophysically react in a maladaptive way, which may finally lead to the stage of burnout, which he describes as “the organism’s ability to deal with the psychophysiological imposition of stress is depleted, and the response system is exhausted” (Silva, 1990, p. 11). However, his terminology has been criticized as it mixes contemporary and earlier definitions of staleness and overtraining (Gustafsson, Madigan, & Lundkvist, 2018).

Other theories are based on Silva’s idea: The biopsychological perspective of stress and recovery (Kallus & Kellmann, 2000), the failure-adaptation model (Tenenbaum et al., 2003) and the total-quality-recovery-model (Kenttä & Hassmen, 1998).

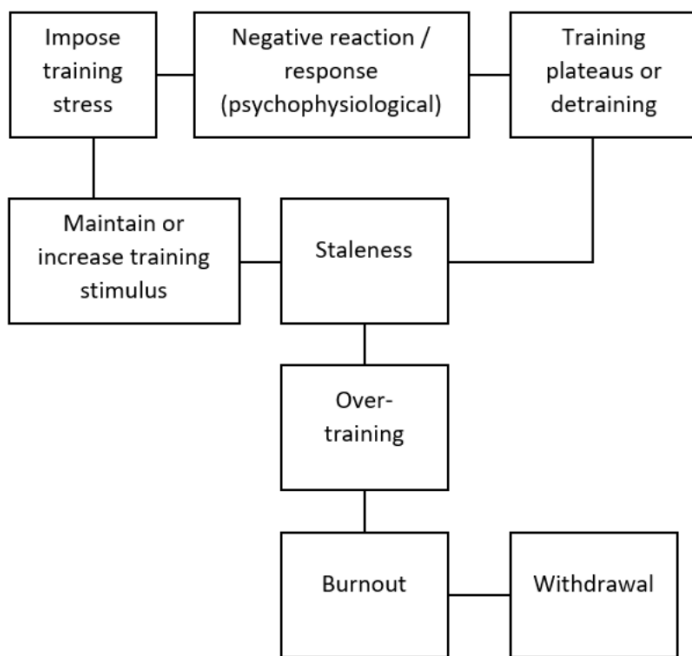


Figure 5. Negative training stress response model by Silva (1990).

Unidimensional Identity Development and External Control Model (Coakley, 1992)

As a contrast to common stress models, Coakley emphasizes the importance of the social environment and organizational structures of elite sport. In his theory, he adopts early conceptualizations of burnout, where burnout is imperatively tied to drop-out and describes athletes who “left high performance sport programs in a state of extreme emotional duress” (Coakley, 1992, p. 272). According to his theory, athletes are likely to reach this state when they a) have developed a unidimensional athlete identity and have invested so much time and effort into the sport that they have not much else to fall back on when encountering stressful events; and/or b) when the athlete’s autonomy is severely restricted and they lack control over their own lives and life decisions, because decisions are made for them by coaches, managers or parents. The combination of a unidimensional identity paired with low autonomy is likely to invoke feelings of entrapment, which in turn lead to the athletes drop-out, which in Coakley’s understanding equals burnout. Coakley criticises that stress models primarily view the individual as the root of the problem and subsequently promote interventions designed to modify and adapt the individual instead of considering changes to the system itself. Based on interviews, he suggests to view burnout as a social issue instead of a personal failure: In this regard, structures of the sport system and sport organisations should be critically challenged, instead of modifying the athlete to cope with flaws of the system.

Integrated model of athlete burnout (Gustafsson et al., 2011)

In light of the multitude of theoretical models, Gustafsson and colleagues made an “attempt to integrate knowledge from several burnout models” (Gustafsson, Madigan, et al., 2018, p. 9). This model includes antecedents, early signs, consequences, as well as influencing factors. It is sought to “provide[s] a holistic conceptual framework for understanding athlete burnout helping sport scientists, coaches, and practitioners alike in understanding and preventing this maladaptive psychological outcome in athlete populations” (Gustafsson, DeFreese, & Madigan, 2017, p. 110). This model captures and summarizes previous research findings well but constitutes more of a review illustration than a suitable theoretical etiology model.

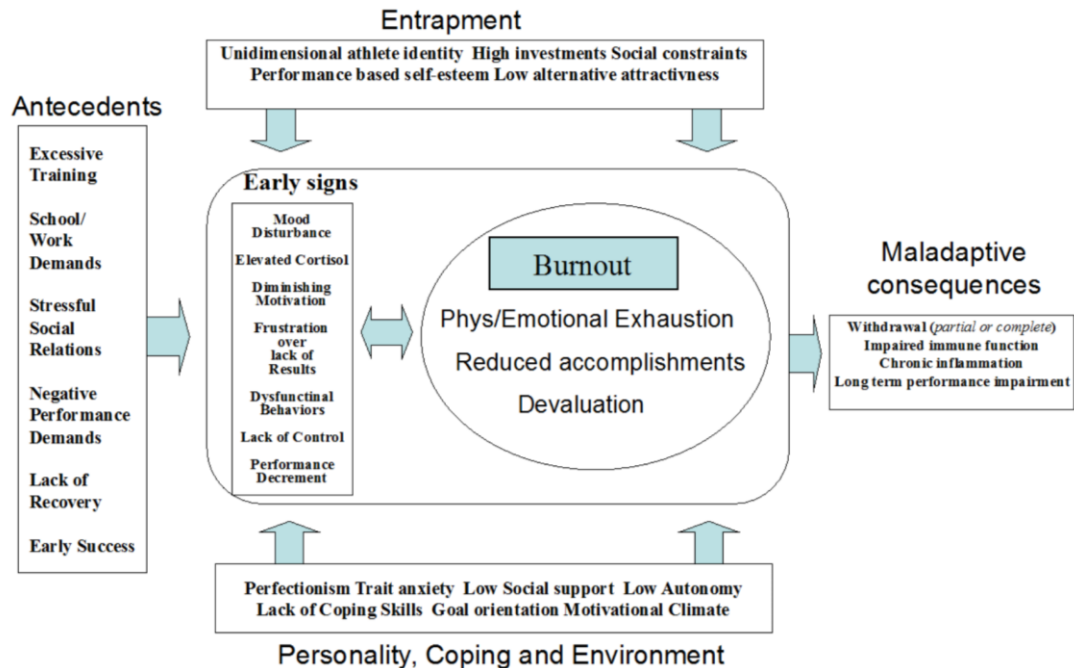


Figure 6. Integrated model of athlete burnout (Gustafsson, Kenttä, & Hassmen, 2011).

To sum up, theoretical models to explain athlete burnout etiology are manifold. This theoretical diversity on the one hand encourages scientific discourse but also creates confusion. Approaching athlete burnout through the lens of a certain theoretical model does not only impact the way it is assessed, but it also provides implications for how it should be prevented or treated. For example, Coakley's socialization view on burnout (1992) suggests to fundamentally question the conditions of the elite sport system and the structure of sport organisations as opposed to viewing individual features as the cause of burnout and modifying the athlete's way of coping with these already exceptionally high demands, as may be suggested when following Smith's stress model (1986).

The fact that all these theories emphasise very different factors indicates that athlete burnout may not solely be an individual, social or environmental issue, but instead should be viewed from a more holistic bio-psycho-social point of view. Interestingly, despite the above-mentioned origin in occupational burnout research and suggestions by DeFreese, Raedeke, & Smith (2015), athlete burnout research has not yet tried to adapt the job demands – job resources model of burnout and work engagement (Demerouti and Nachreiner, 2019) or the person-environment fit model (Kristof-Brown and Guay, 2011) for their purposes. But even more importantly for the present dissertation,

in spite of similarities with depression, so far there are not many advances to adapt more general etiology models of psychopathologies for the purpose of explaining athlete burnout genesis, with the exception of Nixdorf, et al. (2020).

2.3.4.2 Etiology model of depression

Diathesis stress model

As opposed to burnout, for depression there has been agreement on a vulnerability-stress-model (see Fig. 7) approach in recent years. As typical for many clinical psychopathologies, genesis is explained through a combination of personal and environmental factors. These models postulate that individuals differ regarding their diathesis or vulnerability, which entails mainly biological and genetic disadvantageous factors, such as a family history of mental illness. With a high level of vulnerability, even relatively minor stressors can trigger psychopathology, whereas for individuals with low vulnerability, extreme stress is needed to evoke psychological disorder (Monroe and Simons, 1991).

However, this combined theoretical approach has evolved over many years of depression research and combines several stress- and vulnerability theories. In this regard, due to its relative recency, burnout research might have a disadvantage concerning its theoretical development.

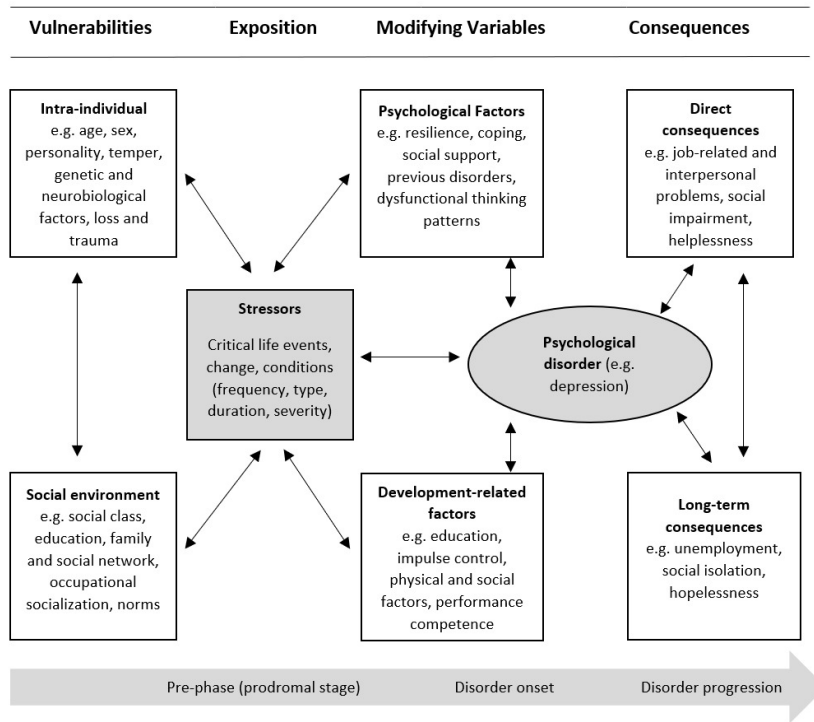


Figure 7. Vulnerability-stress model of psychological disorders translated from Wittchen and Hoyer (2011)

In recent years, a vulnerability-stress-model approach has been used to conceptualize the genesis of depression. In contrast, theoretical etiology models for burnout have not explicitly focused on vulnerability and have just very recently started to consider this combined theoretical modeling (Nixdorf, et al., 2020).

Overall, burnout research presents itself with a lot of conceptual, diagnostic and theoretical confusion and disagreement, whereas depression research demonstrates a lot more consensus. We propose that these differences mainly stem from the disparity regarding formal clinical recognition of the two syndromes. Several similarities presented above suggest that comparison and potential synthesis of the two research traditions may be fruitful in the context of mental ill-health in elite sports (Frank, et al., 2017).

3. Methodological considerations

3.1 Issues of previous research

It has been demonstrated that the theoretical discourse shows a lack of clarity regarding the phenomenon of athlete burnout. The respective field of research entails a number of methodological issues. In the following, we will describe how the present dissertation aims to address these issues and ideas are illustrated in Figure 9:

1. We observe two different research traditions for burnout and depression research. This stems mainly from the fact that depression research has a longer history and that the idea of burnout was developed largely without consideration of the extant syndrome of depression (see 2.3.2). Within these traditions, different theoretical models of pathogenesis are prominent. These theoretical differences are likely to influence the way in which these two syndromes are investigated. For example, assumed risk factors for the respective syndromes may differ. Also, the commonly held belief that burnout is context-specific likely leads to more sport-specific studies with a particular focus on sport stressors. Further, it could be expected that athlete burnout studies reflect the diversity of theoretical models described above (see 2.3.4). In contrast, depression is sought to be more all-encompassing regarding stressors and genesis models. Therefore, respective studies within elite sports may be fewer and may include the assessment of more general risk factors.

The issue of the two separate research traditions is addressed in two ways in the present dissertation: First, the systematic review (study I) includes studies of predictors of both burnout and depression within elite sport. This approach provides a first overview on the types of predictors that are assessed in the sports context for each of the two syndromes. Herein, we aim to detect similarities and differences in the understanding of the risk factors and the etiology of burnout and depression in athletes, respectively. Second, we assess the conceptual overlap of burnout and depression, measured in an elite athlete sample on a factor analytic level (study II). With these two studies, we aim to provide the groundwork for a potential synthesis of athlete burnout and depression research.

2. The distinction of burnout and depression remains under dispute (see 2.3.3). Deciphering this overlap is especially important in the sports context because the construct of athlete burnout has increased in popularity over time and if symptoms are diagnosed as burnout instead of depression this could have detrimental effects for afflicted athletes (e.g. not receiving appropriate treatment).

We approach this issue by using an elite athlete sample in which both burnout and depression symptoms were assessed. Here, we compare different factorial models with one another to determine whether burnout and depression are better conceptualised as two separate constructs or under one general factor (see study II). Similar to comparisons between general burnout and depression, we would expect athlete burnout and depression to share certain commonalities (cf. Bianchi, Schonfeld, & Verkuilen, 2020). Moreover, if considerable overlap is detected, this could also warrant and encourage future studies to validate ABQ cut-offs through depression measures (similar to Åkesdotter, et al., 2020).

3. As demonstrated in chapter 2.3.4, genesis models in athlete burnout research are multifarious, each with a specific idea of underlying determinants. Thus, the choice of a respective theory influences which determinants are being assessed and investigated in empirical studies. This commonly leads to a self-affirming cycle, by which previously assumed correlates are re-assessed over and over to confirm the related theory. For athlete burnout research, this point is problematic because there is no all-encompassing holistic model that combines ideas of the theoretical models and that includes possible correlates from various theoretical angles. This lack of an inclusive model makes it difficult for researchers to discuss potential synthesis of ideas, because the existing models restricting them from broadening their view on the topic of athlete burnout etiology. Here, especially the interaction between personality and environmental aspects is largely underrepresented (Goodger, Gorely, Lavallee, & Harwood, 2007).

In order to progress on this issue, we chose to align the burnout correlates assessed in study III within the more broad and versatile demand resource model (Becker, 2003). This model has previously been used to explain health and ill-health. It is advantageous to previously used athlete burnout models in that it extends the focus from demands to both demands and resources and it captures both external and internal factors. Thus, this model allows to incorporate a wider variety of potentially relevant factors (see Fig. 8) than current athlete burnout models. Moreover, we consider that an exploratory approach allows for novel holistic

perspectives within the field of athlete burnout research. By focussing on common characteristics in athletes with extremely high (or low) athlete burnout scores, we can exploratively determine relevant influential factors (see study III). With this, we aim to provide helpful information for the applied context. With regard to the objective of athlete mental health promotion and maintenance, staff working with elite athletes can benefit from knowing typical risk and protective characteristics of athlete burnout.

	Internal/dispositional	External/contextual
Resource	Internal resource (e.g. optimism, resilience)	External resource (e.g. financial security, social support)
Demand	Internal demand (e.g. perfectionistic concerns)	External demand (e.g. excessive training load, social pressure, time pressure)

Figure 8. Examples of factor types that can be integrated when using the demand resource model of Becker (2003).

4. Since burnout is not formally recognized as a disorder, diagnostic criteria and cut-offs are lacking (see chapter 2.3). The lack of diagnostic cut-offs for burnout has been troubling burnout research for decades. Advances to validate athlete burnout cut-offs have failed due to the lack of agreement on what is considered a clinical level of burnout. Developing cut-offs and validation via depression measures would only be warranted, if there was evidence of considerable overlap. Additionally, the lack of diagnostic criteria has largely impeded athlete burnout research as a whole: Determining prevalences, comparing athletes with and without burnout for the purpose of identifying risk factors are virtually impossible without agreed-upon cut-offs. Therefore, we deemed it necessary to find new approaches to the issue that still offer interpretable output. As Mäkikangas and Kinnunen (2016) suggest, person-oriented methods may be helpful in burnout research as they do not rely on pre-defined cut-offs, but instead “class solutions are formed and compared based on statistical and theoretical considerations (Bergman, Magnusson, & El Khouri, 2003)” (Mäkikangas and Kinnunen, 2016, p. 12). Consequently, if

we cannot compare individuals with and without clinical burnout, we circumvent the problem of missing cut-offs by comparing extreme groups.

For this purpose, we chose the classification tree analysis (study III), which can be considered person-centered as it enables the identification of “groups of individuals who share particular attributes or relations among attributes” (Laursen and Hoff, 2006).

5. Cresswell and Eklund (2007) phrased it accurately when stating, “common among all existing explanations is a process in which perceptions over time lead to the key characteristics of burnout. As such longitudinal studies monitoring burnout across time are crucial to the development and assessment of existing theoretical explanations. In the past, athlete burnout researchers have predominantly employed cross-sectional research designs (Cresswell & Eklund, 2005; Raedeke, Raedeke & Smith)”. Indeed, the vast majority of studies is cross-sectional but many of those studies still claim to assess determinants or predictors of athlete burnout (e.g. Holmberg and Sheridan, 2013). Cross-sectional studies can merely suggest correlation, not causation or imply direction of effect. This involves the danger of confusing risk factors with antecedents, symptoms or consequences.

We address this issue by including only longitudinal study designs in our systematic review (study I) to provide a knowledge base with sound predictive study designs.

Issue	Two separate research traditions (for ABO and DEP)	Unclear distinction/overlap between ABO and DEP	Variety of ABO etiological models	Lack of diagnostic ABO cut-offs	Overreliance on cross-sectional research
	↓	↓	↓	↓	↓
Strategy	Joint inspection of ABO and DEP (Study I) and Overlap assessment (Study II)	Assess conceptual overlap between ABO and DEP (Study II)	Use of the broader demand-resource model and exploratory study approach (Study III)	Extreme group analysis (Study III)	Include only longitudinal designs in Review (Study I)

Figure 9. Overview of issues of previous athlete burnout research and respective strategy to address these issues within this dissertation. ABO: athlete burnout, DEP: depression.

3.2 Specific research questions

The research desiderates explained above are addressed via the following research questions:

- What are risk and protective factors of athletes developing heightened symptoms of psychological exhaustion syndromes (i.e. depression and burnout)? (→ *Study I*)
- Depression and burnout are considered separate syndromes with distinct research traditions. How do symptoms overlap or differentiate in a sample of elite athletes? (→ *Study II*)
- Which characteristics do elite athletes with especially high (or respectively low) burnout symptomatology share? Are there any red flag profiles? (→ *Study III*)

3.3 Aligning the studies within the theoretical research background

As explained above, the central idea of the present dissertation is to link the two strands of burnout and depression research in the context of high performance sport. As presented, various aspects of both strands need to be considered for this purpose. In order to fully comprehend the research conducted in the field of athlete mental health today, it is important to contemplate the historical research backgrounds and conceptual development over time. With this in mind, our first study comparatively summarises the previous literature on predictors of depression and burnout in high level athletes via a systematic review, linking the two research strands on the level of predictors. As demonstrated above, the lack of conceptual clarity has been a major issue in athlete burnout research. With our second study, we strive to investigate the conceptual overlap of depression and athlete burnout on a factor analytical level and thus aim to help decipher this conceptual vagueness. The third study focuses on the athlete burnout strand and addresses both, possible correlating factors and the level of syndrome conceptualization by exploratively approaching the characteristics associated with extreme (i.e. high or low) athlete burnout symptomatology.

Comprising these ideas, Figure 10 was developed for the purpose of illustrating how the studies included in this dissertation align within the dissertation aim.

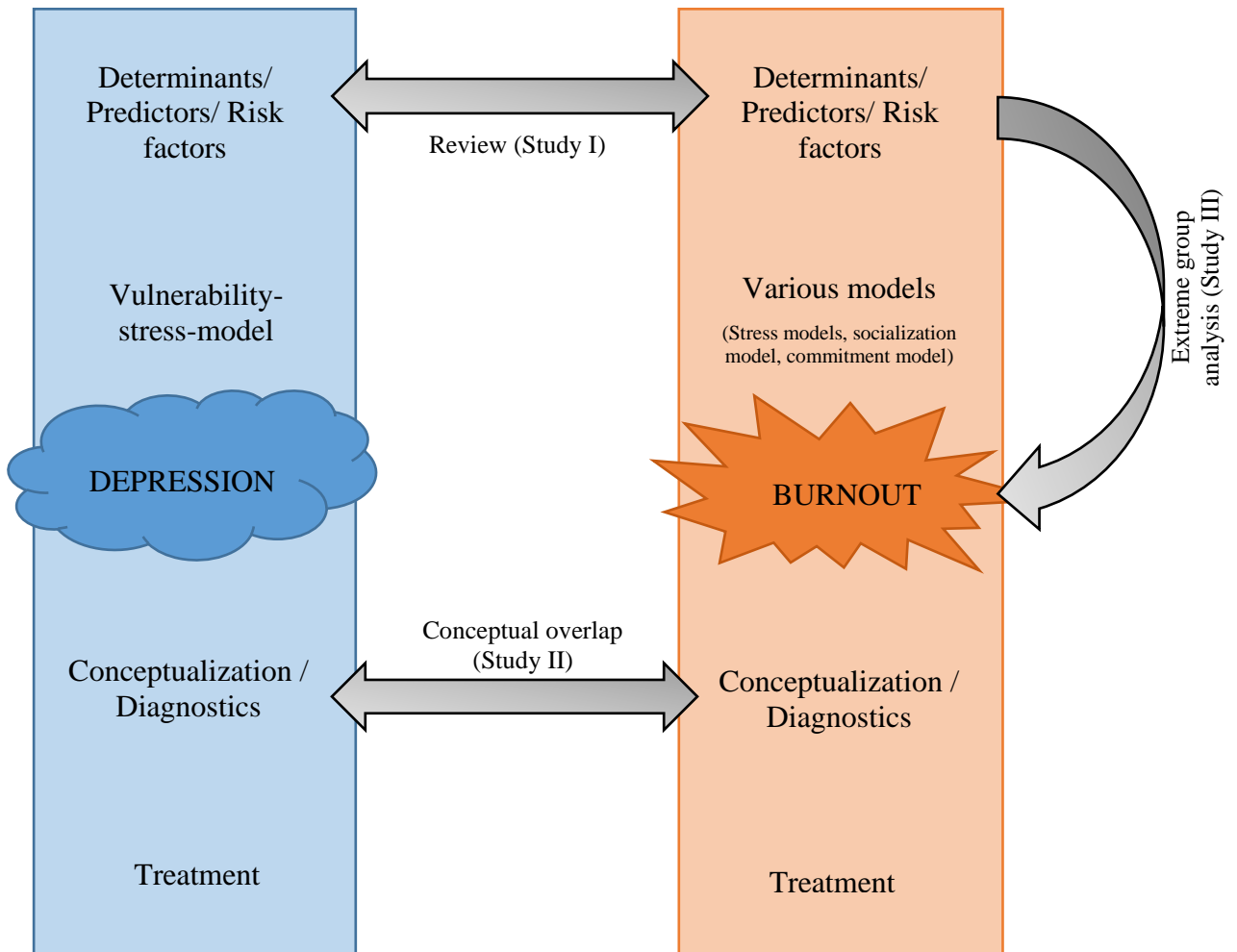


Figure 10. Illustration of study aims with respect to the two research strands of depression and (athlete) burnout.

4. Empirical studies

4.1 Sample description

The analyses reported in manuscripts 2 and 3 are based on data from the “GOAL”-study (The German Young Olympic Athlete's Lifestyle and Health Management Study), which was funded by the Bundesinstitut für Sportwissenschaft (BISp). This study was approved by the ethics

commission of the Faculty of Medicine at the University of Tübingen under the signature 222/2009BO1.

For this project, German youth elite athletes were assessed via questionnaire regarding several health-related variables (e.g. nutrition, medication, injuries, well-being etc.). To ensure elite level, participants were only eligible for participation when they were members of the (youth) national squad of their respective sport. Athletes from all olympic disciplines (summer olympics 2012 and winter olympics 2010) were included. A return rate of 62 % resulted in a study sample of N = 1,138 athletes (Thiel et al., 2011).

Our variables in focus, burnout and depression, were assessed via the Athlete Burnout Questionnaire (Raedeke and Smith, 2001; German version by Ziemainz, Abu-Omar, Raedeke, & Krause, 2004) and the Patient-Health-Questionnaire (PHQ-2 by Löwe, Kroenke, & Gräfe, 2005). Additionally, for study III, we used several potential burnout correlates (e.g. hours of training, coach's leadership style, perfectionism etc.).

4.2 Brief study overview

Study I

The first study was a systematic review summarizing findings on the predictors of burnout and depression in athletes. With this review, we were the first to react to the strong association of burnout and depression by including research on both syndromes. We further included only studies with longitudinal designs to assess true prediction instead of cross-sectional correlations, as it is often the case. Studies were only included if the respective sample consisted of high-level athletes (i.e. competing at least at regional level). The 37 studies included in the review were presented with a focus on measurement of independent and outcome variables as well as study design. Due to the vast heterogeneity of the studies, conducting a meta-analysis was not possible. Instead, review results were synthesized descriptively and predictors were grouped into thematic categories.

Study II

The second study focused on the conceptual overlap of burnout and depression. Acknowledging different research traditions, diagnostic issues and previous research outside the sports context, we

analysed data from N = 1,138 adolescent elite athletes with the Athlete Burnout Questionnaire as a burnout measure and the PHQ-2 as a measure of depression. Conceptual overlap between the two constructs was investigated by assessing factorial structures and comparing four models: A unidimensional model, a correlated factor model, a hierarchical factor model, and a bifactor model were analysed and compared to determine whether a mutual factor would be more appropriate than two separately modeled constructs.

Study III

The aim of the third paper was to ascertain typical characteristics associated with athlete burnout by focussing on athletes with extremely high (or low) scores of burnout symptomatology. For this purpose, the same sample as in study II was assessed with the Athlete Burnout Questionnaire as a burnout measure and other questionnaires assessing several potential influencing factors. The demand-resource-model (Becker) was used as a theoretical base to assess typical characteristics of 'high' and 'low burners' respectively. Classification tree analysis was employed to determine those extreme groups. In this methodological approach an algorithm searches for those characteristics that best split the sample regarding a dependent variable (i.e. burnout symptomatology). Since previous research has advised to assess and analyse the three burnout subscales separately, three separate CTAs were conducted. With respect to the demand-resource- model, the characteristics were then grouped into either 'external' or 'internal' and 'demands' or 'resources'.

4.3 Paper

This chapter comprises the manuscripts included in this dissertation in the following order:

- Study I: Granz, H.L., Gustafsson, H., Schnell, A., Leyhr, D., & Thiel, A. (2020). Exhausted: A systematic review on the predictors of burnout and depression in competitive and elite athletes. *International Review of Sport and Exercise Psychology* (under review).
- Study II: Granz, H.L., Gustafsson, H., & Thiel, A. (2020). Burnout and depression in athletes: One and the same? *Translational Sports Medicine* (submitted).
- Study III: Granz, H.L., Schnell, A., Mayer, J., & Thiel, A. (2019). Risk profiles for athlete burnout in adolescent elite athletes: A classification analysis. *Psychology of Sport and Exercise*, *41*, 130-141.

Exhausted: A systematic review on the predictors of burnout and depression in competitive and elite athletes³

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Abstract

Pursuing a career in elite sport is highly demanding and the pressures inherent to elite sport make athletes especially vulnerable to exhaustion syndromes. Understanding the factors that influence exhaustion syndromes such as burnout and depression can aid in designing suitable prevention and intervention strategies. Previous reviews in the field rely mostly on cross-sectional research and have often not been systematic. Due to two separate research traditions, studies in the field have focused on either depression or burnout in athletes, even though the two concepts share considerable overlap.

In this systematic review we summarize results from 37 longitudinal studies assessing predictors of burnout or depression in high level competitive athletes ($N = 5,423$). Within this review we provide an overview of the multitude of assumed predictors and their relationship with burnout or depression. Further, we explore similarities and differences between burnout and depression studies and critically discuss study design and analysis.

Researchers in sport and exercise psychology are encouraged to conduct longitudinal studies and employ analytical approaches that control for baseline scores and take into account confounders and possible interactions when aiming to model predictions of psychological exhaustion syndromes.

Key Words: athlete, burnout, depression, longitudinal, predictors, systematic review

Introduction

The topic of athlete burnout has received a lot of attention over the past decades (Author, 2014). This is not surprising since elite sport is recognized as a highly demanding endeavour. Here, not only physical but also mental well-being and functioning are imperative to a successful athletic career. In order to further understand and ultimately prevent psychological ill-being, a number of studies have been dedicated to assessing mental health in athletes (review by Rice et al., 2016), and more specifically psychological exhaustion syndromes, such as burnout (e.g. Eklund & DeFreese, 2015) and depression (e.g. Yang et al., 2007). Within this field of research, particular interest has been placed on the conceptualization and distinction of these syndromes, as well as on their causes and risk factors.

Burnout and depression

While depression is incorporated into the international diagnostic standard references (ICD and DSM) and as such has clearly defined diagnostic criteria, the concept of burnout is more controversial (review by Bianchi, Schonfeld, & Laurent, 2015). Here, terminology largely depends on the field of research: Sport scientists and sport psychologists commonly talk about *athlete* or *athletic burnout* as a special and context-specific form of burnout that is composed of symptoms of 1) emotional and physical exhaustion, 2) a reduced sense of accomplishment and 3) a cynical attitude and devaluation of sport (Raedeke & Smith, 2001). Clinical psychologists and medical professionals on the other hand, mostly question the existence of burnout and would file these symptoms under *depression*, where the main symptoms include depressed mood, loss of interest and enjoyment, low energy and reduced self-esteem (World Health Organization, 2018).

Etiologically, both burnout and depression are strongly based on unresolvable stress (Caspi et al., 2003; Weber & Jaekel-Reinhard, 2000) and the main features of both syndromes are similar. However, while the main symptom of burnout is mostly called ‘exhaustion’, the term ‘fatigue’ is commonly used to describe a similar state in depressive patients (World Health Organization, 2018).

Studies show that most individuals with burnout also show symptoms of depression (Ahola et al., 2005; Bianchi, Boffy, Hingray, Truchot, & Laurent, 2013; Bianchi, Schonfeld, & Laurent, 2014). Since depression is a rather broad concept with several subforms, some have argued that

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burnout is a subtype of depression and is just a socially less stigmatizing term for symptoms of depression (Bahlmann, Angermeyer, & Schomerus, 2013; Kaschka, Korczak, & Broich, 2011). Others however, define the burnout syndrome as a distinct disorder (Iacovides, Fountoulakis, Kaprinis, & Kaprinis, 2003) albeit admitting to the above-mentioned similarities with depression and recognizing difficulties in differentiating the two concepts (Brenninkmeyer, Van Yperen, & Buunk, 2001). Either way, there is agreement that the two syndromes overlap substantially and describe very similar symptoms (e.g. low energy, Ahola, Hakanen, Perhoniemi, & Mutanen, 2014). Despite the overlap, these two different terminologies and the associated two research domains have developed relatively independent of each other.

Both burnout and depression are considered syndromes with a complex aetiology. Herein, the interplay of demands of the individual's environment (e.g. in the athlete context: training load, coach's interpersonal style) and dispositional characteristics and resources (e.g. resilience, self-efficacy, optimism, coping strategies) plays a vital role (Maslach & Leiter, 2000). Bio-psycho-models (e.g. cognitive-affective model, R. E. Smith, 1986) or socialization theories (e.g. Coakley, 1992) have been employed to account for this complexity and explain the respective geneses. However, the variety of potential determinants and their interactions increase the challenge of designing appropriate and all-encompassing studies. As a result, most empirical studies on the issue focus on one or only few determinants. Given that exhaustion syndromes arise from an unfavourable interplay of multiple demands and resources, it is vital to summarize and synthesize the findings from previous research so that researchers can make informed choices when designing future studies.

Previous research

So far, there have been a number of reviews in the field of athlete burnout (e.g. Cresswell & Eklund, 2006; Eklund & Cresswell, 2007; Eklund & DeFreese, 2015; Gustafsson, DeFreese, & Madigan, 2017; Gustafsson, Kenttä, & Hassmen, 2011; A. L. Smith, Pacewicz, & Raedeke, 2019). These reviews provide comprehensive overviews on the topic while accentuating certain aspects, such as the conceptualization of athlete burnout and related theoretical approaches, of the established measuring instruments, while also listing some correlates of athlete burnout.

Surprisingly, to date there are only three systematic reviews on the topic of athlete burnout: The review of Goodger, Gorely, Lavalley, and Harwood (2007) covers burnout in sport and as such

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includes not only athletes but also coaches and other staff. In their review, they yield a comprehensive assessment of burnout in the sport context. They summarize the relevant literature systematically by differentiating between athlete and coach burnout. They also illustrate their findings on burnout correlates in a well-structured table which in turn greatly facilitates future research. However, their review only summarizes the literature up until 2005, which leaves research of the last thirteen years unaccounted for (except for consideration within narrative reviews). Li, Wang, and Kee (2013) assessed the literature on burnout and its relation to basic needs and motivation. While this review provides important insights into theoretical underpinnings of athlete burnout, it mostly includes studies with a cross-sectional design. The third systematic review and meta-analysis of Pacewicz, Mellano, and Smith (2019) focusses on the relationship between social aspects (e.g. social support, relatedness, conflict) and athlete burnout. Although, the authors included both cross-sectional and longitudinal studies into a meta-analysis, they only analysed cross-sectional effect sizes.

For depression, there are some reviews that focus on athlete populations. However, of those reviews only few assess determinants of depression (e.g. Frank et al., 2013; Wolanin, Gross, & Hong, 2015). Furthermore, hardly any of the reviews are systematic (e.g. meta-analysis by Gorczynski, Coyle, & Gibson, 2017). Moreover, many reviews exclusively attend to the relationship between depression and sports-related concussion (e.g. Rice et al., 2018; Yrondi, Brauge, LeMen, Arbus, & Pariente, 2017). Generally, this is indeed an important issue, but rather concerns the direct neurophysiological connection between the two rather than the bio-psycho-social aetiology of the syndrome.

Current Review

The above-mentioned reviews provide certain valuable insights into the issue. Nevertheless, three research gaps remain: Firstly, with regards to the close overlap, we acknowledge that studies which focus on either burnout or depression assess very similar symptomatology. Frank, Nixdorf, and Beckmann (2017) suggested, that “as both syndromes do not fully explain each other, interchanging both terms and syndromes should be avoided. Preferably, future research might consider the transfer of knowledge between both syndromes to draw founded conclusions.” Against this background, a joint inspection of research on both syndromes is highly warranted for the current review, particularly if relevant studies should not be missed due to issues of terminology.

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Secondly, it has been criticized that most research in the field overly relies on cross-sectional data, because this approach brings about the issue of not knowing whether assessed correlates represent predictors or consequences (Gustafsson et al., 2017). Thus, in order to gather evidence on the predictors of athlete burnout and depression, it is imperative to focus on longitudinal designs (Cresswell & Eklund, 2007). Also, only longitudinal studies can provide information on the processual development and stability of symptomatology over time. Even though the number of longitudinal study designs is still scarce, it has increased over the past couple of years with varying time frames. Thus, for this review it is natural to include longitudinal study designs and analyses only.

Thirdly, as listed above, a couple of reviews on the topic of burnout or depression in athletes exist, but there have been many empirical studies in the past couple of years, which are not yet included in any of the previous reviews. Moreover, there is a definite lack of systematisation in the majority of reviews.

Given these three research gaps, conducting a current systematic review that summarises and synthesizes the findings of longitudinal studies on predictors of both burnout and depression in athletes is highly warranted. Within this systematic review, our main questions are:

- a) Which factors predict burnout and depression symptoms in athletes?
- b) What are differences and similarities between burnout and depression studies and study findings?

In this regard, we want to look at sample composition, study design and measures and statistical approaches of the respective studies.

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Method

Sources and search strategy

The literature search was conducted between October and December 2018. Search strategy used the following databases to locate relevant published longitudinal studies on athlete burnout: EBSCOhost, SPOLIT, PubMed. The search was not restricted to certain years of publication. The following search term was used:

(athlete OR athletes OR "elite sport" OR "elite athlete" OR "elite athletes" OR "high-performance athlete" OR "high-performance athletes" OR "competitive athlete" OR "competitive athletes" OR "professional athlete" OR "professional athletes" OR "top athlete" OR "top athletes" OR "top level athlete" OR "top level athletes" OR "top level sport" OR "high-performance sport")

AND

("athlete burnout" OR "athlete burn-out" OR "athletic burnout" OR "athletic burn-out" OR "sport burnout" OR "sport burn-out" OR "burnout" OR "burn-out" OR "burning out" OR "burned out" OR "burnout syndrome" OR "burn-out syndrome" OR depressi OR depression)*

AND

(predict OR determin* OR correlate OR causal OR cause* OR causality OR factor* OR association* OR antecedent OR risk OR protective)*

AND

longitudinal OR prospective

Inclusion criteria were as follows: (a) articles were published in English or German; (b) studies were empirical and had a longitudinal study design (more than one time point of measurement); (c) subjects were high level active athletes competing at either international, national or regional level in their discipline; (d) the outcome variable was a validated measure of either depressive symptoms or burnout symptomatology; (e) independent variables were tested for their prediction of either depressive or burnout symptomatology; and (f) both, outcome and independent variables were measured at baseline and the outcome variable was measured at another time point following baseline measurement. Empirical qualitative and mixed methods studies were also included if they met criteria (a), (b) and (c) and aimed to assess experience of depression or burnout and underlying factors over time.

Articles were excluded when they assessed retired or former athletes, unpublished studies or dissertations. Additionally, studies were also excluded if the data were analysed cross-sectionally, or if analyses did not control for baseline scores of the outcome variable. Studies in which the

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independent variable was unclear⁴ were also excluded. Studies were screened by two independent reviewers and in cases of disagreement a third reviewer was asked to weigh in.

Data extraction

We extracted sample characteristics (sample size, age, sex, type of sport, competition level, and country), study design (study purpose, time frame, timing of measurements), measures of independent and outcome variables, type of statistical analysis, study results and limitations.

Synthesis of results

Only few studies included in this review employed similar study design, parameters and measures. Thus, conducting a meta-analysis to synthesize findings quantitatively appeared unreasonable as it would not have been likely to provide meaningful results (Deeks, Higgins, & Altman, 2019). Instead, we decided for a narrative synthesis of results.

Results

Study selection

The literature search yielded a total of $N = 312$ records (305 through database search and an added 7 records through cross-referencing). Duplicates were removed and after title and abstract screening, 91 studies were identified as likely to meet inclusion criteria. After full-text screening, a total of 37 studies were included in the synthesis.

⁴ For example, one study only assessed athletes with concussions without a healthy control group. Thus, it was not possible to estimate the predictive value of concussion on the outcome variable.

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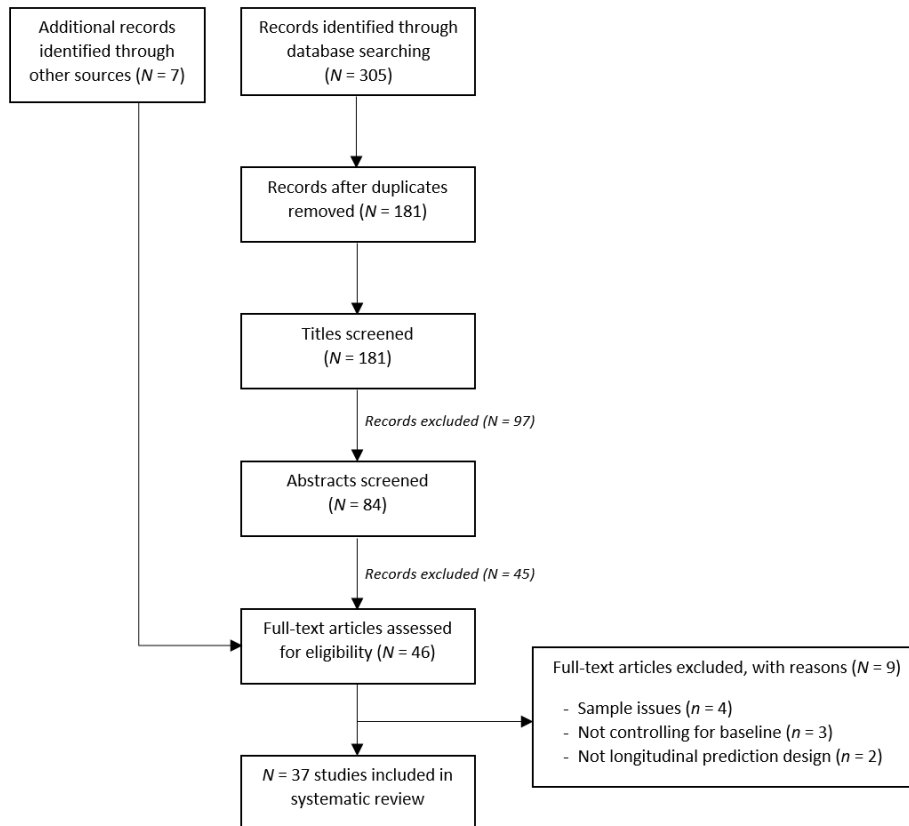


Figure 1. Study selection process.

Study characteristics

The number of publications of relevant studies has strongly increased over the past 20 years (see Figure 2). Studies included in this systematic review were conducted in various different countries, with the majority from Europe. Participants in the study samples ranged from competing at regional level up to being part of the national squad of their sport and competing internationally. Out of the studies included, 35 were quantitative, one was qualitative and one utilized a mixed method design. The studies' time frame of assessment ranged from 2 weeks to 3 years. Since all of the studies included were longitudinal, variables were measured at least twice and up to 6 times (see Table 1). Studies included in this review employed a number of different measures for burnout and depressive symptomatology (see Table 1 and S1).

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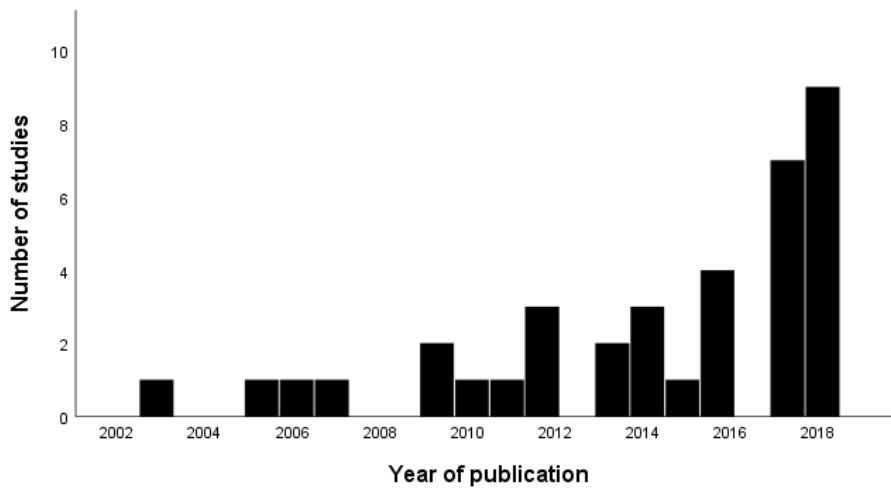


Figure 2. Distribution of the year of publication of the eligible studies included in this systematic review.

[Table 1 near here]

Quality appraisal

For quality appraisal, we considered several tools. GRADE (Ryan & Hill, 2016), which is the tool suggested by Cochrane standards, is mainly designed for intervention studies and ideally randomized control studies. Therefore, many items are rather difficult to apply to our studies. However, the item ‘indirectness’ is unique to the GRADE tool and very appropriate for our study purpose. The Mixed Methods Appraisal Tool (MMAT, Hong et al., 2018) seemed especially fitting, since it allows to appraise studies of various designs and scientific approaches. We decided to rate study quality via the MMAT without item 3.5 as it is only applicable for intervention studies. Instead, we added the ‘indirectness’-item of GRADE. Regarding the response format, we decided to use the binary point format of the MMAT, with the exception of the item concerning the follow-up rate (item 3.3) which was subdivided in four quality categories (c.f. Babbie, 1973 as referenced by Kristman, Manno, & Côte, 2004; see Table S2).

Since the studies included covered such a wide variety of potential predictors which we wanted to portray, we did not use the quality appraisal for study selection but for orientation and information purposes only (see Table S3 and S4).

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Stability of burnout and depressive symptoms over time

The studies included are very heterogeneous regarding time frame and point of measurement, making it difficult to sum up the results regarding stability of burnout and depressive symptomatology. Also, not all studies give details on symptom stability over time. For burnout symptoms, study data indicate that in most studies symptoms either increase or remain stable. For depressive symptoms the data showed mixed results regarding symptom development over time. Also, one study that assessed both depression and burnout symptoms over the course of 6 months found that prevalence of burnout symptoms increased, while prevalence of depressive symptoms decreased over the same period of time (Gerber, Best, et al., 2018).

Predictors of burnout and depressive symptoms

Table 2 illustrates the predictors and their influence on either global burnout or the respective subscales, depending on the study design. Predictors of depressive symptoms are summarized in Table 4. Results from qualitative and mixed method studies are not included in the tables but can be found in the text below.

[Table 2 near here]

[Table 3 near here]

In addition to the results of the quantitative studies, we also included one mixed method and one qualitative study in this review. In the mixed method study (Sorkkila, Ryba, Selanne, & Aunola, 2018), four symptom clusters were formed. Burnout risk types were associated with reporting higher demands (e.g. school-related stress, inadequate recovery, disempowering coaching, limited social life outside of sport and school), while non-risk types were associated with having more resources available (e.g. social support, adaptability, intrinsic motivation for sport). In the qualitative study (Cresswell & Eklund, 2007) rugby players attributed their negative experiences (i.e. heightened burnout symptoms) to either explicit sport-specific aspects (e.g. heavy training demands, competitive transitions), aspects involving both external and internal pressure and expectations (e.g. pressure to comply with demands and to perform, pressure from public and media), social aspects (e.g. poor relationship with team management) or injury/ frustration at repeated injuries. Athletes also feared non- or de-selection and perceived the insecurity of being

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able to maintain their position as stressful. Positive experiences (i.e. no/low burnout symptoms) on the other hand were attributed to perceptions of positive social support, open and free communication with teammates and staff, trust in resources and support system, positive experiences outside of rugby, low playing demands and high competence.

Interaction and mediation effects

Interaction and Mediation effects were only assessed in 10 of the 37 studies included. Detailed information of the statistically significant effects can be found in Table 4.

[Table 4 near here]

Discussion

The aim of this systematic review was to gather and synthesize the findings from longitudinal studies assessing predictors of both burnout and depression symptoms in athletes. Hereby, we wanted to provide a summary and critical review of pre-existing literature on the topic and its study characteristics as well as create an overview of predictors and the nature of their relationship with burnout and depression symptoms.

Predictors of burnout and depressive symptoms

As previously mentioned, studies included in this review are very heterogeneous and thus identifying common themes has proven to be challenging. Nevertheless, certain assumptions can be made from the results: Predictor variables assessed in the studies were grouped into either demographics, sport-related aspects, motivational aspects, medical issues and psychopathology, perceptions, cognitions and dispositions, and stressors and strains.

For burnout, the most frequently assessed predictor variables were related to motivation, such as regulatory styles, motivational climate, achievement goals, and basic needs satisfaction. These variables can be aligned with commitment theory (Raedeke, 1997; Schmidt & Stein, 1991), where entrapment – as opposed to enjoyment – of an activity is likely to lead to negative motivational consequences and ultimately burnout.

In addition, most predictor variables of burnout are directly or indirectly connected to social influences. In most cases this was specifically the coach (e.g. coach-created motivational climate,

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perceived coaching style, need for autonomy, controlled motivation, evaluative perfectionistic concerns, socially prescribed perfectionism, satisfaction with social support). These results indicate that social and interpersonal aspects, as well as external and internal expectations are ascribed a vital role in the genesis of burnout.

For depression, the most frequently assessed predictors were medical aspects (especially number of injuries), adverse life events and sport career dissatisfaction. These predictors suggest that in the respective studies depression is viewed primarily as a post-traumatic syndrome. However, it is important to note that these specific findings are based on results of five studies (all included in the present review conducted by the same research group) repeatedly employing the exact same research design. Interestingly, depression studies did not assess resources or potential protective factors, but only risk factors and adverse experiences.

Overlap of burnout and depression

One of the major novelties of this review was the idea to include studies on both depression and burnout. Analyzing both depression and burnout together has already received some attention in general psychological research (e.g. Bianchi et al., 2015) and a combined approach has previously been suggested by researchers in the sports context (e.g. Frank et al., 2017), but had yet to be implemented. Our results confirm the separate research traditions: depression papers are rather published in (sports) medical journals while burnout papers are more likely published in sport psychological journals. Conceptually, the studies included in our review seem to view and assess depression as a potential consequence of a traumatic event, such as an injury. Burnout on the other hand, is considered the product of a complex and intertwined socio-emotional process that mostly revolves around motivational aspects and psychological dispositions. This is illustrated by the fact that burnout studies in this review put a stronger emphasis on the subjective perceptions of stressors (e.g. satisfaction with social support, perceived coach-created motivational climate) and the bilateral relationships between relevant factors (e.g. Isoard-Gauthier, Guillet-Descas, & Lemyre, 2012). In contrast, depression studies mainly assess objective predictors (e.g. number of injuries, occurrence of adverse life events). This finding is especially interesting because in clinical psychological research experts agree on the idea that depression also originates from a complex cluster of bio-psycho-social risk factors (e.g. Garcia-Toro & Aguirre, 2007).

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By including studies on both syndromes, we have taken the first step to integrate and compare findings and approaches of both fields. Even though this review does not presume to solve the conceptual differentiation between depression and burnout in sport, it can provide further details on the overlap and differences in pre-existing research.

In the upcoming ICD-11, burnout will be filed newly under ‘problems associated with employment or unemployment’: “Burn-out refers specifically to phenomena in the occupational context and should not be applied to describe experiences in other areas of life”. For professional athletes, the sport context would be the occupational context, but for non-professionals, as most Olympic athletes are, this would not apply. Under these circumstances, one could pose the question whether ‘athlete burnout’ is still an appropriate term.

Study design

Contrary to previous reviews, we chose to include only studies using a longitudinal design. This specification is crucial because only longitudinal designs allow to assume predictions, whereas in cross-sectional analyses direction of effect is unknown. Therefore, factors that are in fact consequences may be erroneously interpreted as predictors and vice versa. Also, labeling correlates in cross-sectional study designs as ‘predictors’ (e.g. Holmberg & Sheridan, 2013) is not appropriate and should strictly be avoided. We are aware, that only RCTs would be able to provide information on specific causes of the syndromes. However, there are hardly any intervention studies in the field, let alone RCTs, because many of the assumed predictors can hardly be regulated deliberately and assigned randomly (e.g. resilience, optimism, athlete identity, coach-athlete relationship).

When looking at the longitudinal studies included in this review, we can see that study designs are heterogeneous regarding time frames and points of measurement, samples, measures, and analytic approaches: The time frames of the studies varied from a few weeks up to three years. Considering athlete burnout is regarded as a rather stable and enduring phenomenon, this suggests that substantial time is needed to note changes (Isoard-Gauthier et al., 2012; Shirom, 2005). For example, Lonsdale and Hodge (2011) propose a period of at least 4 months as appropriate in order to provide meaningful information on changes and predictions.

Clinical depression instruments often inquire about symptoms occurring over the past two weeks. With respect to that, it seems unreasonable to assess predictors of depression in a

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longitudinal design within a time frame of 2 weeks (see Hutchison, Mainwaring, Comper, Richards, & Bisschop, 2009). The heterogeneity regarding time frames and time points also hampers gathering aggregated information on the stability of the outcome variables (depression and burnout). However, our results suggest, that in the vast majority of studies, symptoms either increase or remain stable but hardly ever decrease. This finding indicates that depression and burnout symptoms are not seasonal occurrences that subside by themselves, but need prevention and early intervention/treatment to impede manifestation of symptoms. One explanation for this effect may lie in demand appraisal: Individuals with experience of burnout or depression symptoms may be prone to perceive new demands as threatening, which in turn could increase their likelihood to develop symptoms. In contrast, individuals without symptom experience can perceive demands neutral or positively challenging (Cresswell & Eklund, 2007).

Another issue diminishing comparability of the studies lies in the variation of time points of measurement. While in some studies athletes were assessed pre-season, in others assessment was conducted in season or just prior to major competitions. Also, competition cycles vary between sports, which should be incorporated when studying mixed samples (c.f. Frank et al., 2017).

One of the major challenges of this review is the multitude of assessed predictor variables in the studies included. On the one hand this could point at the fact that burnout and depression have a complex and multi-causal aetiology. On the other hand, this could also indicate that there is no mutual consent on the underlying theory and genesis model. Interestingly, there are hardly any replications to be found and only few studies even assess the same predictor variables. Hence, this deficiency makes it difficult to conduct meta-analyses and make assumptions about the stability of study results. Results should therefore be interpreted with caution.

Another shortcoming lies in the conceptualization of variables, because depending on the theoretical approach, conceptualization and measurement of constructs and sub-constructs may differ. While most studies assess the three burnout subscales separately – as is recommended (Maslach, Jackson, & Leiter, 1996) – some studies investigate effects on global burnout (sum score, e.g. Balaguer et al., 2012; Madigan, Stoeber, & Passfield, 2016a). Regarding depression studies, some assess effects on the severity of depressive symptoms and therefore measure the outcome variable as a continuous variable (e.g. Shanmugam, Jowett, & Meyer, 2014). Others however, refer to the clinical diagnostic criteria and assess the effects on depression as a binary construct (e.g.

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Gouttebarga, Tol, & Kerkhoffs, 2016). Similarly, this issue of varying conceptualization appears for predictor variables: for instance, motivation can be divided into amotivation, extrinsic and intrinsic motivation. But these can also be divided further into the subtypes (e.g. external regulation, introjected regulation etc.). Alternatively, motivation could be split into either self-determined or non-self-determined motivation (Deci & Ryan, 2008). Of course all these categories are closely linked and overlap partially, but the varying level of partitioning makes comparison and synthesis of study results very challenging.

Additionally, studies differ regarding the complexity of their prediction modelling: Some studies account for interaction or mediation effects, while others simply “throw in” one or few predictors and neglect to analyse possible interactions. Herein, the quality of the theoretical base of the studies’ hypotheses also varies noticeably: the majority of burnout studies entail a more thorough theoretical background (e.g. Adie, Duda, & Ntoumanis, 2012) than most depression studies (e.g. Gouttebarga & Kerkhoffs, 2017).

Sample characteristics

Regarding sample characteristics, the studies included were conducted in various different countries, with the vast majority from Europe. This finding is surprising as we would have expected more studies from the US due to the stronger professionalization of sport psychology (Wylleman, Harwood, Elbe, Reints, & de Caluwé, 2009).

For this systematic review, we did not restrict eligible samples to elite athletes only. Instead, we chose to include studies assessing samples of high level active competitive athletes of any age. We chose this broader category because we wanted make sure to include all relevant studies on athlete samples and still be able to differentiate from mass sport. More specifically, being an elite or professional athlete does not necessarily mean a higher level of pressure and demands. In fact, aspiring junior athletes on the verge of making it or not making it to the senior level may be under a lot more pressure due to the insecurities and dual burden compared to professional athletes (Appleton, Hall, & Hill, 2009; Teubert, Cachay, Borggreffe, & Thiel, 2006).

Gender distribution within the eligible studies showed that nearly half of the studies assessed male athlete samples only, whereas no study assessed only female athletes. Considering that especially for adolescent athletes demands and their perception may differ for girls and boys

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(Schubring & Thiel, 2014), we suggest that future research should include mixed samples with stratification for gender or invariance testing or research on female samples may be necessary.

Data analysis

Since baseline control is a crucial part of prediction modelling (MacCallum & Austin, 2000; Taris, 2000), studies were only included into this review when the outcome variables (burnout/depression) had been assessed at both T1 and T2 (or the following points of measurement if applicable) and independent variables (predictors) had been assessed at least at T1. For an ideal longitudinal design independent variables should also be assessed at both T1 and T2. However, out of the eligible studies only few assessed change score predictions.

As this review clearly shows, there are a number of longitudinal studies. However, many do not encompass the sample size to conduct meaningful longitudinal analyses. Others would have had large enough samples but only analysed the data via correlations and cross-sectional analyses and thus miss the chance of extracting more in-depth information.

Few studies reported analysing both between-person as well as within-person predictions. While between-person predictions enable comparing groups with certain characteristics or evaluating interventions on a group level, within-person predictions provide information on the individual development and intervention efficacy at the individual level. The majority of studies in this review analysed between-person predictions, only few analysed within-person predictions. In order to utilize the above-mentioned benefits an ideal study design would include both types of analyses (e.g. Madigan et al., 2016a).

Overall, it is necessary to use methods that consider baseline levels and account for the complex interactions between relevant variables in order to advance the understanding of the underlying genesis models of burnout and depression. Therefore, the application of suitable and sophisticated statistical methods (e.g. cross-lagged panel analysis, see Kenny, 2005) in this field is highly warranted. For instance, with regard to the multitude of correlates assessed, it could be helpful to consider testing for underlying latent variables (Skrondal & Rabe-Hesketh, 2004).

Strengths and limitations

Given that the number of publications on burnout and depression in competitive sports has risen since Goodger and colleagues (2007) published their review, this systematic review can be

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considered as very relevant. Our review provides an overview of longitudinal study designs and methods in the field of burnout and depression in athletes. This is especially important due to the previous over-reliance on cross-sectional studies in the field. The combined approach to include studies on both depression and burnout is a major novelty in the field of (athlete) mental health. This approach is sought to focus on the symptoms of ill-being rather than lose itself in conceptual uncertainties. As such it can help address the issue with a more applied focus than most research in the field. Further, this review can provide an important knowledge base for future research in the field due to detailed carving out of respective study characteristics and results.

Regarding possible limitations, we cannot rule out that our search strategy overlooked some relevant studies due to publication bias. As to the rest, the main limitations of our review are caused by the studies analysed. As mentioned above, the main discovery of this systematic review is the heterogeneity of the studies currently present, regarding both the study designs and statistical modelling. Due to this heterogeneity, we could not conduct a meaningful meta-analysis. Even more so, the multitude of predictor variables and the few studies assessing the same variables exacerbated the meaningful synthesis of findings and the presentation of results did not suffice to report effect sizes in an informative manner. However, the resulting narrative synthesis ('vote counting') of results can certainly be viewed as a limitation.

Implications

As a result of this review, certain research implications can be gathered: Regarding study designs, it is important to increase the number of longitudinal study designs. Thereby, more sophisticated analytical methods are needed to gather information on predictive effects over time while controlling for confounding variables, mediations, and indirect effects. This information is particularly imperative for the applied sports context, in order to act as early as possible to foster well-being, prevent ill-being and prevent dropout due to ill-being in the long run. In this regard, special attention is to be paid to the complexity of burnout and depression. Hence, the experience of burnout and depression symptoms does not only depend on the demands posed on an athlete, but on his or her appraisal of such, the coping strategies available and the behavioural reaction and post-reappraisal. The analysis of burnout and depression as a complex and subjective experience requires more mixed methods studies to benefit from both, the generalizability of quantitative

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studies and the depth of qualitative approaches (c.f. Sorkkila, Ryba, et al., 2018). Contentwise, it would also be helpful to conduct replications of thorough study designs in order to consolidate the knowledge base.

Finally, in terms of conceptualization the research field of athlete mental health would benefit from assessing symptoms rather than syndromes. After all, the ultimate aim is to prevent symptoms of exhaustion, regardless of the syndrome category under which these symptoms are subsumed.

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Tables

Table 1

Sample and study characteristics of eligible studies

Study no.		N Sample size (m/f)	Mean age (age range)	Country	Type of sport	Time frame of assessment	Outcome variable (measure)	Predictors assessed	Type of study approach
1	Adie, Duda, & Ntoumanis (2012)	54 (54/0)	13.82 (11-18)	UK	soccer	2 years	Burnout (ABQ)	Perceived coach autonomy support Basic needs	quantitative
2	Balaguer et al. (2012)	597 (597/0)	12.58 (11-14)	Spain	soccer	? ⁵	Burnout (ABQ)	Coach autonomy support Coach controlling interpersonal style Basic need satisfaction / thwarting	quantitative
3	Brandt et al. (2018)	12 (12/0)	28.15 (16-42)	Brazil	mixed martial arts	30 days	Depression (BRUMS ⁶)	Rapid weight loss	quantitative
4	Chen, Kee, & Tsai (2009)	188 (102/86)	16.48 (15-18)	Taiwan	diverse	3 months	Burnout (ABQ)	Perfectionism	quantitative
5	Cresswell (2009)	183 (183/0)	25.19 or 26.92 ⁷ (18-36)	GB	rugby	12 weeks	Burnout (ABQ)	Rugby hassles Satisfaction with social support Money-related hassles	quantitative
6	Cresswell and Eklund (2007)	9 (9/0)	25.33 (22-30)	New Zealand	rugby	1 year	-	-	qualitative
7	Cresswell and Eklund (2006)	109 (109/0)	25.23 (19-32)	New Zealand	rugby	30 weeks	Burnout (ABQ)	Team Time Starting status Number of injuries Playing position National level experience Age	quantitative
8	Cresswell and Eklund (2005)	102 (102/0)	24.75 (19-32)	New Zealand	rugby	12-13 weeks	Burnout (ABQ)	Motivation Number of injuries Playing position team Time Professional experience Training hours Number of games Win/loss ratio	quantitative

⁵ T1: 2 months into the season, T2: end of season

⁶ Brunel Mood Scale

⁷ Contradictory data

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								Starting status	
9	DeFreese and Smith (2014)	465 (191/274)	19.7 (18-24)	US	swimming diving, track & field	~ 4 months	Burnout (ABQ)	Social support Negative social interactions Trait negative effect Self-determined motivation Perceived stress	quantitative
10	Frank, et al. (2017)	92 (n.s.)	14.82 (n.s.)	Germany	MTB, badminton, gymnastics, swimming, speed skating, short track, soccer, hockey	~ 1 season ⁸	Both (ABQ, CES-D)	Burnout symptoms Depression symptoms	quantitative
11	Gerber, Best, et al. (2018)*	197 (124/73)	16.83 (14-22)	Switzerland	soccer, handball, volleyball, swimming, judo, track & field, tennis, uni hockey, karate, MTB, golf, others	6 months	Both (SMBM, PHQ-9)	Perceived stress Mental toughness	quantitative
12	Gerber, Gustafsson, et al. (2018)*	197 (124/73)	16.83 (14-24)	Switzerland	soccer, handball, volleyball, swimming, judo, track & field, tennis, uni hockey, karate, MTB, golf, others	6 months	Both (ABQ, SMBM, PHQ-9)	Perceived stress Life satisfaction	quantitative
13	Gouttebauge et al. (2018)	333 (333/0)	26 (n.s.)	Australia, England, France, Ireland, Italy, New Zealand, Pacific Islands, South Africa, Wales, Argentina, Canada, USA	rugby	1 year	Depression (GHQ-12)	Adverse life events Sport career satisfaction	quantitative
14	Gouttebauge et al. (2017)	143 (51/92)	27 (n.s.)	Netherlands	48 % team 52 % individual	1 year	Depression (GHQ-12)	Adverse life events Career dissatisfaction Being injured	quantitative
15	Gouttebauge and Kerkhoffs (2017)	81 (81/0)	26 (n.s.)	Denmark, Finland, Norway, Switzerland	ice hockey	6 months	Depression (GHQ-12)	Number of recent life events Career dissatisfaction Number of severe injuries Number of surgeries	quantitative
16	Gouttebauge, Tol, & Kerkhoffs (2016)	108 (108/0)	25 (18-n.s.)	Ireland	gaelic football, hurling	6 months	Depression (GHQ-12)	Number of recent life events Career dissatisfaction Number of severe injuries Number of surgeries	quantitative
17	Gouttebauge, Aoki, Verhagen, & Kerkhoffs (2017)*	262 (262/0)	27 (18-n.s.)	Finland, France, Norway, Spain, Sweden	soccer	1 year	Depression (GHQ-12)	Number of recent adverse life events Recent conflict with coach Career dissatisfaction	quantitative
18	Ingrell, Johnson, & Ivarsson (2019)	78 (48/30)	12.7 (n.s.)	Sweden	soccer, ice hockey, figure skating, floorball, swimming, diving, basketball, badminton, tennis	3 years	Burnout (ABQ)	Ego- and task orientation	quantitative

⁸ Assessment time intervals were specific to each sport (T1: preparation, T2: competition, T3: recovery)

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19	Isoard-Gauthier, Guillet-Descas, & Lemyre (2012)*	309 (152/157)	15.4 (n.s.)	France	handball	6 months	Burnout (ABQ)	Perceived coach-created motivational climate Basic needs Motivation	quantitative
20	Isoard-Gauthier, Guillet-Descas, & Duda (2013)*	309 (152/157)	15.4 (n.s.)	France	handball	6 months	Burnout (ABQ)	Perceived coach-created motivational climate Perceived competence Achievement goals	quantitative
21	Kilic et al. (2018)*	262 (262/0)	27 (n.s.)	Finland, France, Norway, Spain, Sweden	soccer	1 year	Depression (GHQ-12)	Severe musculoskeletal time-loss injuries	quantitative
22	Lai and Wiggins (2003)	73 (34/39)	19.38 (18-23)	USA	soccer	~4 months	Burnout (BIA ⁹)	Sex Time	quantitative
23	Li, Ivarsson, Stenling, & Wu (2018)	10 (10/0)	24.80 (n.s.)	China	soccer	5 months	Burnout (ABQ)	Sleep quality	quantitative
24	Lonsdale and Hodge (2011)	119 (51/68)	24.74 (14-53)	New Zealand	diverse	4 months	Burnout (ABQ)	Motivation	quantitative
25	Madigan and Nicholls (2017)	102 (74/28)	17.7 (16-20)	UK	soccer, rugby, basketball, athletics, others	3 months	Burnout (ABQ)	Mental toughness	quantitative
26	Madigan, Stoeber, & Passfield (2016a)	111 (59/52)	24.8 (20-35)	UK	athletics, netball, gymnastics, rugby, cycling, soccer, others	3 months	Burnout (ABQ)	Perfectionism	quantitative
27	Madigan, Stoeber, & Passfield (2016b)	141 (124/17)	17.3 (16-19)	UK	soccer, rugby, basketball, athletics, others	6 months	Burnout (ABQ)	Perfectionism Motivation	quantitative
28	Madigan, Stoeber, & Passfield (2015)	101 (80/21)	17.7 (16-19)	UK	soccer, rugby, basketball, athletics, others	3 months	Burnout (ABQ)	Perfectionism	quantitative
29	Mainwaring, Bisschop, Comper, Richards, & Hutchison (2010)	51 (21/30)	21.2 (17.5-37)	Canada	basketball, field hockey, football, hockey, lacrosse, MTB, rugby, soccer, volleyball	1 month	Depression (POMS)	Concussion ACL injury	quantitative
30	Martinent, Decret, Guillet-Descas, & Isoard-Gauthier (2014)	145 (99/46)	13.89 (n.s.)	France	table tennis	2 months	Burnout (ABQ)	Motivation	quantitative
31	Schellenberg, Gaudreau, & Crocker (2013)	421 (202/219)	19.68 (n.s.)	Canada	volleyball	3 months	Burnout (ABQ)	Passion Coping	quantitative
32	Shanmugam, Jowett, & Meyer (2014)	122 (36/86)	21.22 (17-36)	UK	38 % team 62 % individual	6 months	Depression (Symptom Checklist 90R)	Eating psychopathology	quantitative
33	E. P. Smith, Hill, & Hall (2018)	108 (108/0)	16.15 (14-21)	UK	soccer	3 months	Both (ABQ, CES-D)	Perfectionism Burnout symptoms Depressive symptoms	quantitative
34	Sorkkila, Ryba, Selanne, & Aunola (2018)*	quanti: 373 (179/194) quali: 17 (7/10)	16 (15-16)	Finland	50 % team 50 % individual	6 months	Burnout (SpBI ¹⁰)	School burnout symptoms	Mixed methods

⁹ Burnout Inventory for Athletes

¹⁰ Sport Burnout Inventory – Dual Career Form

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35	Sorkkila, Aunola, Salmela-Aro, Tolvanen, & Ryba (2018)*	373 (179/194)	16 (15-16)	Finland	50 % team 50 % individual	6 months	Burnout (SpBI ²)	School burnout symptoms Achievement goals (in sport and school)	quantitative
36	Stenling, Ivarsson, Hassmén, & Lindwall (2017)	T1: 247 (138/109) T2: 178 T3: 164	17.8 (16-20)	Sweden	alpine skiing, biathlon, cross-country skiing	6 months	Depression (GHQ-12)	Coach controlling behaviours Controlled motivation	quantitative
37	Turner and Moore (2016)	46 (46/0)	15.62 (n.s.)	Ireland	gaelic football	8 weeks	Burnout (ABQ)	Irrational beliefs	quantitative

Note. n.s. not specified.

* Studies analysing the same data-set: #11 and #12, #17 and #21, #19 and #20, #34 and #35.

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Table 2

Summary of predictors and their influence on burnout symptoms (separately for global burnout and burnout subscales)

Predictors	Σ of studies	Study no.	Global burnout			Burnout -EXH			Burnout - RA			Burnout - DEV			Trend	
			+	-	0	+	-	0	+	-	0	+	-	0		
Perceived coaching style	3	1, 2*, 19*														
	3	1, 2*, 19*	*	*	2	*	19, 1	*	*	19	*	*	*	19	0/-	
<i>autonomy-supportive</i>	2	2*, 19*	*	*	2	*	19	*	*	19	*	*	19	0/-		
<i>controlling</i>	1	20														
Perceived coach-created motivational climate	1	20														
<i>Ego-involving climate</i>	1	20	*	*	*	*	*	20	*	*	20	*	*	20	0	
<i>Task-involving climate</i>	1	20	*	*	*	*	*	20	*	*	20	*	*	20	0	
Basic needs satisfaction	3	1, 19*, 20														
<i>Autonomy</i>	2	1, 19*	*	*	*	*	*	1, 19	*	19	*	*	19	0/-		
<i>Competence</i>	3	1, 19*, 20	*	*	*	*	19, 20	1	*	19, 20	*	*	19, 20	0/-		
<i>Relatedness</i>	2	1, 19*	*	*	*	19	*	1	*	*	19	*	*	19	0/+	
Passion	1	31*														
<i>Harmonious passion</i>	1	31*	*	*	31	*	*	*	*	*	*	*	*	*	0	
<i>Obsessive passion</i>	1	31*	*	31	*	*	*	*	*	*	*	*	*	*	-	
Motivation	5	8, 19*, 24, 27*, 30														
<i>Amotivation</i>	5	8, 19*, 24, 27*, 30	*	*	27	8, 24	*	19, 30	8, 19, 24	*	30	8, 19, 24	*	30	0/+	
Motivational aspects	<i>Extrinsic motivation</i>	1	8*	*	*	*	8	*	*	8	*	*	8	*	-	
	<i>External regulation</i>	3	19*, 24, 30	*	*	*	24	*	19, 30	*	*	19, 24, 30	*	*	19, 24, 30	0/+
	<i>Introjected regulation</i>	3	19*, 24, 30	*	*	*	24	*	19, 30	24, 30	*	19	24	*	19, 30	0/+
	<i>Identified regulation</i>	3	19*, 24, 30	*	*	*	*	19	24, 30	*	19	24, 30	*	*	19, 24, 30	0/-
	<i>Integrated regulation</i>	1	24	*	*	*	*	*	24	*	*	24	*	*	24	0
	<i>Intrinsic motivation</i>	2	24, 19*	*	*	*	*	*	19, 24	*	19	24	*	*	19, 24	0/-
	<i>Intrinsic motivation (IM)</i>	1	30	*	*	*	*	*	30	*	*	30	*	*	30	0
	<i>IM to experience stimulation</i>	2	8*, 30	*	*	*	*	8	30	*	*	8,30	*	8	30	0/-
	<i>IM to know and towards accomplishment</i>	3	9, 24, 27*	*	9, 27	*	*	9, 24	*	*	9, 24	*	*	9, 24	*	-
	<i>Controlled motivation</i>	1	27*	27	*	*	*	*	*	*	*	*	*	*	*	+
	Achievement goals (sport)	2	20, 35													
	<i>Mastery approach</i>	1	20	*	*	*	*	*	20	*	*	20	*	*	20	0/-
<i>Mastery avoidance</i>	1	20	*	*	*	*	*	20	20	*	*	*	*	20	0/+	
<i>Performance approach</i>	1	20	*	*	*	20	*	*	*	*	20	*	*	20	0/+	
<i>Performance avoidance</i>	1	20	*	*	*	*	*	20	*	*	20	*	*	20	0	
<i>Mastery</i>	1	35	*	*	*	*	*	35	*	*	35	*	*	35	0	
<i>Performance</i>	1	35	*	*	*	*	*	35	*	*	35	*	*	35	0	
Achievement goals (school)	1	35														
<i>Mastery</i>	1	35	*	*	*	*	*	35	*	*	35	*	*	35	0	
<i>Performance</i>	1	35	*	*	*	*	*	35	*	*	35	*	*	35	0	
Ego Orientation	1	18	*	*	*	*	*	18	*	*	18	*	*	18	0	
Task Orientation	1	18	*	*	*	*	*	18	*	18	*	*	18	*	0/-	
Trait negative affect	1	9	9	*	*	9	*	*	*	9	*	*	9	*	0/+	
Perfectionism	5	4, 26*, 27*, 28, 33														
<i>Striving/personal standards</i>	4	4, 26*, 27*, 28	*	26, 27, 28	*	*	*	4, 26	*	26	4	*	26	4	0/-	
<i>Concern/evaluative concerns</i>	4	4, 26*, 27*, 28	26, 27, 28	*	*	*	*	4, 26	26	*	4	*	*	4, 26	0/+	
<i>Self-oriented perfectionism</i>	1	33	*	*	*	*	*	33	*	*	33	*	*	33	0	
<i>Socially prescribed perfectionism</i>	1	33	*	*	*	33	*	*	*	*	33	33	*	*	0/+	
<i>Irrational beliefs</i>	1	37	*	*	*	37	*	*	*	*	37	*	*	37	0/+	
Mental toughness	2	11*, 25	*	25	11	*	25	*	*	25	*	*	25	*	0/-	
Medical issues and psychopathology	2	7*, 8*	*	*	*	7, 8	*	*	7	*	8	7	*	8	0/+	
Depression	1	10	10	*	*	*	*	*	*	*	*	*	*	*	+	

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Stressors and strains	Satisfaction with social support	2	5, 9	•	9	•	•	9	5	•	5	9	•	5	9	0/-	
	Negative social interactions	1	9	9	•	•	9	•	•	•	9	•	•	9	•	9	0/+
	Perceived stress	2	9, 11*	9	•	11	9	•	•	9	•	•	9	•	•	•	+
	Perceptions of rugby hassles	1	5	•	•	•	5	•	•	5	•	•	5	•	•	•	+
	Concerns about money hassles	1	5	•	•	•	•	•	5	•	•	•	•	•	•	5	0/+
	Sleep quality	1	23	•	•	23	•	•	•	•	•	•	•	•	•	•	0
	School burnout	1	35	•	•	•	•	•	•	•	•	•	•	•	•	•	+
	<i>School exhaustion</i>	1	35	•	•	•	35	•	•	•	•	•	•	•	•	•	+
	<i>School cynicism</i>	1	35	•	•	•	•	•	•	•	•	•	•	•	•	35	0
	<i>School inadequacy</i>	1	35	•	•	•	•	•	•	•	•	35	•	•	•	•	0
Demographics and sport-specific aspects	Playing position																
	<i>forwards (as compared to backs)</i>	2	7*, 8*	•	•	•	7	•	8	•	•	7, 8	7	•	8	0/+	
	Team	2	7*, 8*	•	•	•	8!	8!	7	•	•	7, 8	7!	7!	8	0/!	
	Training hours	1	8*	•	•	•	•	•	8	•	•	8	•	•	8	0	
	Number of games	1	8*	•	•	•	•	•	8	•	•	8	•	•	8	0	
	Win/loss ratio	1	8*	•	•	•	•	8	•	•	•	8	•	•	8	0/-	
	Starting status																
	<i>Starters (as compared to non-starters)</i>	2	7*, 8*	•	•	•	•	•	7, 8	•	7	8	•	•	7, 8	0/-	
	Professional/national level experience	2	7*, 8*	•	•	•	7, 8	•	•	•	•	7, 8	7, 8	•	•	•	0/+
	Age	1	7*	•	•	•	•	•	7	•	•	7	•	•	7	0	
Sex	1	22	•	•	22	•	•	•	•	•	•	•	•	•	•	0	
Time	3	1, 7*, 8*	•	•	•	1	•	7, 8	7	•	8	•	•	7, 8	0/+		

Note. Positioning of numbers in tables represent study results with the respective study number: Predictor shows either positive (+), negative (-) or no (0) significant predictive value for the outcome variable (either global burnout or burnout subscales). The trend summarises study results for each predictor.

Abbreviations: Burnout-EXH: Subscale Emotional and Physical Exhaustion, Burnout-RA: Subscale Reduced sense of accomplishment, Burnout-DEV: Subscale Sport devaluation

* these studies also analysed indirect effects (see Table 4).

! Respective predictor has an effect but results do not clearly show the nature of that effect.

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Table 3

Summary of predictors and their influence on depressive symptoms

	Predictors	∑ of studies	Study no.	Depressive symptoms			Trend
				+	-	0	
Medical issues and psychopathology	Severe musculoskeletal time loss injuries	5	14, 15, 16, 21, 29*	16,21, 29	•	14,15	0/+
	Concussion	1	29*	29	•	•	+
	Number of surgeries	2	15, 16	•	•	15,16	0
	Burnout symptoms	2	10, 12				
	<i>Global burnout</i>	1	10	10	•	•	+
	<i>Physical and emotional exhaustion</i>	1	12	12	•	•	+
	<i>Reduced sense of accomplishment</i>	1	12	•	•	12	0
	<i>Sport devaluation</i>	1	12	12	•	•	+
Perceptions, Cognitions, and Dispositions	Eating psychopathology	1	32	32	•	•	+
	Perfectionism	1	33				
	<i>Self-oriented perfectionism</i>	1	33	•	•	33	0
	<i>Socially prescribed perfectionism</i>	1	33	•	•	33	0
Motivational aspects	Mental toughness	1	11*	•	•	11	0
	Controlling coach behaviour	1	36	•	•	36	0
Stressors and strains	Controlled motivation	1	36	36	•	•	+
	Adverse life events	5	13, 14, 15, 16, 17	•	•	13, 14, 15, 16, 17	0
Stressors and strains	Sport career dissatisfaction	5	13, 14, 15, 16, 17	•	•	13, 14, 15, 16, 17	0
	Rapid weight loss	1	3	•	•	3	0
	Perceived stress	1	11*	11	•	•	+
	Recent conflict with trainer/coach	1	17	•	•	17	0

Note. Positioning of numbers in tables represent study results with the respective study number: Predictor shows either positive (+), negative (-) or no (0) significant predictive value for the outcome variable (depressive symptoms). The trend summarises study results for each predictor.

*these studies also analysed indirect effects (see Table 4)

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Table 4

Results of significant interaction and mediation effects in the eligible studies

Study no.	Relationship / Path assessed	Results
<i>Interaction effects</i>		
1	Relatedness \times time ² \rightarrow Burnout-EXH	With increasing time the positive predictive influence of need for relatedness on EXH increases exponentially.
7	Playing position \times time \rightarrow Burnout-EXH	Forwards showed higher exhaustion scores than backs. Backs showed sharper decrease from T1 to T2 and sharper increase from T2 to T3.
8	Team \times time \rightarrow Burnout-RA	“Players reported levels of reduced RA varied across time. The way that players’ reports of RA changed across the league tournament was also related to their team membership”
11	Perceived stress \times mental toughness \rightarrow Burnout	High perceived stress and high mental toughness lead to lower burnout scores compared to high perceived stress and low mental toughness.
	Perceived stress \times mental toughness \rightarrow Depression	For low perceived stress burnout scores are the same for low and high mental toughness. High perceived stress and high mental toughness lead to lower burnout scores compared to high perceived stress and low mental toughness.
26	Personal standards perfectionism (PSP) \times evaluative concerns perfectionism (ECP) \rightarrow Burnout	For low perceived stress burnout scores are the similar for low and high mental toughness. Positive slope of ECP was only sig. for low PSP, but not high PSP (Interpretation: high PSP can buffer effect of high ECP on burnout.)
	Personal standards perfectionism (PSP) \times evaluative concerns perfectionism (ECP) \rightarrow Burnout-EXH	Negative slope of PSP sig. at low levels of ECP and high ECP (Interpretation: PSP as strong protective factor, only pure ECP predicted positive increase in burnout)
29	Type of injury \times time \rightarrow Depression	Positive slope of ECP only sig. at low PSP, negative slope of PSP only sig. at high ECP
		Concussion group: slower increase of depression scores, peak at 12 days post-injury, back to baseline 23 days post-injury. Knee-injury group: sharp increase of depression scores, peak at 4 days post-injury, back to baseline 10 days post-injury Control group: low depression scores, stable over time
<i>Mediation effects</i>		
2	Coach autonomy support \rightarrow need satisfaction \rightarrow Burnout	Coach autonomy support negatively influenced burnout through psych. need satisfaction
	Coach autonomy support \rightarrow need thwarting \rightarrow Burnout	Coach autonomy support negatively influenced burnout through psych. need thwarting
	Controlling coach style \rightarrow need thwarting \rightarrow Burnout	Controlling coach style had a positive effect on burnout through psych. need thwarting
19	Coach autonomy support \rightarrow autonomy \rightarrow Burnout-RA	“Perceived autonomy supportive coaching style has a negative mediating influence on reduced sense of accomplishment.[...] results imply that autonomy, competence, intrinsic motivation to know and to accomplish things and identified regulation represent mediators of the impact of perceived coaching style on athlete burnout.”
	Coach autonomy support \rightarrow competence \rightarrow Burnout-RA	
	Coach autonomy support \rightarrow intrinsic motivation (to know and towards accomplishment) \rightarrow Burnout-RA	
	Coach autonomy support \rightarrow identified regulation \rightarrow Burnout-RA	
	Competence \rightarrow external regulation \rightarrow Burnout-RA	“Our findings suggest that external regulation partially mediates the competence \rightarrow reduced sense of accomplishment relationship.”
27	Perfectionistic striving \rightarrow autonomous motivation \rightarrow Burnout	Perfectionistic strivings had a negative effect on athlete burnout via autonomous motivation.
	Perfectionistic concerns \rightarrow autonomous motivation \rightarrow Burnout	Perfectionistic concerns had a positive effect on athlete burnout via autonomous motivation and controlled motivation
31	Obsessive passion \rightarrow disengagement-oriented coping \rightarrow changes in Burnout	“Disengagement-oriented coping suppressed the relationship between obsessive passion and changes in burnout.” Without the mediator, obsessive passion would have a stronger negative predictive influence on changes in burnout.

Note. Burnout-EXH: Subscale Emotional and Physical Exhaustion, Burnout-RA: Subscale Reduced sense of accomplishment

References

- Adie, J. W., Duda, J. L., & Ntoumanis, N. (2012). Perceived coach-autonomy support, basic need satisfaction and the well- and ill-being of elite youth soccer players: A longitudinal investigation. *Psychology of Sport and Exercise, 13*, 51-59. doi: 10.1016/j.psychsport.2011.07.008
- Ahola, K., Hakonen, J., Perhoniemi, R., & Mutanen, P. (2014). Relationship between burnout and depressive symptoms: A study using the person-centred approach. *Burnout Research, 1*, 29-37.
- Ahola, K., Honkonen, T., Isometsä, E., Kalimo, R., Nykyri, E., Aromaa, A., et al. (2005). The relationship between job-related burnout and depressive disorders - Results from the Finnish Health 2000 Study. *Journal of Affective Disorders, 88*, 55-62.
- Appleton, P. R., Hall, H. K., & Hill, A. P. (2009). Relations between multidimensional perfectionism and burnout in junior-elite male athletes. *Psychology of Sport and Exercise, 10*, 457-465.
- Babbie, E. R. (1973). *Survey research methods*. Belmont, CA: Wadsworth.
- Bahlmann, J., Angermeyer, M. C., & Schomerus, G. (2013). "Burnout" statt "Depression" - eine Strategie zur Vermeidung von Stigma? *Psychiatrische Praxis, 40*, 78-82.
- Balaguer, I., González, L., Fabra, P., Castillo, I., Mercé, J., & Duda, J. L. (2012). Coaches' interpersonal style, basic psychological needs and the well- and ill-being of young soccer players: A longitudinal analysis. *Journal of Sports Sciences, 30*, 1619-1629. doi: 10.1080/02640414.2012.731517
- Bianchi, R., Boffy, C., Hingray, C., Truchot, D., & Laurent, E. (2013). Comparative symptomatology of burnout and depression. *Journal of Health Psychology, 18*, 782-787.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2014). Is burnout a depressive disorder? A re-examination with special focus on atypical depression. *International Journal of Stress Management, 21*, 307-324.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2015). Burnout-depression overlap: A review. *Clinical Psychology Review, 36*, 28-41.
- Brandt, R., Bevilacqua, G. G., Coimbra, D. R., Pombo, L. C., Miarka, B., & Lane, A. M. (2018). Body Weight and Mood State Modifications in Mixed Martial Arts: An Exploratory Pilot. *J Strength Cond Res, 32*, 2548-2554. doi: 10.1519/jsc.0000000000002639
- Brenninkmeyer, V., Van Yperen, N. W., & Buunk, B. P. (2001). Burnout and depression are not identical twins: Is decline of superiority a distinguishing feature? *Personality and Individual Differences, 30*, 837-880.
- Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H., et al. (2003). Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. *Science, 301*, 386-389.
- Chen, L., Kee, Y., & Tsai, Y. (2009). An Examination of the Dual Model of Perfectionism and Adolescent Athlete Burnout: A Short-Term Longitudinal Research. *Social Indicators Research, 91*, 189-201. doi: 10.1007/s11205-008-9277-9

STUDY I – PREDICTORS OF BURNOUT AND DEPRESSION IN ATHLETES

- Coakley, J. (1992). Burnout among adolescent athletes: A personal failure or social problem? *Sociology of Sport Journal*, 9, 271-285.
- Cresswell, S. L. (2009). Possible early signs of athlete burnout: A prospective study. *Journal of Science and Medicine in Sport*, 12, 393-398.
- Cresswell, S. L., & Eklund, R. C. (2005). Changes in Athlete Burnout and Motivation over a 12-Week League Tournament. *Medicine & Science in Sports & Exercise*, 37, 1957-1966. doi: 10.1249/01.mss.0000176304.14675.32
- Cresswell, S. L., & Eklund, R. C. (2006). Changes in athlete burnout over a thirty-week "rugby year". *Journal Of Science And Medicine In Sport*, 9, 125-134.
- Cresswell, S. L., & Eklund, R. C. (2007). Athlete Burnout: A Longitudinal Qualitative Study. *Sport Psychologist*, 21, 1-20.
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology*, 49, 182-185.
- Deeks, J. J., Higgins, J. P., & Altman, D. G. (2019). Analysing data and undertaking meta-analyses. In J. P. Higgins, J. Thomas, J. Chandler, M. Cumpston, T. Li, M. J. Page & V. A. Welch (Eds.), *Cochrane handbook for systematic reviews of interventions* (pp. 241-284). Hoboken, NJ: Wiley-Blackwell.
- DeFreese, J. D., & Smith, A. L. (2014). Athlete social support, negative social interactions, and psychological health across a competitive sport season. *Journal Of Sport & Exercise Psychology*, 36, 619-630.
- Eklund, R. C., & Cresswell, S. L. (2007). Athlete burnout. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of sport psychology* (pp. 621-641). New York: Wiley & Sons.
- Eklund, R. C., & DeFreese, J. D. (2015). Athlete Burnout: What we know, what we could know, and how we can find out more. *International Journal of Applied Sports Sciences*, 27, 63-75.
- Frank, R., Nixdorf, I., & Beckmann, J. (2017). Analyzing the Relationship Between Burnout and Depression in Junior Elite Athletes. *Journal of Clinical Sport Psychology*, 11, 287-303.
- Frank, R., Nixdorf, I., Beckmann, J., Kramer, U., Mangold, S., Krumm, P., et al. (2013). Depression among elite athletes: Prevalence and psychological factors. *Deutsche Zeitschrift für Sportmedizin*, 64, 320-326.
- Garcia-Toro, M., & Aguirre, I. (2007). Biopsychosocial model in depression revisited. *Medical hypotheses*, 68, 683-691.
- Gerber, M., Best, S., Meerstetter, F., Walter, M., Ludyga, S., Brand, S., et al. (2018). Effects of stress and mental toughness on burnout and depressive symptoms: A prospective study with young elite athletes. *Journal of Science and Medicine in Sport*, 21, 1200-1205. doi: 10.1016/j.jsams.2018.05.018
- Gerber, M., Gustafsson, H., Seelig, H., Kellmann, M., Ludyga, S., Colledge, F., et al. (2018). Usefulness of the Athlete Burnout Questionnaire (ABQ) as a screening tool for the detection of clinically relevant burnout symptoms among young elite athletes. *Psychology of Sport & Exercise*, 39, 104-113. doi: 10.1016/j.psychsport.2018.08.005

STUDY I – PREDICTORS OF BURNOUT AND DEPRESSION IN ATHLETES

- Goodger, K., Gorely, T., Lavallee, D., & Harwood, C. (2007). Burnout in sport: A systematic review. *The Sport Psychologist, 21*, 127-151.
- Gorczyński, P. F., Coyle, M., & Gibson, K. (2017). Depressive symptoms in high-performance athletes and non-athletes: a comparative meta-analysis. *British Journal of Sports Medicine, 51*, 1348-1354.
- Gouttebauge, V., Aoki, H., Verhagen, E. A. L. M., & Kerkhoffs, G. M. M. J. (2017). A 12-Month Prospective Cohort Study of Symptoms of Common Mental Disorders Among European Professional Footballers. *Clinical Journal Of Sport Medicine: Official Journal Of The Canadian Academy Of Sport Medicine, 27*, 487-492. doi: 10.1097/JSM.0000000000000388
- Gouttebauge, V., Hopley, P., Kerkhoffs, G. M. M. J., Verhagen, E., Viljoen, W., Wylleman, P., et al. (2018). A 12-month prospective cohort study of symptoms of common mental disorders among professional rugby players. *European Journal of Sport Science, 18*, 1004-1012. doi: 10.1080/17461391.2018.1466914
- Gouttebauge, V., Jonkers, R., Moen, M., Verhagen, E., Wylleman, P., & Kerkhoffs, G. (2017). A prospective cohort study on symptoms of common mental disorders among Dutch elite athletes. *Phys Sportsmed, 45*, 426-432. doi: 10.1080/00913847.2017.1370987
- Gouttebauge, V., & Kerkhoffs, G. M. M. J. (2017). A prospective cohort study on symptoms of common mental disorders among current and retired professional ice hockey players. *The Physician And Sportsmedicine, 45*, 252-258. doi: 10.1080/00913847.2017.1338497
- Gouttebauge, V., Tol, J. L., & Kerkhoffs, G. M. M. J. (2016). Epidemiology of symptoms of common mental disorders among elite Gaelic athletes: a prospective cohort study. *The Physician and Sportsmedicine, 44*, 283-289. doi: 10.1080/00913847.2016.1185385
- Gustafsson, H., DeFreese, J. D., & Madigan, D. J. (2017). Athlete burnout: review and recommendations. *Current opinion in Psychology, 16*, 109-113.
- Gustafsson, H., Kenttä, G., & Hassmen, P. (2011). Athlete burnout: An integrated model and future research directions. *International Review of Sport and Exercise Psychology, 4*, 3-24.
- Holmberg, P. M., & Sheridan, D. A. (2013). Self-determined motivation as a predictor of burnout among college athletes. *The Sport Psychologist, 27*, 177-187.
- Hong, Q. N., Pluye, P., Fábregues, S., Bartlett, G., Boardman, F., Cargo, M., et al. (2018). *Mixed Methods Appraisal Tool (MMAT)*. Industry Canada.
- Hutchison, M., Mainwaring, L. M., Comper, P., Richards, D. W., & Bisschop, S. M. (2009). Differential emotional responses of varsity athletes to concussion and musculoskeletal injuries. *Clinical Journal of Sport Medicine, 19*, 13-19. doi: 10.1097/JSM.0b013e318190ba06
- Iacovides, A., Fountoulakis, K. N., Kaprinis, S., & Kaprinis, G. (2003). The relationship between job stress, burnout and clinical depression. *Journal of Affective Disorders, 75*, 209-221.
- Ingrell, J., Johnson, U., & Ivarsson, A. (2019). Developmental changes in burnout perceptions among student-athletes: An achievement goal perspective. *International Journal of Sport and Exercise Psychology, 17*, 509-520.

STUDY I – PREDICTORS OF BURNOUT AND DEPRESSION IN ATHLETES

- Isoard-Gauthier, S., Guillet-Descas, E., & Duda, J. L. (2013). How to achieve in elite training centers without burning out? An achievement goal theory perspective. *Psychology of Sport & Exercise, 14*, 72-83. doi: 10.1016/j.psychsport.2012.08.001
- Isoard-Gauthier, S., Guillet-Descas, E., & Lemyre, P. N. (2012). A prospective study of the influence of perceived coaching style on burnout propensity in high level young athletes: Using a self-determination theory perspective. *The Sport Psychologist, 26*, 282-298.
- Kaschka, W. P., Korczak, D., & Broich, K. (2011). Burnout: A fashionable diagnosis. *Deutsches Ärzteblatt International, 108*, 781-787.
- Kenny, D. A. (2005). Cross-lagged panel design. In B. S. Everitt & D. S. Howell (Eds.), *Encyclopedia of statistics in behavioural science*. Chichester, UK: John Wiley & Sons.
- Kilic, O., Aoki, H., Goedhart, E., Hagglund, M., Kerkhoffs, G. M. M. J., Kuijer, P. P. F. M., et al. (2018). Severe musculoskeletal time-loss injuries and symptoms of common mental disorders in professional soccer: a longitudinal analysis of 12-month follow-up data. *Knee Surg Sports Traumatol Arthrosc, 26*, 946-954. doi: 10.1007/s00167-017-4644-1
- Kristman, V., Manno, M., & Côte, P. (2004). Loss to follow-up in cohort studies: How much is too much? *European Journal of Epidemiology, 19*, 751-760.
- Lai, C., & Wiggins, M. S. (2003). Burnout perceptions over time in NCAA division I soccer players. *International Sports Journal, 7*, 120.
- Li, C., Ivarsson, A., Stenling, A., & Wu, Y. (2018). The dynamic interplay between burnout and sleep among elite blind soccer players. *Psychology of Sport and Exercise, 37*, 164-169. doi: 10.1016/j.psychsport.2017.08.008
- Li, C., Wang, C. J., & Kee, Y. H. (2013). Burnout and its relations with basic psychological needs and motivation among athletes: A systematic review and meta-analysis. *Psychology of Sport and Exercise, 14*, 692-700.
- Lonsdale, C., & Hodge, K. (2011). Temporal ordering of motivational quality and athlete burnout in elite sport. *Med Sci Sports Exerc, 43*, 913-921. doi: 10.1249/MSS.0b013e3181ff56c6
- MacCallum, R. C., & Austin, J. T. (2000). Application of structural equation modelling in psychological research. *Annual Review of Psychology, 51*, 201-226.
- Madigan, D. J., & Nicholls, A. R. (2017). Mental toughness and burnout in junior athletes: A longitudinal investigation. *Psychology of Sport & Exercise, 32*, 138-142. doi: 10.1016/j.psychsport.2017.07.002
- Madigan, D. J., Stoeber, J., & Passfield, L. (2015). Perfectionism and Burnout in Junior Athletes: A Three-Month Longitudinal Study. *Journal of Sport and Exercise Psychology, 37*, 305-315. doi: 10.1123/jsep.2014-0266
- Madigan, D. J., Stoeber, J., & Passfield, L. (2016a). Motivation mediates the perfectionism–burnout relationship: A three-wave longitudinal study with junior athletes. *Journal of Sport & Exercise Psychology, 38*, 341-354. doi: 10.1123/jsep.2015-0238
- Madigan, D. J., Stoeber, J., & Passfield, L. (2016b). Perfectionism and changes in athlete burnout over three months: Interactive effects of personal standards and evaluative concerns perfectionism. *Psychology of Sport & Exercise, 26*, 32-39. doi: 10.1016/j.psychsport.2016.05.010

STUDY I – PREDICTORS OF BURNOUT AND DEPRESSION IN ATHLETES

- Mainwaring, L. M., Bisschop, S. M., Comper, P., Richards, D. W., & Hutchison, M. (2010). Emotional response to sport concussion compared to ACL injury. *Brain Injury, 24*, 589-597. doi: 10.3109/02699051003610508
- Martinet, G., Decret, J. C., Guillet-Descas, E., & Isoard-Gautheur, S. (2014). A reciprocal effects model of the temporal ordering of motivation and burnout among youth table tennis players in intensive training settings. *J Sports Sci, 32*, 1648-1658. doi: 10.1080/02640414.2014.912757
- Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *The Maslach Burnout Inventory Manual, 2nd Ed.* Palo Alto, CA: Consulting Psychologists Press.
- Maslach, C., & Leiter, M. P. (2000). Burnout. In E. Fink (Ed.), *Encyclopedia of stress* (pp. 358-362). New York: Academic Press.
- Pacewicz, C. E., Mellano, K. T., & Smith, A. L. (2019). A meta-analytic review of the relationship between social constructs and athlete burnout. *Psychology of Sport & Exercise, 43*, 155-164.
- Raedeke, T. D. (1997). Is athlete burnout more than just stress? A sport commitment perspective. *Journal of Sport & Exercise Psychology, 19*, 396-417.
- Raedeke, T. D., & Smith, A. L. (2001). Development and preliminary validation of an athlete burnout measure. *Journal of Sport & Exercise Psychology, 23*, 281-306.
- Rice, S. M., Parker, A., Rosenbaum, S., Bailey, A., Purcell, R., & Mawren, D. (2018). Sport-related concussion and mental health outcomes in elite athletes: A systematic review. *Sports Medicine, 48*, 447-465.
- Rice, S. M., Purcell, R., De Silva, S., Mawren, D., McGorry, P. D., & Parker, A. G. (2016). The mental health of elite athletes: A narrative review. *Sports Medicine, 46*, 1333-1353.
- Ryan, R., & Hill, S. (2016). How to GRADE the quality of the evidence Version 3.0 December 2016. from ccrg.cochrane.org/author-resources
- Schellenberg, B. J., Gaudreau, P., & Crocker, P. R. E. (2013). Passion and coping: Relationships with changes in burnout and goal attainment in collegiate volleyball players. *Journal Of Sport & Exercise Psychology, 35*, 270-280.
- Schmidt, G. W., & Stein, G. L. (1991). Sport commitment: A model integrating enjoyment, dropout, and burnout. *Journal Of Sport & Exercise Psychology, 13*, 254-265.
- Schubring, A., & Thiel, A. (2014). Growth problems in youth elite sports: Social conditions, athletes' experiences, and sustainability consequences. *Reflective Practice, 15*, 78-91. doi: 10.1080/14623943.2013.868793.
- Shanmugam, V., Jowett, S., & Meyer, C. (2014). Eating psychopathology as a risk factor for depressive symptoms in a sample of British athletes. *Journal of Sports Sciences, 32*, 1587-1595. doi: 10.1080/02640414.2014.912758
- Shirom, A. (2005). Reflections on the study of burnout. *Work & Stress, 19*, 263-270.
- Skrondal, A., & Rabe-Hesketh, S. (2004). *Generalized latent variable modeling: Multilevel, longitudinal, and structural equation models*: Chapman and Hall/CRC.
- Smith, A. L., Pacewicz, C. E., & Raedeke, T. (2019). Athlete burnout in sport and physical activity. In T. S. Horn & A. L. Smith (Eds.), *Advances in sport and exercise psychology* (Vol. 4th edition, pp. 409-424). Champaign, IL: Human Kinetics.

STUDY I – PREDICTORS OF BURNOUT AND DEPRESSION IN ATHLETES

- Smith, E. P., Hill, A. P., & Hall, H. K. (2018). Perfectionism, Burnout, and Depression in Youth Soccer Players: A Longitudinal Study. *Journal of Clinical Sport Psychology, 12*, 179-200.
- Smith, R. E. (1986). Towards a cognitive-affective model of athlete burnout. *Journal of Sport Psychology, 8*, 36-50.
- Sorkkila, M., Aunola, K., Salmela-Aro, K., Tolvanen, A., & Ryba, T. V. (2018). The co-developmental dynamic of sport and school burnout among student-athletes: The role of achievement goals. *Scandinavian Journal of Medicine & Science in Sports, 28*, 1731-1742.
- Sorkkila, M., Ryba, T. V., Selanne, H., & Aunola, K. (2018). Development of School and Sport Burnout in Adolescent Student-Athletes: A Longitudinal Mixed-Methods Study. *Journal of Research on Adolescence*. doi: 10.1111/jora.12453
- Stenling, A., Ivarsson, A., Hassmén, P., & Lindwall, M. (2017). Longitudinal associations between athletes' controlled motivation, ill-being, and perceptions of controlling coach behaviors: A Bayesian latent growth curve approach. *Psychology of Sport & Exercise, 30*, 205-214. doi: 10.1016/j.psychsport.2017.03.002
- Taris, T. W. (2000). *A primer in longitudinal analysis*. Thousand Oaks, CA: Sage.
- Teubert, H., Cachay, K., Borggrefe, C., & Thiel, A. (2006). *Spitzensport und Schule - Möglichkeiten und Grenzen struktureller Kopplung in der Nachwuchsförderung*. Schondorf: Hofmann.
- Turner, M. J., & Moore, M. (2016). Irrational beliefs predict increased emotional and physical exhaustion in Gaelic football athletes. *International Journal of Sports Psychology, 47*, S. 187-201.
- Weber, A., & Jaekel-Reinhard, A. (2000). Burnout syndrome: A disease of modern societies? *Occupational Medicine, 50*, 512-517.
- Wolanin, A., Gross, M., & Hong, E. (2015). Depression in athletes: Prevalence and risk factors. *Current Sports Medicine Reports, 14*, 56-60.
- World Health Organization. (2018). International classification of diseases for mortality and morbidity statistics 11th Revision. from <https://icd.who.int/browse11/l-m/en>
- Wylleman, P., Harwood, C. G., Elbe, A.-M., Reints, A., & de Caluwé, D. (2009). A perspective on education and professional development in applied sport psychology. *Psychology of Sport & Exercise, 10*, 435-446.
- Yang, J., Peek-Asa, C., Corlette, J., Cheng, G., Foster, D., & Albright, J. (2007). Prevalence of and risk factors associated with symptoms of depression in competitive collegiate student athletes. *Clinical Journal of Sport Medicine, 17*, 481-487.
- Yrondi, A., Brauge, D., LeMen, J., Arbus, C., & Pariente, J. (2017). Depression and sports-related concussion: A systematic review. *La Presse Médicale, 46*, 890-902.

Burnout and Depression in Athletes: One and the same?¹¹

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Abstract

Currently, there is a debate on the conceptual overlap of burnout and depression and whether they can be considered distinct constructs. However, this discussion has for the most part not included athletes. Due to their extensive demands, athletes represent a potential risk group for developing psychological disorders. In addition, the climate and ‘culture of risk’ typically present in elite sport may increase stigma of mental illness and heighten the risk of overlooking symptoms. In order to effectively screen for and treat potential disorders, concept clarity of syndromes is vital. The aim of this study was to determine the conceptual overlap of burnout and depression in a sample of German adolescent elite athletes.

We used data from the GOAL study (“German Young Olympic Athletes' Lifestyle and Health Management Study”) in which 1138 young elite athletes ($M = 16.33$ years, $SD = 1.10$) were assessed regarding athlete burnout symptomatology (via the ABQ-D) and depressive symptomatology (PHQ-2). We compared four different factor models: (A) unidimensional, (B) correlated subscales, (C) higher order factor model and (D) bifactor model.

Burnout components correlate more strongly with the depression factor than with each other. Bifactor modeling shows that burnout and depression share a common factor, but this is not strong enough to assume conceptual congruence.

Our results do not support the idea that burnout and depression represent distinct constructs. Instead, results suggest that it may be fruitful to consider both in a joint syndrome.

Keywords: burnout, depression, anxiety, overlap, distinction, structural equation model, conceptualization, Athlete Burnout Questionnaire

Introduction

Elite athletes are “engulfed” in a high performance society, in which physical and mental limits are constantly challenged and pushed for the sake of optimizing performance. Daily routines are coined by a specific culture of risk : Here, athletes are frequently encouraged to overcome pain thresholds and distress is easily trivialized (Mayer & Thiel, 2018). Within this culture of risk, the peril of overlooking psychological ill-being is especially high. This constitutes a major issue, because due to their extensive demands athletes represent a potentially vulnerable group for stress-based psychological disorders (Hughes & Leavey, 2012; Reardon & Factor, 2010).

In the public debate, the high levels of stress in elite sport are receiving increasing attention. When famous athletes do not meet performance expectations, take a break from their sport or even drop out prematurely, the media are often quick to speculate about exhaustion, chronic stress, burnout or depression as a reason. In everyday speech, these terms are used interchangeably and surprisingly, this lack of concept clarity is also persisting in current research on stress-based psychological syndromes. This deficiency is particularly salient regarding the differentiation between burnout and depression (Bianchi, Schonfeld, & Laurent, 2019).

The overlap or respectively the distinction of burnout and depression has been researched quite frequently, mainly by the work group of Bianchi (e.g. Bianchi, Schonfeld, & Laurent, 2015; Bianchi, Schonfeld, Vandel, & Laurent, 2017; Bianchi, Schonfeld, & Verkuilen, 2020). However, in the sports context there are only very few studies on the matter (De Francisco, Arce, del Pilar Vílchez, & Vales, 2016; Frank, Nixdorf, & Beckmann, 2017; Nixdorf, Beckmann, & Nixdorf, 2020). This is rather surprising, because compared to other professions, burnout has been researched in athletes quite frequently. A specific measure, the Athlete Burnout Questionnaire (ABQ, Raedeke & Smith, 2001) has even been developed, which is widely used (Gustafsson, Madigan, & Lundkvist, 2018). The sport scientific interest in this topic may be due to the fact that the idea of burnout fits the elite sport context particularly well. In order to burn out, one has to ‘burn’ (= be passionate) for something first (Pines, 1993), which seems to be an essential prerequisite for success in elite sport. Athletes are high performers who have to handle exceptionally high demands and put tremendous amount of effort into their sport. This requires not only a high level of commitment, but also passion. This high level of

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commitment, passion and focus can, in turn, lead to accepting loads that are actually above the individual's capacity limit. Even athletes, who are considered to be mentally strong, can therefore reach the point where the demands of this high-pressure context are too high. Depression on the other hand is not associated with extreme commitment and drive for a certain task but is more commonly associated with sensitive individuals with avolition and fatigue, an association that is not common with elite athletes and also not desirable.

Deciphering the extent of the overlap of burnout and depression is an important matter for both scientific and applied purposes in elite sports and beyond. From a scientific perspective, precise conceptualization of constructs is crucial to develop a comprehensive conceptual understanding of the syndromes that can in turn inspire pre- or intervention strategies. Further clarifying the overlap between the two syndromes is also important because, if they overlap substantially, findings of burnout and depression research could potentially be synthesized and inform one another, as suggested by Frank et al. (2017). Regarding the applied context, the current lack of concept clarity causes a challenge to efficiently screen for symptoms. Hence, prevalence estimates may be biased due to the distinction into two separate constructs. Furthermore, a clinical depression may go unnoticed or not treated appropriately, due to the burnout label (Bianchi, Schonfeld, & Laurent, 2014). Here, it is important to specifically assess high performance athletes. This population is subject to a very particular set of demands and extensive stressors which make them at risk for developing mental illnesses (Hughes & Leavey, 2012; Reardon & Factor, 2010). Additionally, athlete's symptoms can easily be overlooked due to the above-mentioned normality of high-risk behavior.

The practical problem of confusing burnout and depression in elite sport is that the treatment of burnout may be restricted to simply reducing demands (e.g. work load, training), whereas for depression a more substantial psychotherapeutic approach, possibly combined with medication, is common. This is also relevant for the professional care responsibility of staff. While burnout is not a clinical diagnosis and as such may be treated by sport psychologists, athletes with depression should be referred to a clinically trained psychotherapist.

Also, it should be remembered that concept clarity could aid in stigma reduction associated with social (un-)desirability: A common belief in elite sport is that athletes need to be tough and hardened up to handle the excessive demands of elite sport. In this status quo, mental illness, such as depression, is quickly considered a sign of innate mental weakness, whereas burnout may be considered to point to an athlete's (over)commitment and as such may be

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considered more socially desirable. Reducing the stigma of mental illness in high performance sport would help decrease the stigma for the general population as well and increase help-seeking behavior, due to role model function of athletes and media attention.

Outside of the sports context, there is an ongoing scientific debate on the conceptualization of burnout and its distinction and potential overlap with depression (Koutsimani, Anthony, & Georganta, 2019). More recently, some of these issues have also been assessed in the sports context (De Francisco et al., 2016; Nixdorf et al., 2020). However, this discussion can be led on a number of levels:

First, depression is incorporated in the relevant diagnostic manuals, such as ICD-11 and DSM-V, while burnout is not recognized as a distinct disorder but only mentioned as an “occupational phenomenon” (World Health Organization, 2018) and can be coded as Z73 “problems related to life management difficulty” in the ICD-10 (Hamann et al., 2013). The persistent lack of consensual diagnostic criteria for burnout even after 40 years of research constitutes a major deficiency in this field (Bianchi et al., 2017). Researchers have criticized that in early publications on the burnout syndrome pre-existing similar psychological disorders, such as depression, were not considered (Bianchi et al., 2017). According to their view, the burnout syndrome is the result of construct proliferation (Cole, Walter, Bedeian, & O’Boyle, 2012). The two separate constructs have then developed in two separate research traditions and because of the so-called ‘jangle fallacy’, whereby it is erroneously assumed that two identical things are different, because they are labeled differently (Bianchi & Schonfeld, 2018). These two separate research traditions have not been questioned until recent years.

Second, symptom wise, both syndromes show great overlap. For example, Gustafsson, Hassmén, Kenttä, and Johansson (2008) reported that athletes with burnout described their experience as being “depressed, irritated and frustrated all at once” (p. 810). Interestingly, even Freudenberger, the founding father of the burnout construct, gathered from a qualitative study with volunteer service workers at a free clinic that the burned out individual “looks, acts and seems depressed” (Freudenberger, 1974, p. 161). Individuals afflicted with either burnout or depression show comparably high levels of exhaustion (‘fatigue’ for depression) (Van Dam, Keijsers, Eling, & Becker, 2015), both physically and mentally. They experience a loss of interest and meaning for activities that they previously enjoyed (‘devaluation’ for burnout). Additionally, they often feel worthless and unable to cope with their daily demands (‘reduced sense of accomplishment’ for burnout) (American Psychiatric Association, 2013).

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Consequentially, the affected individuals suffer from impaired functionality and decreased performance.

Third, regarding etiology, both syndromes are strongly connected to stress (Schonfeld & Bianchi, 2016). For the sport context, De Francisco et al. (2016) found that variance in burnout and depression was in large parts explained by stress. Along these lines, overall depression research has evolved from mere stress theories and vulnerability theories to combined vulnerability-stress-models or diathesis-stress models (Hankin & Abela, 2005). For athlete burnout several theories co-exist: These focus for example on either stress (Smith, 1986), commitment (Schmidt & Stein, 1991) or on socialization (Coakley, 1992). However, the efforts to combine them to a global model are still in its infancy here. One of the few examples of a combined approach was made by Nixdorf et al. (2020) who very recently introduced the idea for a sport-specific diathesis-stress model that pertains to both burnout and depression.

A common differentiation between the two syndromes is that burnout is often described as a job-related and work-specific issue (Maslach, Schaufeli, & Leiter, 2001). However, this view has been contested in studies showing that depression can also be work-related and burnout does not necessarily have to be specific to the working context (e.g. Hakanen & Bakker, 2017).

The terminology in itself suggests different etiologies: The term burnout indicates having reached a final stage of a high intensity ('burning') process. It is commonly discussed as a 'high-performer syndrome' and as such suggests exhaustion due to an excessive amount or intensity of work (=exogenous genesis). The term depression from Latin 'deprimere' on the other hand means 'pressed down' and describes the feeling of being dispirited, down, and sad. Here, the term is not associated with a specific external cause (=endogenous genesis). As a consequence of these implications, burnout is the much more socially desirable diagnosis than depression, as it suggests having worked until exhaustion which is rather considered a protestant virtue than a flaw. Clinical experts often discard burnout as a separate syndrome because the term burnout may just be a socially less stigmatized term for symptoms of depression (Bianchi, Verkuilen, Brisson, Schonfeld, & Laurent, 2016) and demote it to being a 'fashionable diagnosis' (Kaschka, Korczak, & Broich, 2011). This social desirability plays an even more particular role in the sports context. Here, high level functionality is essential and any decrease of this functionality is considered a weakness which in turn can seriously impact an athlete's chances of a sports career.

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Fourth, numerous studies have shown high correlations between burnout and depression scores (Bianchi et al., 2016; Koutsimani et al., 2019)¹². Furthermore, several studies show an especially high correlation between the burnout subscale emotional and physical exhaustion and depression (Bianchi et al., 2015). When focusing on the diagnostic overlap, studies have shown that up to 90 % of individuals who are experiencing burnout symptoms would also meet the diagnostic criteria for a depression (e.g. Bianchi et al., 2014; Schonfeld & Bianchi, 2016). Also, psychotherapists report that most patients with a (self-diagnosed) burnout syndrome also meet the criteria of a diagnosis of another psychopathology (Maske, Riedel-Heller, Seiffert, Jacobi, & Hapke, 2016). This strong diagnostic overlap may indicate that burnout could be at least another subtype of mood disorders, such as depression, which is a rather broad concept with several subforms.

Findings on the temporal relationship between burnout and depression are mixed: In some studies burnout symptoms are assessed as antecedents to symptoms of clinical depression (e.g. Hakanen & Schaufeli, 2012). From this viewpoint, burnout symptoms would constitute a subclinical early form of depression. Others view burnout as a final stage and found depressive symptomatology to predict this state of total exhaustion (e.g. Armon, Shirom, & Melamed, 2012). And there are also studies reporting the parallel development of burnout and depressive symptomatology over time (Ahola, Hakanen, Perhoniemi, & Mutanen, 2014), indicating close overlap, if not congruency. In one of the few studies in the sports context, cross-lagged panel analyses found that stress was a better predictor for burnout and depression as they were for each other (Frank et al., 2017).

There are only few studies that have approached the potential overlap issue on a factor analytic level. Schonfeld, Verkuilen, and Bianchi (2019) found that burnout, depression and anxiety share a common factor which they labeled ‘nonspecific psychological distress’. Another very recent large scale study found that depression and the burnout subscales are reflective of the same higher order factor (Bianchi et al., 2020). However, in these studies burnout was assessed in non-athlete working samples and via the Shirom-Melamed Burnout

¹² Clinical depression instruments generally inquire about the symptoms present for the past two weeks (e.g. CES-D, PHQ-9). Burnout measures commonly assess symptoms over a longer period of time (~1 month to 1 year) or do not specify a certain time frame (e.g. ABQ). The study of Bianchi et al. (2016) is remarkable, because the authors standardized the time frame of symptom assessment so that burnout symptoms were also assessed for the time frame of the past two weeks.

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Measure (SMBM) and versions of the Maslach Burnout Inventory (MBI). As mentioned above, this issue has hardly ever been assessed and discussed within the sports context and factor analytic overlap assessments with sport-specific measures (such as the ABQ) are non-existent, despite or maybe even due to the popularity of the burnout construct in sports science research. If the elite sports system aims to keep their athletes physically as well as mentally healthy, it is important to have clearly defined constructs of disorders, as this facilitates efficient screening and prevents misdiagnoses. Therefore, this paper focuses on the following research question: How do depressive and burnout symptoms overlap in a sample of junior elite athletes?

Method

Sample

Participants of the study were youth athletes ($N = 1138$, 500 female) with a mean age of 16.33 years ($SD = 1.10$) who were all part of the national squad within their sport. We included athletes of all Olympic disciplines¹³ in this study in order to obtain a comprehensive overview of German youth elite athletes. Data were collected as a part of the research project “Individuelles Gesundheitsmanagement im Olympischen NAchwuchsLeistungssport” (GOAL) which was funded by the German Federal Institute of Sport Science. Questionnaires were sent out via direct mail, centralized distribution or at centralized squad practices. Response rate was 62 % (Thiel et al., 2011). An analysis of responders and non-responders regarding age and gender showed no significant differences (Diehl, Thiel, Zipfel, Mayer, & Schneider, 2012). This study was approved by the ethics commission of the faculty of medicine at the university of Tübingen under the signature 222/2009BO1.

Measures

Burnout symptoms were assessed via the German version of the Athletes Burnout Questionnaire (ABQ, original version by Raedeke & Smith, 2001). The ABQ entails 15 items that are divided equally into the three subscales ‘emotional and physical exhaustion’, ‘sport devaluation’ and ‘reduced sense of accomplishment’. Answers are given on a 5 point rating scale from 1 (“almost never”) to 5 (“almost always”). The German version has shown acceptable validity and reliability (Ziemainz, Abu-Omar, Raedeke, & Krause, 2004). For our

¹³ the selected disciplines were related to the Summer Olympics 2012 and Winter Olympics 2010

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sample, internal consistency for the overall scale was good, with Cronbach's α .875. Internal consistency of the ABQ-subscales was good or at least acceptable (Cronbach's α ranging from .754 to .886).

Symptoms of depression were assessed via the PHQ-2, an ultra-brief scale for screening for depression. Symptoms are assessed for the past two weeks and answers are given on a 4 point rating scale from 0 ("not at all") to 3 ("nearly every day"). Scores are added and overall score above 3 has shown to indicate major depression with a sensitivity of 87% and a specificity of 78% (Löwe, Kroenke, & Gräfe, 2005).

Statistical Analysis

Prior to conducting analyses, descriptive statistics were checked for extreme outliers and correlation matrices showed positive correlations for all variables included in the analyses. Data were found to show a positively skewed distribution because the majority of participants had low symptom scores. Missings were analysed via Little's MCAR test and were found to not be missing completely at random ($p < .01$). However, the dataset showed a missings rate of less than 1 %, which can be assumed to have no relevant impact on analyses (Schafer, 1999).

Firstly, an EFA with all ABQ and PHQ-2 items was conducted. Since the data were skewed, we chose the method of principal axis factoring (Fabrigar, Wegener, MacCallum, & Strahan, 1999). On the base of the EFA results, four models were tested via structural equation modeling and compared with one another: (A) A one factor model with all 17 indicators loading on one factor only, (B) an oblique factor model of four factors, (C) a hierarchical factor model with a second order general factor and (D) a bifactor measurement model (see Fig. 2). Items were treated as ordinal and we used the WLSMV estimator.

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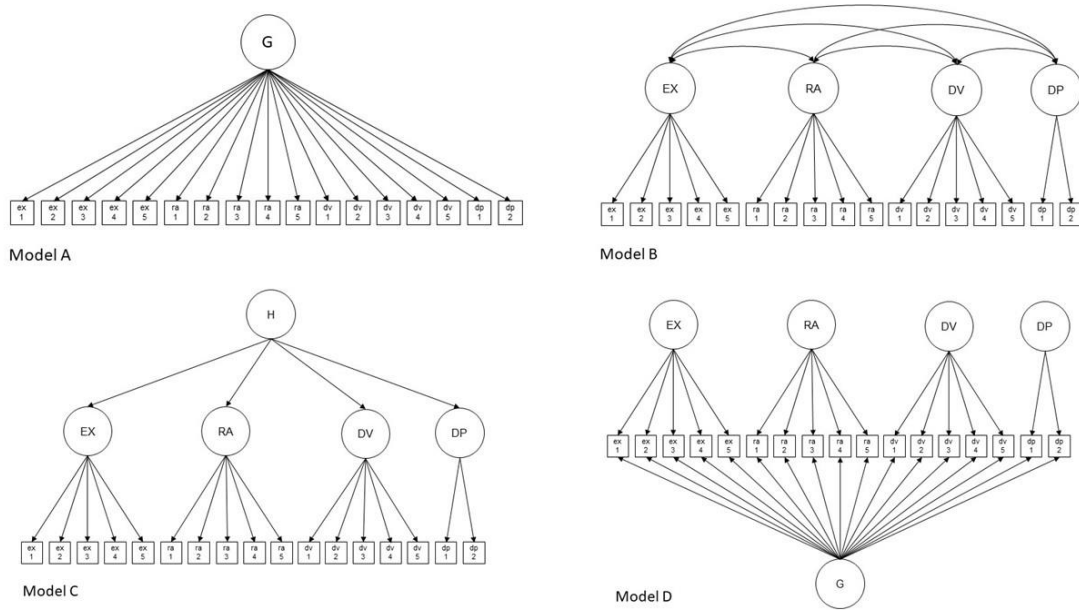


Figure 2. Schematic models to be analysed

Results

Exploratory factor analysis with principal axis factoring and promax rotation was computed, yielding a four factor structure. This analysis produced a Kaiser-Meyer-Olkin coefficient of sampling adequacy of .901 and Bartlett’s Test of Sphericity of $\chi^2 = 7249.2, p < .001$. Following Scree-test and Guttman criteria, four factors were extracted. These factors showed correlations ranging from .389 up to .629. If extracted factors are correlated, this implies a higher-order or hierarchical factor (Thompson, 2004).

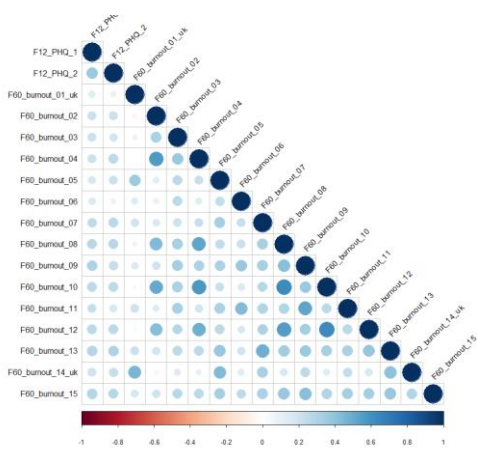


Figure 3. Item correlations

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Table 1.

Correlations between the four factors extracted via principal axis EFA with promax rotation.

Factor	1	2	3	4
1 (Emotional and physical exhaustion)	1.000	.389	.532	.629
2 (Reduced sense of accomplishment)		1.000	.576	.604
3 (Sport devaluation)			1.000	.582
4 (Depressive Symptoms)				1.000

Our sample's results also show that all three factors associated with the burnout subscales correlate higher with the depression factor, with coefficients ranging from $r = .582$ to $r = .629$, than with the other burnout factors ($r = .389$ to $.576$, see Table 1).

Table 2.

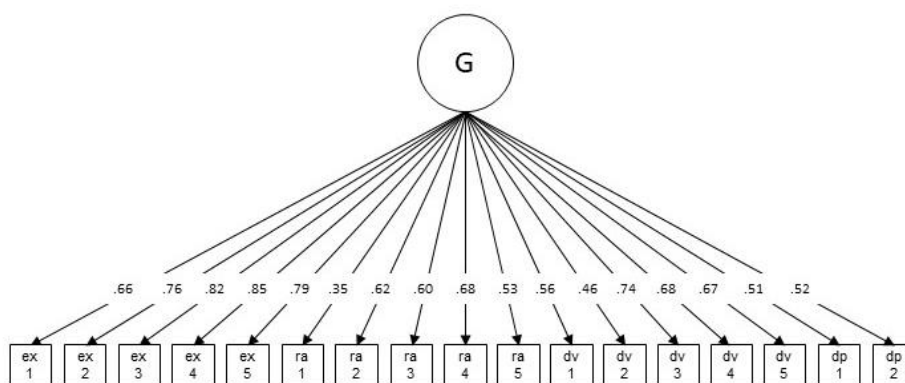
Item loadings on extracted EFA factors

Item number	Item [†]	Extracted factor			
		1	2	3	4
ABQ 2	I feel so tired from my training that I have trouble finding energy to do other things.	.785			
4	I feel overly tired from my sport participation.	.868			
8	I feel "wiped out" from sport.	.733			
10	I feel physically worn out from sport.	.918			
12	I am exhausted by the mental and physical demands of sport.	.758			
1	I'm accomplishing many worthwhile things in sport		.694		
5	I am not achieving much in sport.		.613		
7	I am not performing up to my ability in sport.		.335		
13	It seems that no matter what I do, I don't perform as well as I should.		.430		
14	I feel successful at sport.		.858		
3	The effort I spend in sport would be better spent doing other things.	.308		.293	
6	I don't care as much about my sport performance as I used to.			.720	
9	I'm not into sport like I used to be.			.683	
11	I feel less concerned about being successful in sport than I used to.			.845	
15	I have negative feelings towards sport.			.264	.274
	Over the last 2 weeks how often have you been bothered by the following problems?				
PHQ-1	Little interest or pleasure in doing things				.726
PHQ-2	Feeling down, depressed or hopeless				.742

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Note. Extraction method: Principal axis factoring. Rotation method: Promax with Kaiser-normalization. †For the purpose of comprehensibility, we listed the original ABQ and PHQ items in English, but study questionnaires included the German versions of the Athlete Burnout Questionnaire as translated and validated by Ziemainz et al. (2004) and PHQ-2 (Löwe et al., 2005).

A simple first order factor model (model A, see Figure 4) with all items loading on one single general factor showed very poor model fit with RMSEA = 0.159, CFI = 0.811, TLI = 0.783, SRMR = .125, $\chi^2(119) = 3315.706$, $p < .001$.

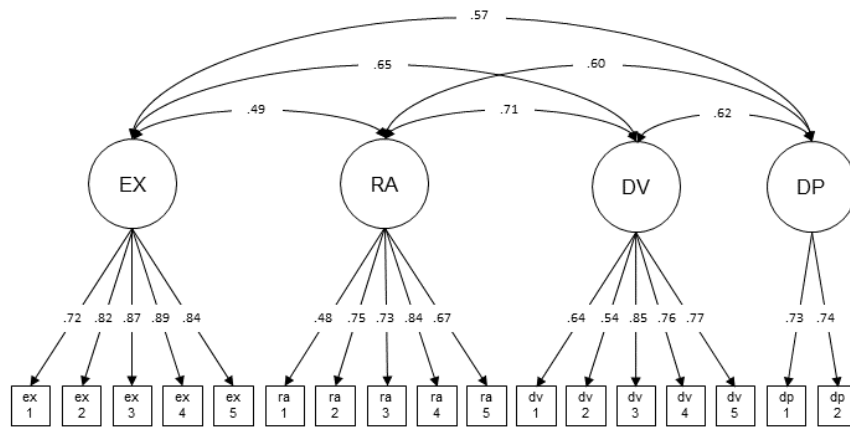


Model A

Figure 4. Graphical summary of the unidimensional model. “ex”, Emotional and physical exhaustion items, “ra” Reduced sense of accomplishment items, “dv”, Sport devaluation items, “dp” Depression items

The first order factor model (model B, see Figure 5), in which ABQ items (ex, ra, dv) were allowed to load on their respective subscale and PHQ items (dp) were allowed to load on the factor depression, showed moderate model fit with RMSEA = 0.103, CFI = 0.924, TLI = 0.908, SRMR = .075, $\chi^2(113) = 1395.792$, $p < .001$.

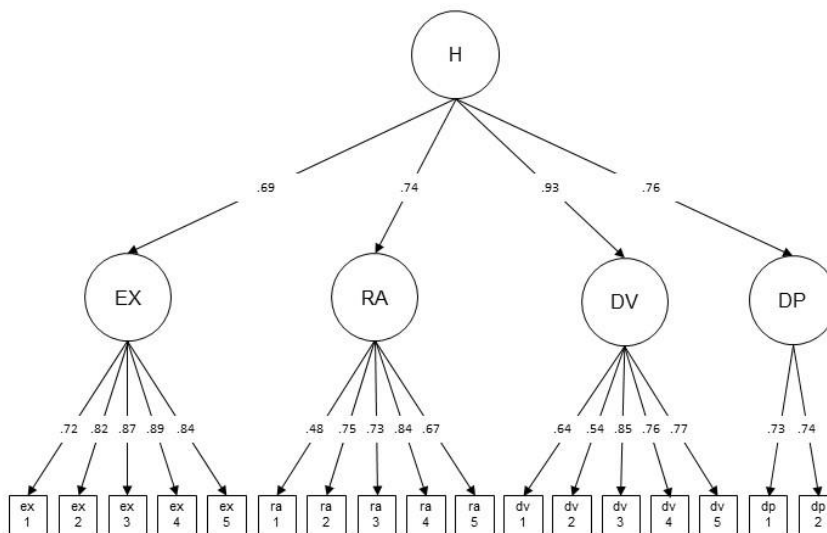
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Model B

Figure 5. Graphical summary of the correlated specific factor model. “EX” Emotional and physical exhaustion factor, “RA” Reduced sense of accomplishment factor, “DV” Sport devaluation factor, “DP” Depression factor

The hierarchical factor model (model C, see Figure 6) with an added second order factor above the subscales showed moderate model fit with RMSEA = 0.101, CFI = 0.926, TLI = 0.912, SRMR = .078, $\chi^2(115) = 1364.150 p < .001$.



Model C

Figure 6. Graphical summary of the higher order model. “EX”, Emotional and physical exhaustion factor, “RA” Reduced sense of accomplishment factor, “DV”, Sport devaluation factor, “DP” Depression factor, “H” higher order factor

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For the bifactor model (model D, see Figure 7), loadings of the two PHQ items (dp) on the specific factor (DP) were constrained to be equal due to identifiability issues. The bifactor factor model showed good model fit with RMSEA = 0.074 [.068; .079], CFI = 0.965, TLI = 0.954, SRMR = .054, $\chi^2(103) = 693.460$, $p < .001$. Additional calculations provided PUC = 0.77, ECV = 0.46 and omegaH = 0.65.

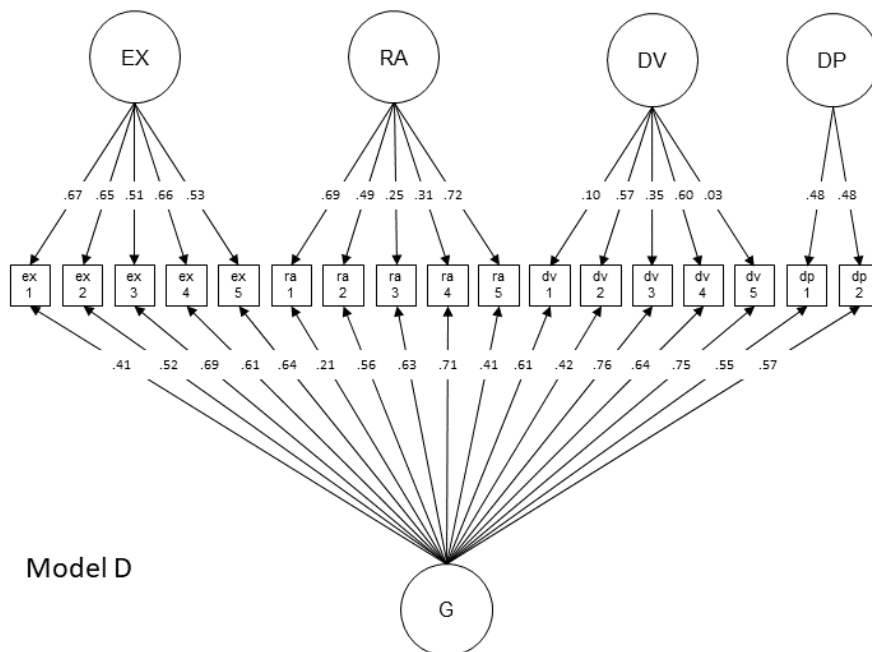


Figure 7. Graphical summary of the bifactor model. “EX”, Emotional and physical exhaustion factor, “RA” Reduced sense of accomplishment factor, “DV”, Sport devaluation factor, “DP” Depression factor

Chi squared tests conducted to compare model fit showed that all models differed significantly (with all $p < .01$), with model D showing the best fit.

Discussion

The present study aims to analyse the conceptual overlap between burnout and depression in a sample of youth elite athletes. We found that the extracted factors associated with the burnout components showed higher correlations with the depression factor than with each other. This study finding parallels with Bianchi and colleagues (2020), which led them to question the meaningfulness of pooling the burnout subfactors together as one syndrome but distinct from

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depression. If the burnout subscales share more variance with depression than with each other, then it should at least be considered as part of a joint syndrome.

Further, results suggest that the subsumption of items into the respective factors helps in explaining the variance in the data as Models B, C and D showed superior fit to Model A. The bifactor model (Model D) showed by far the best model fit, however, it also indicated bias. Thus, it can be concluded that the data show evidence of a common factor. Still, this common factor does not appear to be strong enough to assume conceptual congruence. For the purpose of facilitating model identifiability, it could be helpful to replicate analyses with a more elaborate depression measure. On average, the majority of items still showed considerable loadings on the specific factors. This finding, paired with the poor fit of the unidimensional model, indicates justification for the allocation of items into the subscales and suggests presence of multidimensionality.

Items dv1 and dv5 showed cross-loadings in the EFA. This also shows in the bifactor model because their loadings on the specific DV factor are extremely low (see Figure 7). The data suggest that while the burnout subscales EX and RA seem to be well represented by their respective items, specific items of the DV subscale are mostly indicators of the overall common factor and less so of the specific DV factor. This finding could inspire taking a closer look at the respective items.

Limitations

Our study has several strengths, for example being the first study to assess the question of conceptual overlap in an athlete sample with an athlete specific measure, as well as assessing a sample of only elite performance level in which all study participants were squad members of the youth national team. Nevertheless, as any study, the present study also has a number of limitations:

First, analyses were conducted on the base of self-report instruments. Since mental illness is afflicted with a certain stigma and as mentioned above may be interpreted as weakness and inaptitude, especially within the context of elite sport, responses may be biased due to social desirability.

Second, the depression measure employed is an ultra-brief scale with good enough quality criteria. However, a two-item measure may constitute an issue regarding psychometric properties and thus complicates model fitting. A more detailed instrument may provide more

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refined results. Also, since the issue in question is related to psychometrics, it may be fruitful to repeat this analysis with several measures for (athlete) burnout as well as several measures for depression in order to decipher to what extent they assess the same construct(s).

Third, the burnout and the depression measure differ in elaborateness, but also in specificity. The ABQ specifically concerns emotions and attitudes regarding sport, whereas the PHQ assesses symptoms generally and does not make any reference to sport. This in itself could potentially influence factorial structure and thus factor analytic results should be interpreted with caution. To avoid this issue, one would have to adapt measures and for example create a sport-specific depression scale. However, present theory considers burnout to be context specific and depression more universal. Since measures are built on and represent present theory they should not be adapted contrary to that respective theory.

Fourth, the two measures differ regarding the time frame in focus: The PHQ inquires about symptoms within the past two weeks, whereas the ABQ does not specify a time frame. Since this paper is based on secondary data analysis, we could not adapt the time frame, but would recommend adapting the measures to achieve matching time frames, such as Bianchi et al. (2016).

In addition to these recommendations, further studies should approach the issue of overlap by comparing several burnout and depression measures, because effects of association between the two constructs can be moderated by the type of instrument (meta-analysis by Koutsimani et al., 2019). Also, longitudinal analyses, such as Frank et al. (2017), assessing the temporal association of burnout and depression symptoms, would aid in deciphering the relationship between the two. Alternative approaches could include comparison of qualitative experiences or comparison of (neuro-) physiological correlates.

Finally, our study does not claim to provide answers to whether the two syndromes differ regarding context specificity. In order to progress on this question, future studies would also need to assess stressful life events in- and outside of sport, sport adversity, sport support, sport satisfaction as analogous to job adversity, workplace support, sport satisfaction which are assessed in similar studies with working samples (e.g. Schonfeld & Bianchi, 2016). All in all, our findings suggest that burnout and depression as measured by the ABQ and PHQ-2 may be considered manifestations of a joint syndrome. At the same time, item allocation to subscales can be considered purposeful, since our data also suggest presence of multidimensionality.

Perspective

The overlap between burnout and depression has been researched in several studies outside of the sport context, and some researchers have approached the issue on a factor analytic level (e.g. Bianchi et al., 2020). Our study extends this approach to the context of elite sport. Deciphering this overlap is especially important within elite sport because of a) the normality of high risk behavior that can lead to overlooking symptoms, b) the potential influence of social desirability and stigma may cause underestimation of prevalence and reluctance to help-seeking, c) differences in professional care responsibility (sport psychologist vs. psychotherapist) and treatment.

Our study showed that burnout and depression are associated with each other and do show a common factor. For the practical context, we would advise staff working with athletes to treat burnout as if it were a clinical diagnosis, because it may be masking an underlying depression. We would also advise to screen athletes presenting with burnout symptoms for suicidal ideation because burnout instruments do not include this, even though a high rate of burned out individuals reports suicidal thoughts (Schonfeld & Bianchi, 2016).

References

- Ahola, K., Hakanen, J., Perhoniemi, R., & Mutanen, P. (2014). Relationship between burnout and depressive symptoms: A study using the person-centred approach. *Burnout Research, 1*, 29-37.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Association.
- Armon, G., Shirom, A., & Melamed, S. (2012). The big five personality factors as predictors of changes across time in burnout and its facets. *Journal of personality, 80*, 403-427.
- Bianchi, R., & Schonfeld, I. S. (2018). Burnout-depression overlap: Nomological network examination and factor-analytic approach. *Scandinavian journal of psychology, 59*, 532-539.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2014). Is burnout a depressive disorder? A re-examination with special focus on atypical depression. *International Journal of Stress Management, 21*, 307-324.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2015). Burnout-depression overlap: A review. *Clinical Psychology Review, 36*, 28-41.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2019). Burnout: Moving beyond the status quo. *International Journal of Stress Management, 26*, 36.

STUDY II – CONCEPTUAL OVERLAP OF BURNOUT AND DEPRESSION

- Bianchi, R., Schonfeld, I. S., Vandell, P., & Laurent, E. (2017). On the depressive nature of the “burnout syndrome”: A clarification.
- Bianchi, R., Schonfeld, I. S., & Verkuilen, J. (2020). A five-sample confirmatory factor analytic study of burnout-depression overlap. *Journal of Clinical Psychology*.
- Bianchi, R., Verkuilen, J., Brisson, R., Schonfeld, I. S., & Laurent, E. (2016). Burnout and depression: Label-related stigma, help-seeking, and syndrome overlap. *Psychiatry research*, 245, 91-98.
- Coakley, J. (1992). Burnout among adolescent athletes: A personal failure or social problem? *Sociology of Sport Journal*, 9, 271-285.
- Cole, M. S., Walter, F., Bedeian, A. G., & O’Boyle, E. H. (2012). Job burnout and employee engagement: A meta-analytic examination of construct proliferation. *Journal of management*, 38, 1550-1581.
- De Francisco, C., Arce, C., del Pilar Vílchez, M., & Vales, Á. (2016). Antecedents and consequences of burnout in athletes: Perceived stress and depression. *International journal of clinical and health psychology*, 16, 239-246.
- Diehl, K., Thiel, A., Zipfel, S., Mayer, J., & Schneider, S. (2012). Substance use among elite adolescent athletes: Findings from the GOAL study. *Scandinavian Journal of Medicine and Science in Sports*. doi: 10.1111/j.1600-0838.2012.01472.x
- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological methods*, 4, 272.
- Frank, R., Nixdorf, I., & Beckmann, J. (2017). Analyzing the Relationship Between Burnout and Depression in Junior Elite Athletes. *Journal of Clinical Sport Psychology*, 11, 287-303.
- Freudenberger, H. J. (1974). Staff burn-out. *Journal of Social Issues*, 30, 159-165.
- Gustafsson, H., Hassmén, P., Kenttä, G., & Johansson, M. (2008). A qualitative analysis of burnout in elite Swedish athletes. *Psychology of sport and exercise*, 9, 800-816.
- Gustafsson, H., Madigan, D. J., & Lundkvist, E. (2018). Burnout in athletes *Handbuch Stressregulation und Sport* (pp. 489-504). Berlin, Heidelberg: Springer.
- Hakanen, J. J., & Bakker, A. B. (2017). Born and bred to burn out: A life-course view and reflections on job burnout. *Journal of occupational health psychology*, 22, 354.
- Hakanen, J. J., & Schaufeli, W. B. (2012). Do burnout and work engagement predict depressive symptoms and life satisfaction? A three-wave seven-year prospective study. *Journal of affective disorders*, 141, 415-424.
- Hamann, J., Parchmann, A., Mendel, R., Bühner, M., Reichhart, T., & Kissling, W. (2013). Understanding the term burnout in psychiatry and psychotherapy. *Der Nervenarzt*, 84, 838-843.
- Hankin, B. L., & Abela, J. R. (2005). *Development of psychopathology: A vulnerability-stress perspective*: Sage.
- Hughes, L., & Leavey, G. (2012). Setting the bar: athletes and vulnerability to mental illness. *British Journal of Psychiatry*, 200, 95-96.

STUDY II – CONCEPTUAL OVERLAP OF BURNOUT AND DEPRESSION

- Kaschka, W. P., Korczak, D., & Broich, K. (2011). Burnout: A fashionable diagnosis. *Deutsches Ärzteblatt International*, *108*, 781-787.
- Koutsimani, P., Anthony, M., & Georganta, K. (2019). The relationship between burnout, depression and anxiety: A systematic review and meta-analysis. *Frontiers in psychology*, *10*, 284.
- Löwe, B., Kroenke, K., & Gräfe, K. (2005). Detecting and monitoring depression with a two-item questionnaire (PHQ-2). *Journal of psychosomatic research*, *58*, 163-171.
- Maske, U. E., Riedel-Heller, S. G., Seiffert, I., Jacobi, F., & Hapke, U. (2016). Prevalence and Comorbidity of Self-Reported Diagnosis of Burnout Syndrome in the General Population-Results of the German Health Interview and Examination Survey for Adults (DEGS1). *Psychiatrische Praxis*, *43*, e1-e1.
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, *52*, 397-422.
- Mayer, J., & Thiel, A. (2018). Presenteeism in the elite sports workplace: The willingness to compete hurt among German elite handball and track and field athletes. *International review for the sociology of sport*, *53*, 49-68.
- Nixdorf, I., Beckmann, J., & Nixdorf, R. (2020). Psychological predictors for depression and burnout among German junior elite athletes. *Frontiers of Psychology*, *11*.
- Pines, A. M. (1993). Burnout: An existentialistic perspective. In W. B. Schaufeli, C. Maslach & T. Marek (Eds.), *Professional burnout: Developments in theory and research*: Taylor & Francis.
- Raedeke, T. D., & Smith, A. L. (2001). Development and preliminary validation of an athlete burnout measure. *Journal of Sport & Exercise Psychology*, *23*, 281-306.
- Reardon, C. L., & Factor, R. M. (2010). Sport psychiatry. *Sports Medicine*, *40*, 961-980.
- Schafer, J. L. (1999). Multiple imputation: a primer. *Statistical methods in medical research*, *8*, 3-15.
- Schmidt, G. W., & Stein, G. L. (1991). Sport commitment: A model integrating enjoyment, dropout, and burnout. *Journal Of Sport & Exercise Psychology*, *13*, 254-265.
- Schonfeld, I. S., & Bianchi, R. (2016). Burnout and depression: Two entities or one? *Journal of Clinical Psychology*, *72*, 22-37.
- Schonfeld, I. S., Verkuilen, J., & Bianchi, R. (2019). An exploratory structural equation modeling bi-factor analytic approach to uncovering what burnout, depression, and anxiety scales measure. *Psychological assessment*.
- Smith, R. E. (1986). Towards a cognitive-affective model of athlete burnout. *Journal of Sport Psychology*, *8*, 36-50.
- Thiel, A., Diehl, K., Giel, K. E., Schnell, A., Schubring, A. M., Mayer, J., et al. (2011). The German young olympic athletes' lifestyle and health management study (GOAL study): Design of a mixed-method study. *BMC Public Health*, *11*, 410. doi: 10.1186/1471-2458-11-410
- Thompson, B. (2004). Exploratory and confirmatory factor analysis: Understanding concepts and applications. *Washington, DC*, 10694-10000.

STUDY II – CONCEPTUAL OVERLAP OF BURNOUT AND DEPRESSION

- Van Dam, A., Keijsers, G. P., Eling, P., & Becker, E. S. (2015). Burnout and impaired cognitive performance; review of evidence, underlying processes and future directions. *Handbook on burnout and sleep deprivation: Risk factors, management strategies and impact on performance and behaviour*, 113-128.
- World Health Organization. (2018). International classification of diseases for mortality and morbidity statistics 11th Revision. from <https://icd.who.int/browse11/l-m/en>
- Ziemainz, H., Abu-Omar, K., Raedeke, T., & Krause, K. (2004). Burnout im Sport. Zur Prävalenz von Burnout aus bedingungsbezogener Perspektive. *Leistungssport*, 34, 12-17.

Risk profiles for athlete burnout in adolescent elite athletes - a classification analysis¹⁴

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Abstract

All adolescent elite athletes are subjected to extensive additional stressors compared to their age-mates, but only some show symptoms of athlete burnout (ABO). In this study, we aim to decipher which features characterize adolescent elite athletes with especially high and low ABO symptomatology.

We used data from the GOAL study (“German Young Olympic Athletes' Lifestyle and Health Management Study”) in which 1138 young elite athletes ($M = 16.33$ years, $SD = 1.10$) were assessed regarding ABO symptomatology (via the ABQ) and a number of correlate features. Cross-sectional data were analysed via Classification Tree Analysis in order to identify and characterize groups with extreme levels of ABO symptomatology.

Results indicate different relevant correlates for each of the three symptoms. Comprehensive analyses revealed specific combinations of high and low-risk characteristics. High-risk characteristics included being involved in a technical, endurance, aesthetic or weight-dependent sport, training under an autocratic or laissez-faire coach, high subjective stress outside of sport, a low willingness to make psychological sacrifices, lack of sleep, and being female. Low-risk characteristics included fewer hours of training, low social pressure, low subjective stress outside of sport, a high willingness to make psychological sacrifices, and a high health satisfaction.

Our results provide a necessary base for future hypothesis-testing studies in the field of adolescent ABO, as well as important insights for practitioners in the field, which can aid to create a base for optimal athletic performance.

Abbreviations

ABO = athlete burnout

Burnout-EXH = Burnout symptom ‘physical and emotional exhaustion’

Burnout-RA = Burnout symptom ‘reduced sense of accomplishment’

Burnout-DEV = Burnout symptom ‘sport devaluation’

Introduction

A career as an elite athlete is extremely demanding, with constant pressure of performance, competition and high expectations as inherent features of elite sport. Still, sometimes the demands imposed on an athlete can exceed his or her resources for coping. In turn, this imbalance threatens their mental and emotional well-being which can lead to chronic stress and even burnout (Maslach & Leiter, 2000).

For adolescents, the involvement in elite sports is especially challenging (Brettschneider, 1999; Teubert, Cachay, Borggreffe, & Thiel, 2006). At this age, pursuing school is usually their only obligation, but the requirements of elite sport add to the challenges of adolescence itself, creating additional strain for young elite athletes. Since it has been suggested that high stress levels and burnout symptoms foster early dropout of elite sport (Isoard-Gautheur, Guillet-Descas, & Gustafsson, 2016), sport-psychological researchers and practitioners recognize the need to elicit which athletes are at risk of athlete burnout and which conditions or dispositions make them susceptible.

Burnout vs. Depression

Due to substantial proximity to and overlap with depression, the concept of burnout is discussed controversially within the scientific community (e.g., Ahola, Hakanen, Perhoniemi, & Mutanen, 2014; Bianchi, Schonfeld, & Laurent, 2015; Brenninkmeyer, Van Yperen, & Buunk, 2001). However, as this is not the focus of the present study, we will not discuss this issue in detail. While symptoms of depression are rather general features of the individual's emotional state, burnout symptoms refer to the individual's level of functionality within a specific context – which in general burnout research is mostly job-related (Maslach, Schaufeli, & Leiter, 2001). For elite athletes, the specific context of functionality is elite sport. Here, functionality means being physically, mentally and emotionally capable to train and successfully compete under high pressure. For an athlete with burnout symptoms this functionality is inclined to be severely restricted (Gould & Dieffenbach, 2002).

Athlete Burnout

Since the environment of elite athletes is very distinct from other work contexts, Maslach's definition of general burnout has been adapted to fit the sports context (Raedeke, 1997). According to this definition, athlete burnout (ABO) is characterized by three key symptoms: (a) Physical and emotional exhaustion (Burnout-EXH) describes a feeling of depletion of one's

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physical and emotional resources. (b) A reduced sense of accomplishment (Burnout-RA) is characterized by a decreased striving for athletic performance and (c) sport devaluation (Burnout-DEV) comprises a loss of interest and questioning the meaning of (elite) sport. There is relative agreement that Burnout-EXH represents the core symptom of (athlete) burnout (Gustafsson, Kenttä, & Hassmen, 2011; Schaufeli & Buunk, 2003). Still, it has been shown that especially athletes with high scores of Burnout-RA and Burnout-DEV have a higher likelihood of dropping out of elite sport, as compared to athletes with only high Burnout-EXH scores (Isoard-Gauthier et al., 2016). Therefore, a definition including all three symptoms - as is most commonly used in recent ABO research - is necessary in order to characterize ABO as a multidimensional syndrome.

Even though the term ‘burnout’ suggests a final stage in which chronic stress has led to being completely ‘burned out’ with impaired functionality, this categorical conceptualization of burnout syndrome is rather uncommon among researchers today. Instead, a dimensional conceptualization, in which burnout is viewed as a process with the symptoms measured on a continuum, has been adopted (Cherniss, 1980) and is now employed more frequently (Schaufeli & Buunk, 2003).

It has been suggested that only individuals who are highly motivated (‘being on fire’) are at risk of burnout (Pines, 1993). Following this argumentation, athletes represent a risk group for developing burnout because high motivation, commitment and a high willingness to make sacrifices for the sport are key components of becoming a successful athlete (Durand-Bush, Salmela, & Green-Demers, 2001). Adolescent elite athletes represent an especially vulnerable subgroup due to their developmental stage. During this phase, in which important processes of identity and personality development as well as essential physical changes take place, adolescents are particularly impressionable causing them to be more fragile compared to adult athletes with higher psycho-socio-emotional maturity (Lupien, McEwen, Gunnar, & Heim, 2009). In order to decipher the mechanisms of ABO development and characteristics that foster or prevent burnout symptomatology, it is vital to assess athletes at a young age.

To date, there are no recognized thresholds for the explicit diagnosis of ABO. Hence, there is no theoretical base for a binary classification into healthy and burned-out individuals and thus determining prevalence is difficult. Nevertheless, to be able to divide samples into so-called ‘high’ and ‘low burners’, some researchers have created cut-offs (cf. Curran, Appleton, Hill, & Hall, 2011; Hodge, Lonsdale, & Ng, 2008; Raedeke, 1997). Others employed tertials of a population-based sample (Maslach, Jackson, & Leiter, 1996) for comparison, which suggest

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a prevalence of adolescent athletes experiencing high levels of burnout symptomatology (i.e. athletes with all three symptom scores in the highest tertial) of about 1 to 9 % (Gustafsson, Kenttä, Hassmen, & Lundqvist, 2007). However, all of these procedures should be treated with caution as they have no sufficient theoretical base and no clinical value.

Undoubtedly, discussing the issue of ABO is valid. But regardless of the applied instrument and procedure, it becomes apparent that some athletes develop higher ABO symptoms than others, even though they all face the high demands of elite sport. When consulting general burnout research on this issue, burnout is considered to occur when the present demands exceed the available resources of an individual (Maslach & Leiter, 2000). Thus, a closer look at the ratio of demands and resources is recommended.

Athlete burnout as a function of demands and resources

Demands on young elite athletes are extremely high. On top of academic demands adolescent elite athletes are facing 700 to 800 hours of training annually, constant performance pressure and competitions (Gustafsson, Hassmen, & Hassmen, 2011). Therefore, it is not surprising that adolescent elite athletes also have higher overall stress levels than their non-athlete counterparts (Hoffmann, Sallen, Albert, & Richartz, 2012). More so, the developmental phase of adolescence constitutes challenge (Coleman, 2011) and thus a demand in itself. In addition to substantial physical changes, major personality development takes place during those formative years. On a psychosocial level adolescents have to navigate so-called ‘normative developmental tasks of adolescence’ (cf., Havighurst, 1956), including detachment from the parents, identity building, and the development of personal values and beliefs. For adolescent elite athletes, the subculture of elite sport presents them with additional demands in form of sport-related developmental tasks (Ohlert & Kleinert, 2014), such as optimizing one’s athletic performance or coping with high expectations, pressure, and failure (Ohlert, 2013). In order to fulfil these tasks, young athletes need positive social support. Parents, coaches, and other staff have a wide influence on the social climate of a young athlete which contributes considerably to the athlete’s psycho-social development and development of a positive self-concept (Tamminen, Holt, & Crocker, 2012).

The above-mentioned challenges and their connection to ABO have been assessed in detail by various studies (see Table 1). However, it is important to note that most of these studies have focused on single or few ABO-correlates (e.g. perfectionism) and to date, a lack of a more comprehensive assessment of ABO-correlates remains. Years of burnout research have indicated that the genesis of burnout is complex and involves a variety of external demands and

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resources (e.g. environmental, structural, and social factors) as well as internal demands and resources, which are mostly defined by psychological variables (e.g. passion).

Table 1.

Aspects that have been linked to ABO in previous research with respective research examples.

External demands and resources	
Aspects of training and competition	
<i>Type of sport</i>	(Dubuc-Charbonneau, Durand-Bush, & Forneris, 2014; Kenttä, Hassmen, & Raglin, 2001)
<i>Time of socialization in elite sports</i>	(Coakley, 1992)
<i>Hours of training</i>	(Gould & Dieffenbach, 2002; Kenttä et al., 2001)
<i>Aspects of recovery</i>	(Kallus & Kellmann, 2000; Kenttä & Hassmen, 1998)
Social aspects	
<i>Social pressure</i>	(Gould, Udry, Tuffey, & Loehr, 1997; Ommundsen, Roberts, Lemyre, & Miller, 2006)
<i>Social support</i>	(Krippel & Ziemainz, 2010; Ommundsen et al., 2006)
<i>Coach's style of leadership</i>	(Harris & Ostrow, 2008; Isoard-Gauthier, Guillet-Descas, & Lemyre, 2012)
Internal demands and resources	
Psychological aspects	
<i>Perceived stress</i>	(Kenttä et al., 2001; Raedeke & Smith, 2004)
<i>Perfectionism</i>	(Hill & Curran, 2016)
<i>Passion</i>	(Curran et al., 2011; Gustafsson, Hassmen, et al., 2011)
<i>Optimism</i>	(Gustafsson & Skoog, 2012)
Health aspects	
<i>Depressive symptoms</i>	(Bianchi et al., 2015)
<i>Sleeping pattern</i>	(Krippel & Ziemainz, 2010)
<i>Biography of injury</i>	(Cresswell & Eklund, 2006b)
<i>Health perception and –satisfaction</i>	(Krippel & Ziemainz, 2010)
Demographic aspects	
<i>Gender</i>	(Heidari, 2013; A. L. Smith, Gustafsson, & Hassmen, 2010)
<i>Age</i>	(Harris & Watson, 2011)

In terms of theoretical underpinnings, recent ABO research has mostly been aligned with frameworks, such as Deci and Ryan's (2008) self-determination theory (Lemyre, Treasure, & Roberts, 2006; Li, Wang, & Kee, 2013), or cognitive-affective models of stress and burnout (e.g. Gould & Dieffenbach, 2002; R. E. Smith, 1986). However, general burnout research considers an imbalance of the demands an individual is confronted with and their available resources as the source of burnout. This imbalance can then lead to a state of overload and exhaustion (Maslach & Leiter, 2000). Against this background, the *demand resource model* by

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Peter Becker (2003) offers an ideal theoretical underpinning for our study. The core idea of this model is that an individual's state of health depends on the ability to handle external and internal demands with the means of external and internal resources. Here, 'external' means any demands and resources that stem from the individual's environment or given structural factors, while 'internal' includes any demands and resources that originate from within the individual, their beliefs and personality features. The demand resource model provides an ideal fit for our study rationale for the following four reasons: Firstly and as illustrated in Figure 1, all of the correlates from previous ABO research (cf. Tab. 1) can be integrated into this model. Secondly, the model incorporates both external and internal factors, as is important in the genesis of ABO. Thirdly, the model allows for possible interactions between said factors, which general burnout research has deemed important (cf. Maslach & Leiter, 2000). Fourthly, the model's outcome variable is the individual's state of health, which in our study relates specifically to ABO symptomatology.

Study approach

Recent ABO research has gathered valuable information regarding the conceptualization of ABO itself (see reviews by Cresswell & Eklund, 2006a; Eklund & DeFreese, 2015) as well as identified antecedents, risk factors, and consequences of ABO (e.g. review by Gustafsson, Kenttä, et al., 2011). Nevertheless, certain research desiderates remain.

Firstly, the vagueness of diagnostic criteria impedes identifying individuals with ABO. Due to its conceptualization as a process, many researchers have refrained from defining explicit cut-off points for ABO diagnosis. Nevertheless, despite a lack of a theoretical base, some researchers have applied cut-off values (Curran et al., 2011; Hodge et al., 2008). Secondly, elite sports systems including opportunities, resources, and funding vary between nations. Thus, it is important to assess ABO nation-specifically, which for the German elite sport is still in its infancy.

Thirdly, and most importantly for our project, many studies in the field are selective when assessing ABO correlates and often consider only single factors (e.g. perfectionism, Hill, Hall, & Appleton, 2010) and neglect to assess interactions of influencing factors of ABO (see review by Goodger, Gorely, Lavalley, & Harwood, 2007). While a selective approach offers in-depth information on the respective correlate in focus, it also disregards the complexity of the concept of ABO and the variety of correlates. This third desiderate is especially meaningful as it fails to take into account general burnout research which clearly states that burnout is the product of an interaction of contextual and personal factors (Maslach & Leiter, 2000).

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In the present study, we aim to address these research desiderates constructively. To avoid relying on cut-off scores, we chose to focus on the two extreme groups, those with the highest and those with the lowest burnout symptomatology. Since large samples are needed to reach meaningful results, we assessed a sample of 1138 German adolescent elite athletes. Moreover, in terms of the number of correlates included while incorporating possible interactions between the respective correlates, we aim to take a more comprehensive approach to the topic of ABO in adolescent elite athletes than many previous studies. Following previous research, all of the correlates included could show significant associations with ABO. However, as we are analyzing extreme groups, we are not testing each of the correlates for its relationship with ABO symptomatology. Instead, we concentrate on the profile characteristics that the athletes with the most extreme (highest or lowest) ABO symptomatology levels have in common, creating a high (or low) risk cluster profile. Therefore we do not propose hypotheses and the present study remains exploratory in nature. Only by deciphering the demand and resource features relevant to ABO and the interactions between those features, we can provide a base for future hypothesis-testing studies and a knowledge base for athletes, coaches, parents, staff, and elite sport associations.

With regards to a recent review (Gustafsson, DeFreese, & Madigan, 2017), which called for studies determining distinct ‘burnout profiles’ using a person-centered approach, in our study, we focus on identifying the factors that best characterize and differentiate a sample of athletes regarding burnout symptomatology. More specifically, by comparing contrast groups we want to assess (I) which context and personal factors indicate especially high or low susceptibility to athlete burnout? Further, we want to determine (II) whether we can identify risk feature combinations that heighten the risk for athlete burnout?

Method

Participants and Recruitment Procedure

Subjects were adolescent athletes ($N = 1138$, 500 female) with a mean age of 16.33 years ($SD = 1.10$) who were all part of the national youth squad within their sport. Athletes of all Olympic disciplines (related to the Summer Olympics 2012 and Winter Olympics 2010) were included in this study in order to obtain a comprehensive overview of German elite athletes. Data were collected between February 2010 and January 2011 as a part of the research project “The German Young Olympic Athlete’s Lifestyle and Health Management Study” (GOAL) funded by the Federal Institute of Sports Science. Questionnaires were sent out via direct mail,

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centralized distribution or at centralized squad practices. Our sample comprises 62 % of the adolescent elite athletes born between 1992 and 1995 (Thiel et al., 2011). An analysis of responders and non-responders regarding age and gender showed no significant differences (Diehl, Thiel, Zipfel, Mayer, & Schneider, 2012). This study was approved by the ethics commission of the Faculty of Medicine at the University of Tübingen under the signature 222/2009BO1.

Measures

Athlete burnout. Recent studies on burnout in elite athletes have mostly employed the „Athlete Burnout Questionnaire“ (ABQ by Raedeke & Smith, 2001). We utilized its validated German version (ABQ-D by Ziemainz, Abu-Omar, Raedeke, & Krause, 2004). This 15-item-questionnaire is adapted to the sports environment and is based on the three key symptom dimensions: Physical and emotional exhaustion, reduced sense of accomplishment, and sport devaluation. Items were answered on a 5-point rating scale ranging from 1 = “almost never” to 5 = “almost always”. The measure was adapted to the sports context utilizing a number of items from the Maslach Burnout Inventory (Maslach et al., 1996). The authors advised that the three subscales should be measured individually as this would be more precise, and not be combined to an overall burnout score as this would not add value. The ABQ has shown good reliability and validity in a range of athlete populations (Raedeke & Smith, 2009) and also for youth athletes (Sharp, Woodcock, Holland, Duda, & Cumming, 2010). Analyses of the ABQ-D also reached satisfying reliability and validity (Ziemainz et al., 2004).

Correlates included in the analysis. As we aimed to obtain a comprehensive view on the relevant correlates of adolescent ABO, we included most of the factors that previous research identified as important in the genesis of ABO (cf. Table 1) as well as sociodemographic characteristics. These variables were obtained through parts of a 24 page composite questionnaire consisting of a total of 85 questions covering a wide range of health-related topics (see Table 2, for details see Thiel et al., 2011).

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Table 2.

Overview of the variables that were included in the analysis as independent variables.

Variables	Explanation / Example item
Aspects of training and competition	
Type of sport	Categorization adapted from Sungot-Borgen & Torstveit (2004)
Time of socialization in elite sports	Time since squad nomination
Level of competition / squad level	National squad level: A, B, C or D/C
Hours of training	Hours of training per week
Days of competition	Days of competition per season
Aspects of recovery	Frequency of regenerative measures (e.g. massage, relaxation exercise, sauna, ice bath, regenerative gymnastics or regenerative endurance training)
Social aspects	
Social pressure	e.g. "When I mention being in pain, my social environment reacts with reproach."
Main social contact	Main social contact within (e.g. coach) or outside sport (e.g. friends outside sport)
Coach behavior	Style of leadership (autocratic, laissez-faire or democratic)
Relatives involved in elite sport	Any relatives involved in elite sport
Aspects of hyperinclusion	e.g. "Life without sport is pointless." (agree/disagree 5-point-scale)
Psychological aspects	
Perceived stress outside of sport	Perceived stress related to school, family & friends outside of sport
Perfectionistic striving	e.g. "I should either do everything perfectly or not at all." (never/very often 5-point-scale)
Willingness to make psychosocial sacrifices	e.g. "Due to my sport I have no time left for friends and family." (agree/disagree 5-point-scale)
Willingness to make physical sacrifices	e.g. "I am prepared to endure chronic pain in order to succeed in my sport." (agree/disagree 5-point-scale)
Willingness to play hurt	e.g. "I am good at ignoring great pain during competition." (agree/disagree 5-point-scale)
Health-related carefreeness	e.g. "I am not worried about my health." (agree/disagree 5-point-scale)
Health aspects	
Depressive symptoms	PHQ-4, Depression screening within the Patient Health Questionnaire
Hours of sleep	Frequency per week of less than 6 hours of sleep
Biography of injury	Sick days per season (training & competition)
Health perception and satisfaction	Absolute and relative subjective health appraisal & satisfaction
Demographic aspects	
Gender	
Age	
Mother tongue	
Type of school	German school system is divided into different types of schools with increasing academic level

Statistical Analyses¹⁵

Data analyses were carried out using the statistic software IBM SPSS Statistics 23. We chose to analyze the data via classification tree analysis (CTA). This approach is person-centered as it enables the identification of “groups of individuals who share particular attributes or relations among attributes” (Laursen & Hoff, 2006). CTA has been recommended by several researchers (Alkhasawneh, Ngah, Tay, Mat Isa, & Al-Batah, 2014; Chen, Shih, Lin, Chen, & Lin, 2012; Lemon, Roy, Clark, Friedmann, & Rakowski, 2003) as it represents an appropriate statistical tool which “allows for exploratory identification of contrast groups” (Mayer & Thiel, 2014) based on potential determinants. Furthermore it holds the advantages of detecting interactions between the potential determinants and illustrating their level of impact in a hierarchical tree model (Bühl, 2012; Camp & Slattery, 2002).

We chose to apply the Exhaustive CHAID algorithm ('Exhaustive Chi-squared Automatic Interaction Detector', Camp & Slattery, 2002), as it is more appropriate for our purposes than the CHAID algorithm, which does not always form ideal categories of the predictor because the categorization process is suspended as soon as all identified categories differ significantly from each other (Camp & Slattery, 2002).

As specific ‘stopping rules’ for the analysis, we set the level of significance for the splitting of nodes and the merging of categories at .05. The depth was set at 3 and the minimum amount of cases in parent nodes was set at 100 and at 50 for child nodes. Reliability measures were calculated using the risk estimate of misclassification (variance within the nodes). The quality of a tree model was calculated via the explained variance of the tree (variance between the nodes).

Results

We conducted classification tree analyses with three different dependent variables, one for each symptom of athlete burnout (Burnout-EXH, Burnout-RA and Burnout-DEV). The results reported here relate to the extreme groups (highest and lowest ABO symptomatology) as determined by each CTA and as described below in more detail.

¹⁵ Data from the GOAL-study were analysed regarding various health aspects and included a preliminary analysis of burnout symptoms: These analyses were included in the PhD thesis of A. Schnell.

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Contrast groups for Burnout-EXH (see Figure 2)

The trees have to be read from top to bottom. The root node includes the whole sample. On the first level, the algorithm identifies the independent variable (subjective stress outside of sport) that best splits the sample into groups regarding the respective dependent variable (Burnout-EXH). It chooses one specific independent variable that forms groups with greatest possible homogeneity within, and greatest possible heterogeneity between each group regarding the dependent variable (Burnout-EXH). This procedure is repeated until the stopping rules - as mentioned in chapter 2.3 - apply. For each node the mean indicates the group mean of the dependent variable. The cut-points for each independent variable are indicated above each node. This method produces a certain number of final nodes (14 final nodes). Here, we discuss only the final nodes with the highest and the lowest group mean (node 16 and node 6) regarding the dependent variable (Burnout-EXH).

High-risk group - node 16: The highest symptoms of Burnout-EXH are found in athletes who feel the highest amount of stress outside of sport (node 5) when also being involved in technical, aesthetic, weight-dependent or endurance sport (node: 16; $M = 3.13$, $SD = 0.87$).

Low-risk group - node 6: Athletes with lowest amount of stress outside of sport (node 1) report the lowest symptoms of Burnout-EXH when training equal or less than 10 hours per week (node 6; $M = 1.47$, $SD = 0.44$).

Contrast groups for Burnout-RA (see Figure 3)

Following the same procedure, CTA reveals 10 final nodes for Burnout-RA. Node 10 makes up the high-risk group for Burnout-RA. This node includes athletes who have a high expectancy of negative reaction when communicating pain (node 3) and are female (node 10: $M = 2.40$, $SD = 0.65$). The low-risk group for Burnout-RA is represented in node 13. This group incorporates athletes with no fear of getting negative reactions to communication of pain (node 1) then reach the lowest results regarding Burnout-RA when feeling satisfied with their state of health (node 6) and report low levels of stress outside of sport (node 13: $M = 1.68$, $SD = 0.50$).

Contrast groups for Burnout-DEV (see Figure 4)

For Burnout-DEV, CTA reveals 12 final nodes. Node 11 represents the high-risk group for Burnout-DEV. This node includes athletes with a relatively weak willingness to accept psychosocial risks (node 2) who also train under an autocratic or laissez-faire coach (node 5) and sleep less than six hours per night (node 11: $M = 2.28$, $SD = 0.77$). The low-risk group for

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Burnout-DEV is represented in node 14. This group incorporates athletes who are willing to risk their own psychosocial health to a high but not extreme extent (node 3) and who are not expecting negative reaction to communication of pain (node 7) combined with relatively low levels of stress outside of sport (node 14: $M = 1.35$, $SD = 0.38$).

Quality of the statistical model

The explained variance of the model, or variance between the nodes, was 22.6 % for Burnout-EXH, 13.2 % for Burnout-RA, and 18.8 % for Burnout-DEV respectively.

The risk estimate for misclassification for Burnout-EXH was equal to .523 ($SE = .022$) and a 10-fold cross-validation yielded a risk estimate equal to .616 ($SE = .027$). For Burnout-RA the risk estimate for misclassification was .341 ($SE = .016$) and a 10-fold cross-validation gave a risk estimate equal to .367 ($SE = .018$). For Burnout-DEV the risk estimate for misclassification was .333 ($SE = .018$) and a 10-fold cross-validation resulted in a risk estimate equal to .377 ($SE = .020$).

Integration within the theoretical model

The variables produced by our analysis can be placed within Becker's demand resource model (see Table 3). This model includes four types of influence factors: External demands are structural demands, which are determined by an external system or person (e.g. the hours of training set by the coach, academic demands or expectations of the family). Internal demands are mostly based on individual (psychological) needs and internalized norms and values, such as perfectionism, needs satisfaction or individual expectations. External resources are structural resources, such as social support or financial stability. And internal resources include action beliefs, attitudes to life and advantageous personality facets (e.g. optimism, high perceived self-efficacy) (Becker, Schulz, & Schlotz, 2004). While some variables can be allocated easily, it is important to note that some variables can be interpreted in two ways, as either internal or external. This ambiguity is due to the fact that for some variables (e.g. sleeping pattern), it is not possible to determine whether its manifestation (here < or > than 6 hours) is based on the athletes' environment (e.g. time-wise strain, full schedule) or internal processes (e.g. inner unrest or rumination). In addition, there are some variables which rather constitute a reduced demand than a favourable resource (e.g. low subjective stress outside of sport), while others rather represent an adverse resource than an unfavourable demand (e.g. lower willingness to make psycho-social sacrifices).

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Table 3.

Overview of the correlates relevant in characterizing the extreme groups, separately for each ABO symptom and classified according to the demand resource model (demand/ resource x internal/external).

	demand		resource	
	internal	external	internal	external
Physical and emotional exhaustion				
- High subjective stress outside of sport	(x)	(x)		
- Type of sport		x		
- Low subjective stress outside of sport	(x) red.	(x) red.		
- Less hours of training		x red.		
Reduced sense of accomplishment				
- High expectancy of negative reaction to pain communication		x		
- Female gender	(x)	(x)		
- Low expectancy of negative reaction to pain communication				x
- High individual health satisfaction			x	
- Low subjective stress outside of sport	(x) red.	(x) red.		
Sport devaluation				
- Lower willingness to make psycho-social sacrifices			x adv.	
- Autocratic or laissez-faire coach		x		
- Less hours of sleep	(x)	(x)		
- Higher willingness to make psycho-social sacrifices			x	
- Low expectancy of negative reaction to pain communication				x
- Low subjective stress outside of sport	(x) red.	(x) red.		

Note. ‘x red.’ indicates that the respective correlate constitutes a reduced demand rather than a (positive) resource. ‘x adv.’ indicates that the respective correlate constitutes an adverse (or unfavourable) resource ‘(x)’ indicates that the respective correlate is ambiguous and cannot be classified as strictly external or internal.

Discussion

Our assessment of a wide range of ABO correlates amounted to nine variables, which appear relevant in characterizing those athletes with the highest and lowest burnout symptomatology, respectively. With regards to Becker’s demand resource model, we found confirmation of the assumption in general burnout research that the interactions between demands and resources play a key role in the genesis of ABO (Maslach & Leiter, 2000). More precisely, our statistical approach allowed us to identify especially risky and protective feature combinations. These feature combinations showed that mostly both feature types, demands and resources, interacted

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to characterize the extreme groups of ABO symptomatology (see Table 3). Moreover, it is especially interesting that the associated features and feature combinations vary for each of the three symptoms of ABO, which endorses the procedure of analysing the three symptoms separately.

In the following, the nine variables, that were identified as relevant in characterizing those athletes with the highest and those with the lowest ABO symptomatology, will be discussed separately for each of the three symptoms. In order to avoid reiteration, those variables that are relevant to more than one symptom will only be discussed once.

Burnout-EXH

Our finding, that the highest levels of Burnout-EXH are experienced by athletes with a high level of subjective stress outside of sport, who are also involved in either a technical, endurance, aesthetic, or weight-dependent sport (as opposed to ball games, power sports, antigravitation), underlines the importance of compatibility of sport-related and non-sport-related structures.

A high level of subjective stress outside of sport constitutes a demand for young athletes, but is a composite characteristic of both external and internal demands. Externally, the level of subjective stress outside of sport depends on the objective non-sport-related demands that an athlete is facing (e.g. academic requirements, expectations from social environment). Internally, the athlete's perception and appraisal of these non-sport-related demands contribute to his or her level of subjective stress. This finding is not surprising since any strain outside of sport automatically constitutes an additional burden on top of the demands of elite sport itself (cf. Gustafsson & Skoog, 2012). For adolescent athletes, stress outside of sport is often related to school requirements, such as maintaining certain grades or social expectations, like spending time with friends and family.

The finding, that being involved in an *either technical, endurance, aesthetic or weight-dependent sport* constitutes an external demand, is novel: Previous research has mostly focussed on comparing burnout levels of individual versus team sport athletes, with inconclusive results. Some studies found individual sport athletes showing a higher incidence of burnout than team sport athletes (Kenttä et al., 2001), others found no differences between the two groups (Gustafsson et al., 2007). Comparisons between individual and team sport athletes may, however, be problematic as for example shot-putters and figure-skaters are both involved in individual sports but their specific sport and training environments and characteristics do not show a lot of resemblance. Thus, for our study we refined categories

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based on the division of Sundgot-Borgen and Torstveit (2004). Within this classification, disciplines are categorised into six different types of sport, which share similar physical demands.

Our finding, that the lowest scores of Burnout-EXH are experienced by athletes with a low level of subjective stress outside of sport, who also train equal to or less than 10 hours per week, is mostly in line with previous research.

It seems reasonable that a *lower level of non-sport-related stress* is associated with lower ABO (cf. Gustafsson & Skoog, 2012). However, it remains unclear whether the respective athletes experience low subjective stress outside of sport because they objectively have fewer non-sport-related demands or whether it is due to efficient coping strategies. This uncertainty also suggests two possible placements within our theoretical model: In the first case low non-sport-related stress can be classified as an external reduced demand while in the second case it is influenced by an internal resource, namely coping .

The *extent of training* is seemingly one of the most obvious correlates with respect to stress and burnout. However, contrary to previous studies (e.g. Krippel & Ziemainz, 2010), our results do not explicitly show that extensive hours of training are associated with heightened burnout symptoms. Instead, training less than or equal to ten hours per week constitutes an external reduced demand and thus, is associated with lower ABO symptomatology. Since each training session represents physical and cognitive demands (Pelka & Kellmann, 2017) and fewer hours of training generally mean less time-wise strain for the athlete, fewer hours of training can likely protect against exhaustion. Nevertheless, in elite sport it is a common challenge to have to adapt the training load to a level that increases performance but does not exceed an athlete's exercise tolerance and endangers them in terms of overtraining and exhaustion (Naughton, Farpour-Lambert, Carlson, Bradney, & Van Praagh, 2000). As these tolerance levels are the product of a highly complex interaction of physical, mental and social factors and as such are distinct for every athlete, determining the appropriate amount of training requires coaches to be in close communication with their athletes and sensitive to this balancing act (Schubring, Bub, & Thiel, 2015).

Burnout-RA

Our finding that the highest levels of Burnout-RA are experienced by female athletes who expect negative reactions from their social environment when they communicate pain, partially parallels with previous research.

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When athletes expect negative reactions from their social environment (e.g. coach, parents, peers) when they are injured or experiencing pain, this constitutes an external demand in the form of added *social pressure*. More specifically, the high level of functionality, commitment, and endurance that are expected within the elite sports system, can lead to the impression that injuries are a natural part of elite sport and that admitting to pain or suffering from an injury is considered a weakness (Malcolm, 2006). Consequently, it is intelligible that this inherent fear causes additional stress and hence fosters burnout symptomatology. Further, the coach-athlete relationship is hierarchy-based, because the coach is not only older and possesses more experience and a higher social status, he or she also has a considerable amount of decision power over the entrusted adolescent athlete (Cassidy, Jones, & Potrac, 2009). This power dynamic is very likely to obstruct a trust-based communication between adolescent athletes and their coach. The athlete has to constantly prove him- or herself to their coach in order to be nominated or promoted, which may lead to them hiding any pain or injury.

The finding that *female* adolescent elite athletes show higher scores of burnout symptomatology reflects suggestions of other studies (e.g. Heidari, 2013), but overall research on the existence of gender differences in ABO is ambiguous (A. L. Smith et al., 2010). Our results may be attributed to the fact, that female elite athletes are likely to perceive physical changes during puberty as extremely negative (Schubring, 2014), because the resulting poorer load-power-ratio often (temporarily) decreases their performance (Malina, 2002). The physical changes during puberty are generally perceived as stressful for any adolescent (Coleman, 2011). But within the elite sport, the body plays a uniquely central role related to the athlete's functionality. This focus far exceeds the usual awkwardness and pressure to achieve certain body ideals. Instead, in elite sport the body composition largely determines the athlete's performance potential and therefore their perceived worth in the sports environment.

The finding, that the lowest levels of Burnout-RA are displayed by athletes, who expect few or no negative reactions from their social environment when communicating pain, who are satisfied with their own health, and who experience low non-sport-related stress, underlines the importance of resources.

The social environment of adolescent elite athletes is vital to their performance and well-being and therefore, the level of support plays an important role with regards to ABO. The way the social environment of a young athlete is *responding to injury or pain* is an indicator of the

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level of social support. When athletes are not afraid to communicate pain - because they do not expect their social environment to respond negatively - this can work as an external resource.

Our result that a *high health satisfaction* represents an internal resource, can be attributed to the fact that health is an essential requirement in elite sport. A good state (or perception) of the athlete's own health equals his or her sufficient level of functionality. Also, previous research established that athletes with a high subjective performance ability show lower burnout symptomatology (Lemyre, Hall, & Roberts, 2008).

Burnout-DEV

Our finding that the highest scores of Burnout-DEV are experienced by athletes with a low willingness to make psycho-social sacrifices, who also train under an either autocratic or laissez-faire coach, and who also frequently sleep less than six hours per night, emphasizes the importance of acknowledging both internal and external features. An athlete's *willingness to make psycho-social sacrifices* appears to be an important psychological feature in the context of ABO. Athletes, who are not willing to put up with the extensive psychological and psycho-social strains inherent to elite sport, may suffer additional stress because they repeatedly dispute, whether their commitment is worth the sacrifices. Therefore, a low willingness to make psycho-social sacrifices represents an internal adverse resource.

The *coach* is usually one of the most important persons of reference for an adolescent athlete and also strongly shapes the training atmosphere. Parallel to the findings of Harris and Ostrow (2008), our results show that training under an autocratic coach, who strictly enforces his or her own decisions and is not prepared to compromise, is associated with heightened ABO levels. This finding can be linked to the basic need for autonomy and individual control (Coakley, 1992; Hodge et al., 2008), which may be restricted under an autocratic coach (Brinton, Hill, & Ward, 2017). Our results also showed the same association for training under a laissez-faire coach, who generally provides only few or no rules and structure and tends to overindulge the athlete. Previous literature on the effects of laissez-faire coaching is scarce, but laissez-faire parenting has been associated with negative effects on adolescent behaviour, performance, and health (Santrock, 2004). Hence, our results relate to previous research and show that training under an autocratic or laissez-faire coach, as compared to training under a democratic coach, who includes the athlete in the decision-making process and values his or her opinions, poses an external demand.

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Sleep is one of the most important parts of recovery and is especially vital for adolescent athletes in their specific developmental phase. Athletes need healthy sleeping patterns to be able to meet the requirements of elite sport while remaining mentally healthy. Therefore, it is not surprising that frequently getting less than six hours of sleep per night constitutes an additional demand. Previous research was able to connect a lack of sleep in athletes with decreasing enthusiasm for their sport (Krippel & Ziemainz, 2010). Still, due to the cross-sectional design it is not possible to determine the direction of effect. Thus, we cannot say whether a lack of sleep leads to increased burnout symptoms or whether stress and overload give rise to disordered sleeping patterns and sleep deprivation.

Our finding that the lowest levels of Burnout-DEV are displayed by athletes with a high willingness to make psycho-social sacrifices, who have a supportive environment even when they are injured, and who experience low levels of non-sport-related stress, shows similarities with the findings of the group with the lowest symptoms of Burnout-RA.

Athletes, who are highly *willing to make psycho-social sacrifices* for their sport, hold an internal resource which can help to prevent ABO. This willingness to make psycho-social sacrifices can be considered as an operationalisation of passion for their sport. Harmonious passion has been associated with lower ABO symptomatology in adolescent elite athletes (Curran et al., 2011). Moreover, a high willingness to make psycho-social sacrifices can also be viewed as an effect of hyperinclusion, whereby an athlete is entirely socialized within the elite sports environment and has internalized the accustomed belief in the necessity of sacrificing everything for athletic success (Schnell, Mayer, Diehl, Zipfel, & Thiel, 2014).

Overall, we would like to emphasize that our results do not define predictors of ABO. Instead, through our analysis we can provide specific high and low risk profiles of ABO for adolescent athletes. Within this approach, we do not only take into account the multicausality of the ABO syndrome, but also allow for interactions between the correlate features. We would like to emphasize that these features do not stand alone in their relation to ABO symptomatology. In fact, our results let us assume that adverse external conditions can be compensated by favorable internal resources. This relates to the rationale of global burnout research, which states that burnout originates from a combination of personal and contextual factors. But more importantly, this knowledge points towards the meaningfulness of strengthening young athletes' internal resources. This can be achieved through the employment of trained sport psychologists. With the means of trainings, such as the psychological skills

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training (Sheard & Golby, 2006), these professionals can closely work with the athletes on improving their psychosocial resources and thus alleviate their risk of developing burnout symptoms.

Limitations, implications and future directions

Although promising results were obtained in the current study, certain limitations should be noted. Our study aims at taking a more comprehensive approach to youth athlete burnout than previous studies. Future studies could benefit from including further ABO-related psychological aspects (e.g. self-esteem, motivation).

Due to content-wise overlap, we excluded some variables from the analyses. Given the substantial proximity of burnout and depressive symptoms (Bianchi et al., 2015), we did not include depressive symptomatology in the extreme group analyses. We also excluded sport-related perceived stress as we considered it partially redundant to ABO symptomatology (high correlation, specifically with Burnout-EXH) and keeping it as part of the analysis would have led to methodological issues.

On a methodological level, it is important to note that the measurement of (athlete) burnout entails some issues. Firstly, there is still a debate on the time- and content-wise interrelationship between the individual burnout dimensions (Lundkvist et al., 2017) as well as the necessity of multiple dimensions (Gustafsson, Madigan, & Lundkvist, 2018). Secondly, the lack of substantiated diagnostic criteria strongly impedes research in this respective field. This second issue holds true for nearly all burnout instruments, with the only exception being the Shirom-Melamed Burnout Questionnaire (SMBQ), which up until very recently has not been used in the sport context (Gerber, Best, et al., 2018; Gerber, Gustafsson, et al., 2018). Contrary to that, the ABQ has been developed specifically for athletes and as such has been used multiple times in the sport context. Thus, for comparison with recent research in the field, the ABQ is the most appropriate instrument for our purpose. As for the issue of diagnostic criteria, previous studies have mostly employed basic regression analyses. We chose to focus on the extreme groups because with this approach we gain a more specific view of those athletes that are particularly of interest, which can be helpful in preventing ABO. Further, we can assume that - wherever the “true” cut-off may lie – our high burner group, which contains those athletes with the highest ABO symptom scores, is very likely to score above said cut-off. However, we acknowledge

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that this approach is rather a way that works around the issue than one that directly addresses it.

Methodologically, one could also criticize that our data included self-reports only. Adding evaluations from a coaches' or parents' point of view may have helped to get a more objective view on the athletes' features. However, as burnout symptomatology depends on the individual's appraisal of demands, resources, and related emotions, we considered the athlete perspective to be suitable for our study purpose. As with most survey studies, it is possible that answers of study participants may have been influenced by social desirability. For example, athletes may have answered questions regarding health, well-being, and performance ability untruthfully, due to a fear of being judged as weak within the highly functional elite sport context. However, as participants were briefed thoroughly on anonymity of their data, this effect should be rather marginal. In order to be able to decipher the process of ABO, the order of occurrence of the three symptoms, and possible causal relationships between correlate features and symptomatology, longitudinal data are required. Unfortunately, collecting data over a longer period of time, a few years even, is rarely feasible and even more so for this specific population due to varying squads and dropouts. However, if possible, future research should strongly consider conducting longitudinal studies.

In addition to providing a base for future ABO research our findings also generate valuable practical implications for elite sport. Our results suggest that young athletes need an environment in which non-sport-related stress is low and in which they can still manage the necessary hours of training. Practical suggestions could be to enroll young athletes in special (boarding) schools for elite sport, which try to ensure feasibility of both athletic and academic requirements by providing a structure of flexible schedules and short distances between academic, training, and housing facilities (Deutscher Sportbund, 2003). Nevertheless, attending special schools for elite athletes and nearly exclusively socializing with other athletes may also lead to the development of a restricted athlete identity (Mitchell et al., 2014), whereby the afflicted athletes only align themselves in the elite sport environment. This exclusive focus often diminishes friendships and socialization outside of sport, so in case of dropping out of elite sport these youths often lack a support system to fall back on (Sanders & Stevinson, 2017). Therefore, especially for adolescent athletes who attend elite sport schools, social contacts outside the elite sport environment should be encouraged.

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Furthermore, our results suggest that some behaviours can be connected to stress and ABO symptomatology. Hence, we suggest that coaches and staff remain attentive to their athletes' behaviour, as for example irregularities of sleep or dietary changes could also be indicators of extensive stress.

Our findings also emphasize the importance of the adults involved in an adolescent athlete's life. The finding that autocratic and laissez-faire coaching styles are associated with heightened ABO symptoms should be considered in the selection and development of coaches in German elite sport. As it is vital to create a supportive and considerate environment for the athletes, parents need to be educated on their influence on their children's well-being in order to avoid adding social pressure (Knight, Berrow, & Harwood, 2017). Moreover, the employment of sport psychologists or other professionally trained support staff would be a valuable asset in this respect because young athletes may benefit from sharing their thoughts and worries with an impartial professional who is not directly involved. If the goal is to raise capable, resilient high performance athletes, mental health care is indispensable during the formative years of adolescence.

Conclusion

By being the first to apply a contrast group analysis in this thematic field, we were able to identify certain features that characterize high and low burner profiles. In addition, we found feature combinations that indicate heightened risk of ABO as well as feature combinations that are likely to protect athletes from developing burnout. Through our study we aim to provide a comprehensive empirical base for hypothesis-testing follow-up studies, which is essential to further decipher the mechanisms of ABO development and, above all, to ensure the physical and mental well-being of young athletes within elite sport. The large sample size can be acknowledged as a particular strength: It provides a substantial base for analyses that can aid the development of prevention and treatment programs, inspire further research in the field, and educate athletes, coaches, staff, association officials, and other practitioners in the field of young elite sport on the topic of ABO.

Figures

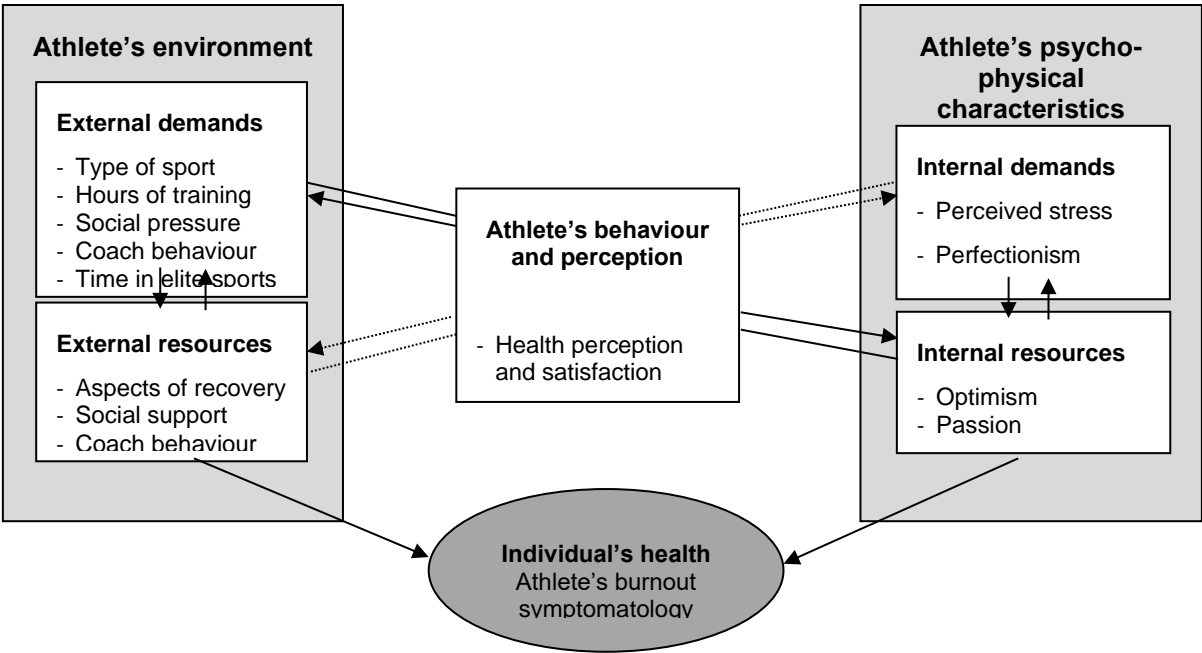


Figure 1. Adapted version of Becker's demand resource model for our study purpose

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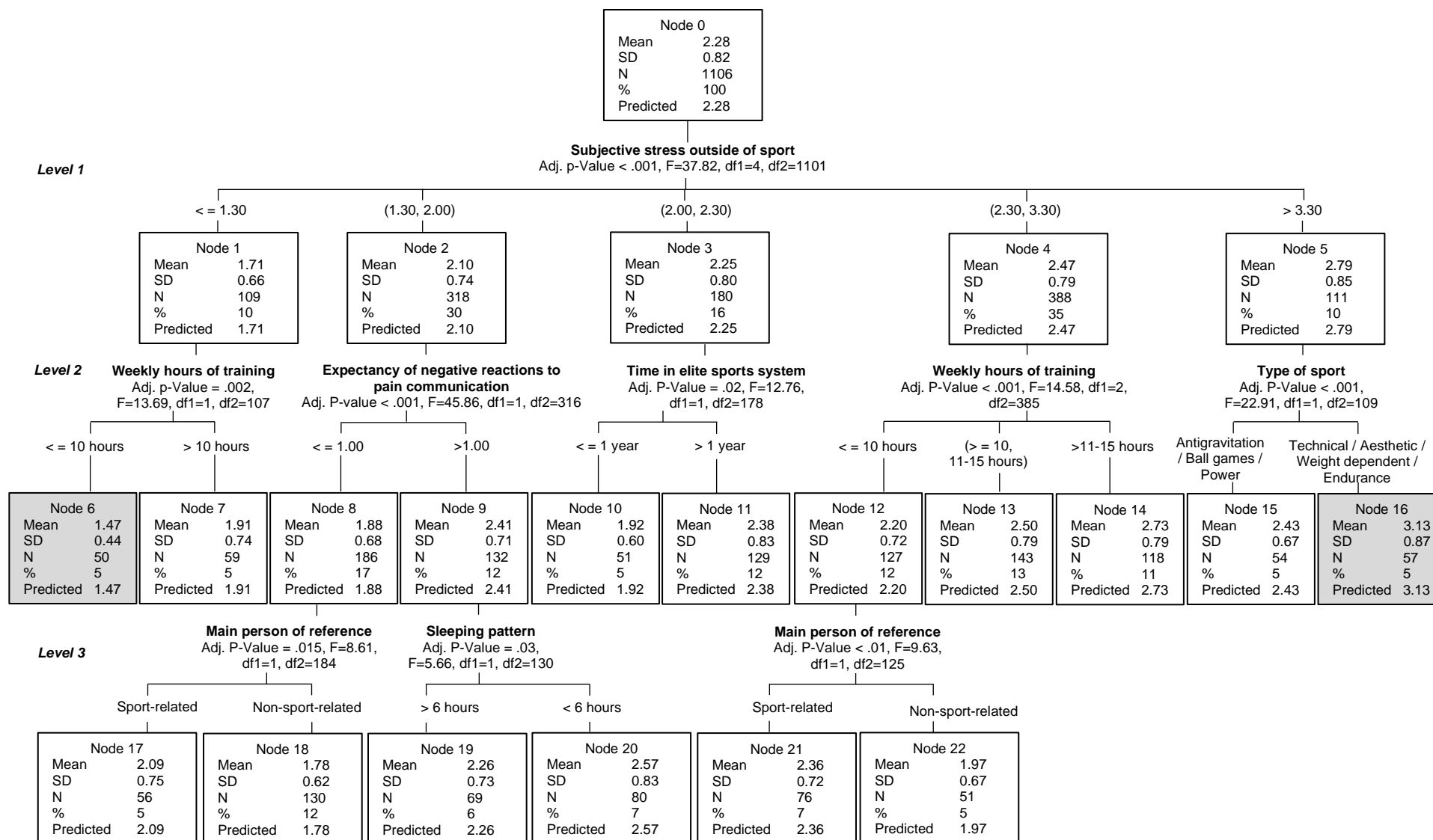


Figure 2. Classification tree analysis for physical and emotional exhaustion (Burnout-EXH). Terminal nodes with highest and lowest mean scores are shaded grey.

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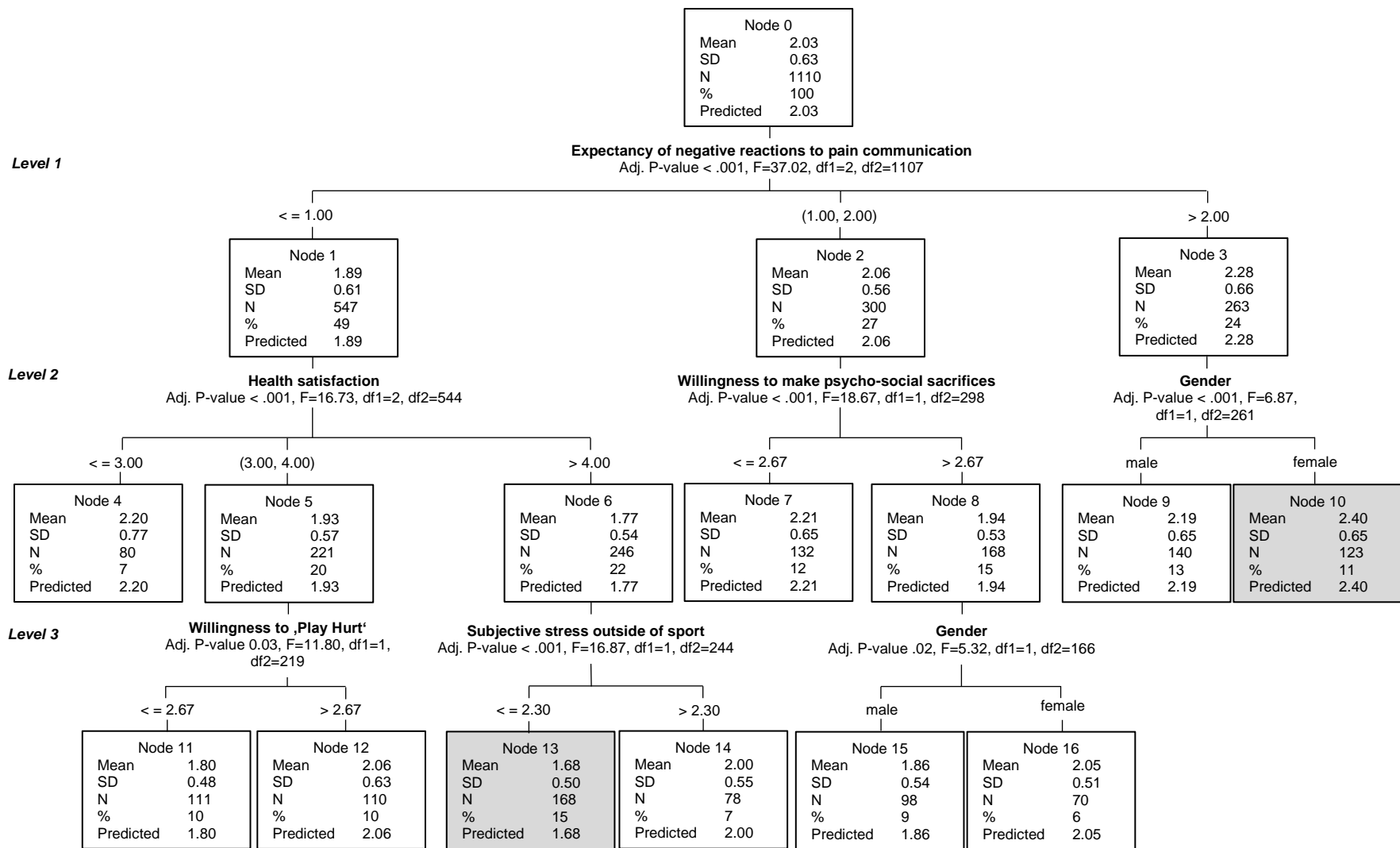


Figure 3. Classification tree analysis for reduced sense of accomplishment (Burnout-RA). Terminal nodes with highest and lowest mean scores are shaded grey.

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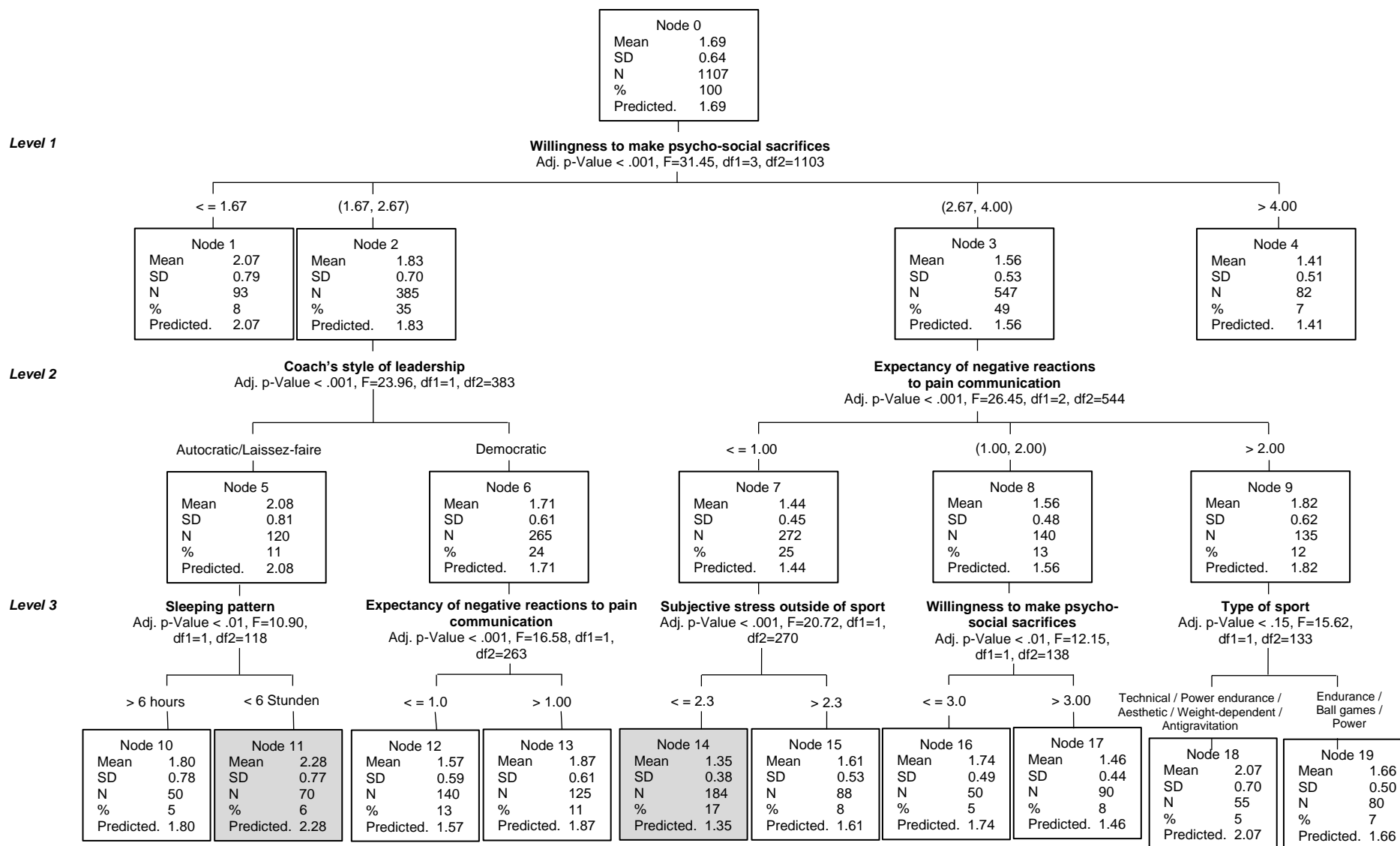


Figure 4. Classification tree analysis for sport devaluation (Burnout-DEV). Terminal nodes with highest and lowest mean scores are shaded grey.

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References

- Ahola, K., Hakanen, J., Perhoniemi, R., & Mutanen, P. (2014). Relationship between burnout and depressive symptoms: A study using the person-centred approach. *Burnout Research, 1*, 29-37.
- Alkhasawneh, M. S., Ngah, U. K., Tay, L. T., Mat Isa, N. A., & Al-Batah, M. S. (2014). Modeling and testing landslide hazard using decision tree. *Journal of Applied Mathematics*.
- Becker, P. (2003). Anforderungs-Ressourcen-Modell in der Gesundheitsförderung. *Leitbegriffe der Gesundheitsförderung, 4*, 13-15.
- Becker, P., Schulz, P., & Schlotz, W. (2004). Persönlichkeit, chronischer Stress und körperliche Gesundheit: Eine prospektive Studie zur Überprüfung eines systemischen Anforderungs-Ressourcen-Modells. *Zeitschrift für Gesundheitspsychologie, 12*, 11-23.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2015). Burnout-depression overlap: A review. *Clinical Psychology Review, 36*, 28-41.
- Brennkmeier, V., Van Yperen, N. W., & Buunk, B. P. (2001). Burnout and depression are not identical twins: Is decline of superiority a distinguishing feature? *Personality and Individual Differences, 30*, 837-880.
- Brettschneider, W. D. (1999). Risks and opportunities: Adolescents in top-level sport growing up with the pressures of school and training. *European Physical Education Review, 5*, 121-133. doi: 10.1177/1356336X990052004
- Brinton, C. S., Hill, B. J., & Ward, P. J. (2017). Authoritative coach: Building youth through sport. *Journal of Park & Recreation Administration, 35*, 51-65.
- Bühl, A. (2012). *SPSS 20 - Einführung in die moderne Datenanalyse 13*. München: Harlow.
- Camp, N., & Slattery, M. (2002). Classification Tree Analysis: A statistical tool to investigate risk factor interactions with an example for colon cancer (United States). *Cancer Causes Control, 13*, 813-823. doi: 10.1023/A:1020611416907
- Cassidy, T., Jones, R., & Potrac, P. (2009). *Understanding sports coaching. The social, cultural and pedagogical foundations of coaching practice*. New York, NY: Routledge.
- Chen, J. A., Shih, C. C., Lin, P. F., Chen, J. J., & Lin, K. C. (2012). Collaborative evaluation and management of students' health-related physical fitness: Applications of cluster analysis and the classification tree. *International Journal of Adolescent Medicine and Health, 24*, 153-159.
- Cherniss, C. (1980). *Staff burnout: Job stress in the human services*. Beverly Hills, CA: Sage Publications.
- Coakley, J. (1992). Burnout among adolescent athletes: A personal failure or social problem? *Sociology of Sport Journal, 9*, 271-285.
- Coleman, J. (2011). *The nature of adolescence*: Routledge.

STUDY III – HIGH AND LOW RISK PROFILES FOR ATHLETE BURNOUT

- Cresswell, S. L., & Eklund, R. C. (2006a). Athlete burnout: Conceptual confusion, current research and future research directions. *Literature Reviews in Sport Psychology*, 91-126.
- Cresswell, S. L., & Eklund, R. C. (2006b). Changes in athlete burnout over a thirty-week "rugby year". *Journal of Science and Medicine in Sport*, 9, 125-134.
- Curran, T., Appleton, P. R., Hill, A., & Hall, H. K. (2011). Passion and burnout in elite junior soccer players: The mediating role of self-determined motivation. *Journal of Psychology of Sport and Exercise*, 12, 655-661.
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology*, 49, 182-185.
- Deutscher Sportbund. (2003). Qualitätskriterien der Eliteschulen des Sports. Frankfurt am Main: Deutscher Sportbund.
- Diehl, K., Thiel, A., Zipfel, S., Mayer, J., & Schneider, S. (2012). Substance use among elite adolescent athletes: Findings from the GOAL study. *Scandinavian Journal of Medicine and Science in Sports*. doi: 10.1111/j.1600-0838.2012.01472.x
- Dubuc-Charbonneau, N., Durand-Bush, N., & Forneris, T. (2014). Exploring levels of student-athlete burnout at two Canadian universities. *Canadian Journal of Higher Education*, 44, 135-151.
- Durand-Bush, N., Salmela, J. H., & Green-Demers, I. (2001). The Ottawa mental skills assessment tool (OMSAT-3*). *The Sport Psychologist*, 15, 1-19.
- Eklund, R. C., & DeFreese, J. D. (2015). Athlete Burnout: What we know, what we could know, and how we can find out more. *International Journal of Applied Sports Sciences*, 27, 63-75.
- Gerber, M., Best, S., Meerstetter, F., Walter, M., Ludyga, S., Brand, S., et al. (2018). Effects of stress and mental toughness on burnout and depressive symptoms: A prospective study with young elite athletes. *Journal of Science and Medicine in Sport*.
- Gerber, M., Gustafsson, H., Seelig, H., Kellmann, M., Ludyga, S., Colledge, F., et al. (2018). Usefulness of the Athlete Burnout Questionnaire (ABQ) as a screening tool for the detection of clinically relevant burnout symptoms among young elite athletes. *Psychology of Sport and Exercise*, 39, 104-113.
- Goodger, K., Gorely, T., Lavalley, D., & Harwood, C. (2007). Burnout in sport: A systematic review. *The Sport Psychologist*, 21, 127-151.
- Gould, D., & Dieffenbach, K. (2002). Overtraining, underrecovery, and burnout in sport. In M. Kellmann (Ed.), *Enhancing recovery: Preventing underperformance in athletes* (pp. 25-35). Champaign, IL: Human Kinetics.
- Gould, D., Udry, E., Tuffey, S., & Loehr, J. (1997). Burnout in competitive junior tennis players: III. Individual differences in the burnout experience. *The Sport Psychologist*, 11, 257-276.
- Gustafsson, H., DeFreese, J. D., & Madigan, D. J. (2017). Athlete burnout: review and recommendations. *Current opinion in Psychology*, 16, 109-113.
- Gustafsson, H., Hassmen, P., & Hassmen, N. (2011). Are athletes burning out with passion? *European Journal of Sport Science*, 11, 387-395.

STUDY III – HIGH AND LOW RISK PROFILES FOR ATHLETE BURNOUT

- Gustafsson, H., Kenttä, G., & Hassmen, P. (2011). Athlete burnout: An integrated model and future research directions. *International Review of Sport and Exercise Psychology*, 4, 3-24.
- Gustafsson, H., Kenttä, G., Hassmen, P., & Lundqvist, C. (2007). Prevalence of burnout in adolescent competitive athletes. *The Sport Psychologist*, 21, 21-37.
- Gustafsson, H., Madigan, D. J., & Lundkvist, E. (2018). Burnout in athletes *Handbuch Stressregulation und Sport* (pp. 489-504). Berlin, Heidelberg: Springer.
- Gustafsson, H., & Skoog, T. (2012). The mediational role of perceived stress in the relation between optimism and burnout in competitive athletes. *Anxiety, Stress & Coping*, 25, 183-199.
- Harris, B. S., & Ostrow, A. C. (2008). Coach and athlete burnout: The role of coaches' decision-making style. *Sports and Athletics Developments*, 81-100.
- Harris, B. S., & Watson, J. C. (2011). Assessing youth sport burnout: A self-determination and identity development perspective. *Journal of Clinical Sport Psychology*, 5, 117-133.
- Havighurst, R. J. (1956). Research on the developmental-task concept. *The School Review*, 64, 215-223. doi: 10.1086/442319
- Heidari, S. (2013). Gender differences in burnout individual athletes. *European Journal of Experimental Biology*, 3, 583-588.
- Hill, A., & Curran, T. (2016). Multidimensional perfectionism and burnout: A meta-analysis. *Personality and Social Psychology Review*, 20, 269-288.
- Hill, A., Hall, H., & Appleton, P. R. (2010). Perfectionism and athlete burnout in junior elite athletes: The mediating role of coping tendencies. *Journal of Anxiety, Stress and Coping*, 23, 415-430.
- Hodge, K., Lonsdale, C., & Ng, J. Y. Y. (2008). Burnout in elite rugby: Relationships with basic psychological needs fulfilment. *Journal of Sports Science*, 26, 835-844.
- Hoffmann, K., Sallen, J., Albert, K., & Richartz, A. (2012). Chronisches Belastungserleben von Spitzensportlern. Welche Rolle spielen soziodemographische und sportliche Rahmenbedingungen? In I. Pfeffer & D. Alfermann (Eds.), *Menschen in Bewegung. Sportpsychologie zwischen Tradition und Zukunft*. Hamburg: Czwalina.
- Isoard-Gauthier, S., Guillet-Descas, E., & Gustafsson, H. (2016). Athlete burnout and the risk of dropout among young elite handball players. *The Sport Psychologist*, 30, 123-130.
- Isoard-Gauthier, S., Guillet-Descas, E., & Lemyre, P. N. (2012). A prospective study of the influence of perceived coaching style on burnout propensity in high level young athletes: Using a self-determination theory perspective. *The Sport Psychologist*, 26, 282-298.
- Kallus, K. W., & Kellmann, M. (2000). Burnout in athletes and coaches. In Y. L. Hanin (Ed.), *Emotions in sport* (pp. 209-230). Champaign, IL: Human Kinetics.
- Kenttä, G., & Hassmen, P. (1998). Overtraining and recovery: A conceptual model. *Sports Medicine*, 26, 1-16.

STUDY III – HIGH AND LOW RISK PROFILES FOR ATHLETE BURNOUT

- Kenttä, G., Hassmen, P., & Raglin, J. S. (2001). Training practices and overtraining syndrome in Swedish age-group athletes. *International Journal of Sports Medicine*, 22, 460-465.
- Knight, C. J., Berrow, S. R., & Harwood, C. G. (2017). Parenting in sport. *Current Opinion in Psychology*, 16, 93-97.
- Krippel, M., & Ziemainz, H. (2010). Burnout as a psychological disorder in competitive athletics. *Advances in Psychological Research*, 69, 177-192.
- Laursen, B. P., & Hoff, E. (2006). Person-centered and variable-centered approaches to longitudinal data. *Merrill-Palmer Quarterly*, 52, 377-389.
- Lemon, S., Roy, J., Clark, M., Friedmann, P., & Rakowski, W. (2003). Classification and regression tree analysis in public health: Methodological Review and comparison with logistic regression. *Annals of Behavioral Medicine*, 26, 172-181.
- Lemyre, P. N., Hall, H. K., & Roberts, G. C. (2008). A social-cognitive approach to burnout in elite athletes. *Scandinavian Journal of Medicine & Science in Sports*, 18, 221-234.
- Lemyre, P. N., Treasure, D., & Roberts, G. (2006). Influence of variability in motivation and affect on elite athlete burnout susceptibility. *Journal of Sport & Exercise Psychology*, 28, 32-48.
- Li, C., Wang, C. J., & Kee, Y. H. (2013). Burnout and its relations with basic psychological needs and motivation among athletes: A systematic review and meta-analysis. *Psychology of Sport and Exercise*, 14, 692-700.
- Lundkvist, E., Gustafsson, H., Davis, P. A., Holmström, S., Lemyre, P. N., & Ivarsson, A. (2017). The temporal relations across burnout dimensions in athletes. *Scandinavian Journal of Medicine and Science in Sports*, 28, 1215-1226.
- Lupien, S. J., McEwen, B. S., Gunnar, M. R., & Heim, C. (2009). Effects of stress throughout the lifespan on the brain, behaviour and cognition. *Nature reviews. Neuroscience*, 10, 434-445.
- Malcolm, N. L. (2006). "Shaking it off" and "Toughing it out" - Socialization to pain and injury in girl's softball. *Journal of Contemporary Ethnography*, 35, 495-525to.
- Malina, R. M. (2002). The young athlete: Biological growth and maturation in a biocultural context. In F. L. Smoll & R. E. Smith (Eds.), *Children and youth sport. A biopsychosocial perspective*. (pp. 261-292). Dubuque, IA: Kendall/Hunt.
- Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *The Maslach Burnout Inventory Manual, 2nd Ed*. Palo Alto, CA: Consulting Psychologists Press.
- Maslach, C., & Leiter, M. P. (2000). Burnout. In E. Fink (Ed.), *Encyclopedia of stress* (pp. 358-362). New York: Academic Press.
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52, 397-422.
- Mayer, J., & Thiel, A. (2014). Health in elite sports from a salutogenetic perspective: Athletes' sense of coherence. *PLoS One*, 9, e102030.
- Mitchell, T. O., Nesti, M., Richardson, D., Midgley, A. W., Eubank, M., & Littlewood, M. (2014). Exploring athletic identity in elite-level English youth football: A cross-sectional approach. *Journal of Sports Sciences*, 32, 1294-1299.

STUDY III – HIGH AND LOW RISK PROFILES FOR ATHLETE BURNOUT

- Naughton, G., Farpour-Lambert, N., Carlson, J., Bradney, M., & Van Praagh, E. (2000). Physiological issues surrounding the performance of adolescent athletes. *Sports Medicine*, 30, 309-325.
- Ohlert, J. (2013). Konzeption und Evaluation einer sportpsychologischen Lehrgangsbetreuung im Mädchenfußball. *Leistungssport*, 43.
- Ohlert, J., & Kleinert, J. (2014). Entwicklungsaufgaben jugendlicher Elite-Handballerinnen und -Handballer. *Zeitschrift für Sportpsychologie*, 21, 161-172.
- Ommundsen, Y., Roberts, G. C., Lemyre, P.-N., & Miller, B. W. (2006). Parental and coach support or pressure on psychosocial outcomes of pediatric athletes in soccer. *Clinical Journal of Sport Medicine*, 16, 522-526.
- Pelka, M., & Kellmann, M. (2017). Understanding underrecovery, overtraining, and burnout in the developing athlete. In J. Baker, S. Cobley, J. Schorer & N. Wattie (Eds.), *Routledge handbook of talent identification and development in sport*. New York: Routledge.
- Pines, A. M. (1993). Burnout: An existentialistic perspective. In W. B. Schaufeli, C. Maslach & T. Marek (Eds.), *Professional burnout: Developments in theory and research*: Taylor & Francis.
- Raedeke, T. D. (1997). Is athlete burnout more than just stress? A sport commitment perspective. *Journal of Sport & Exercise Psychology*, 19, 396-417.
- Raedeke, T. D., & Smith, A. L. (2001). Development and preliminary validation of an athlete burnout measure. *Journal of Sport & Exercise Psychology*, 23, 281-306.
- Raedeke, T. D., & Smith, A. L. (2004). Coping resources and athlete burnout: An examination of stress mediated and moderation hypotheses. *Journal of Sport and Exercise Psychology*, 26, 525-541.
- Raedeke, T. D., & Smith, A. L. (2009). *The athlete burnout questionnaire manual*. Morgantown, WV: Fitness Information Technology.
- Sanders, G., & Stevinson, C. (2017). Associations between retirement reasons, chronic pain, athletic identity, and depressive symptoms among former professional footballers. *European Journal of Sport Science*, 17, 1311-1318.
- Santrock, J. W. (2004). *Life-span development*. New York: McGraw-Hill.
- Schaufeli, W. B., & Buunk, B. P. (2003). Burnout: An overview of 25 years of research and theorizing. In M. J. Schabracq, J. A. M. Winnubst & C. L. Cooper (Eds.), *The handbook of work and health psychology* (pp. 383-425). London: Wiley.
- Schnell, A., Mayer, J., Diehl, K., Zipfel, S., & Thiel, A. (2014). Giving everything for athletic success! - Sports-specific risk acceptance of elite adolescent athletes. *Psychology of Sport and Exercise*, 15, 165-172.
- Schubring, A. (2014). *Wachstum als Herausforderung - Soziologische Analysen des Wachstumsmanagements jugendlicher Spitzenathleten und Nachwuchstrainer*. PhD, Eberhard Karls Universität Tübingen, Tübingen.
- Schubring, A., Bub, E.-M., & Thiel, A. (2015). "How much is too much?" The social construction of elite youth athlete exercise tolerances from the coaches' perspective. *Journal of Sport and Social Issues*, 39, 308-331.

STUDY III – HIGH AND LOW RISK PROFILES FOR ATHLETE BURNOUT

- Sharp, L.-A., Woodcock, C., Holland, M. J., Duda, J. L., & Cumming, J. (2010). Validation of the Athlete Burnout Questionnaire with youth athletes. *Journal of Sport & Exercise Psychology, 32*, 218-219.
- Sheard, M., & Golby, J. (2006). Effect of a psychological skills training program on swimming performance and positive psychological development. *International Journal of Sport and Exercise Psychology, 4*, 149-169.
- Smith, A. L., Gustafsson, H., & Hassmen, P. (2010). Peer motivational climate and burnout perceptions of adolescent athletes. *Psychology of Sport and Exercise, 11*, 453-460.
- Smith, R. E. (1986). Towards a cognitive-affective model of athlete burnout. *Journal of Sport Psychology, 8*, 36-50.
- Sundgot-Borgen, J., & Torstveit, M. K. (2004). Prevalence of eating disorders in elite athletes is higher than in the general population. *Clinical Journal of Sport Medicine, 14*, 25-32.
- Tamminen, K. A., Holt, N. L., & Crocker, P. R. E. (2012). Adolescent athletes: psychosocial challenges and clinical concerns. *Current opinion in psychiatry, 25*, 293-300.
- Teubert, H., Cachay, K., Borggreffe, C., & Thiel, A. (2006). *Spitzensport und Schule - Möglichkeiten und Grenzen struktureller Kopplung in der Nachwuchsförderung*. Schondorf: Hofmann.
- Thiel, A., Diehl, K., Giel, K. E., Schnell, A., Schubring, A. M., Mayer, J., et al. (2011). The German young olympic athletes' lifestyle and health management study (GOAL study): Design of a mixed-method study. *BMC Public Health, 11*, 410. doi: 10.1186/1471-2458-11-410
- Ziemainz, H., Abu-Omar, K., Raedeke, T., & Krause, K. (2004). Burnout im Sport. Zur Prävalenz von Burnout aus bedingungsbezogener Perspektive. *Leistungssport, 34*, 12-17.

4.4 Limitations

The manuscripts and analyses included in the present dissertation project are based on data from a systematic review and data from the “GOAL”-study (see chapter 4.1). The GOAL-study dataset has certain characteristics that represent limitations for the studies conducted and need to be taken into consideration before proceeding to the discussion:

First, collected data were cross-sectional. Even though we criticise the lack of longitudinal studies in the field of athlete burnout, we believe that the specificity and size of the GOAL-study sample still warrants investigation in this regard. Second, the GOAL-study sample consisted of youth athletes only and thus we can not assume that results from our studies II and III also apply for adult athlete populations (cf. Harris and Watson, 2014). However, as described in chapter 2.1, there are several reasons that render the assessment of youth athletes especially relevant. Third, data from the GOAL-study were collected from German youth elite athletes. Since the national talent development and elite sport systems exhibit considerable differences on a structural and organisational level as well as differences regarding financial and societal appreciation, the results from study II and III are not necessarily applicable to other countries' athlete populations. However, many aspects of the framework discussion (see 5.2) and of the theses derived from it (see 5.3) are aimed to be applied to athlete mental health promotion and research on an international level. Fourth, some instruments used in the GOAL-study are not ideal for our study purpose. Using a short version of the PHQ to screen for depressive symptoms may have been suitable for the aims of the research project. However, the brevity of this measure limited model identifiability (see Study II).

5. Discussion

In this chapter, we address the research questions posed in chapter 3.2 and explain to what extent the studies included in this dissertation were able to attend to the initially identified research desiderates (see 3.1). Corresponding study results for each research question are summarized very briefly and discussed comprehensively (see 5.1). Finally, implications for research and practice are derived (see 5.2).

5.1 Addressing previous research desiderates

The first research question was **What are risk and protective factors of athletes developing heightened symptoms of psychological exhaustion syndromes (i.e. depression and burnout)?** This question was investigated in study I and addressed research desiderates 1 (i.e. two separate research traditions for athlete burnout and depression) and 5 (i.e. overreliance on cross-sectional research) as described in chapter 3.1.

The first research desiderate initially identified relates to the fact that (athlete) burnout and depression are hardly ever assessed and analysed together. This separation is sought to stem from the historic development of both constructs which resulted in two separate research traditions. Findings of study I corroborated this idea by indicating that depression and burnout etiology research in athletes are being approached in very dissimilar ways: The type of potential determinants assessed in sport research differs for the two syndromes. For athlete burnout, assumed determinants are mainly psycho-social variables and studies often assess the athlete's subjective perceptions. In contrast, depression's presumed determinants are quite often related to an objectively measureable quantity, such as number of injuries. Additionally, many burnout studies present a more detailed theoretical framework than most depression studies. Even though depression is commonly viewed to originate through a concurrence of vulnerabilities and stressors, the studies included in the review hardly reflect the assessment of potential vulnerabilities.

The fifth research desiderate entails the lack of longitudinal studies. Instead, there is an over-reliance on cross-sectional study designs, whereby authors often still make claims about alleged predictions. This constitutes a particular issue as researchers run the risk of mistaking predictors for antecedents, symptoms, or even consequences. In addition, the multitude of cross-

sectional research may add to the confusion in the field because many factors can potentially be associated with athlete burnout scores but do not necessarily determine athlete burnout symptomatology causally. Since our empirical studies (studies II and III) were based on secondary, cross-sectional data, we were not able to add longitudinal studies to the existing research base. However, by excluding cross-sectional studies when summarizing the available literature in study I, we provide an important and rigorous base for future research on burnout and depression determinants.

The results of our systematic review (study I) showed some agreement but also considerable differences compared to previous reviews. Goodger, et al. (2007) included 21 cross-sectional and only 6 longitudinal studies in their review. Similar to their results, we found various facets of motivation, coach behaviour, and social relationships to be relevant and frequently assessed factors for predicting burnout symptomatology longitudinally. However, some of the factors frequently assessed according to Goodger and colleagues did not come up within our review because they were only assessed within cross-sectional study designs (e.g. coping, anxiety, perceived stress) and thus were not eligible for our review. Also, the associations found by Goodger and colleagues were often unanimously negative or positive, whereas our summary often showed mixed associations.

Our findings are in line with the assumption of two separate but co-existing research strands for (athlete) burnout and depression. This separation heavily impedes critical exchange and discussion and therefore hampers practical action. Additionally, with respect to burnout, there seems to be a discrepancy between the popularity of the construct and its scientific base (Bianchi, et al., 2019). However, the fact that the term ‘burnout’ is popular and commonly used in practice, especially in sports, should be recognised as relevant, even and especially by clinical professionals. Even though burnout is not considered to be a clinical condition (Hamann et al., 2013), researchers and practitioners should at least recognise that in the practical context the term seems to have its purpose: It is more congruent with the mind-set of elite sports and it is less stigmatising and thus can facilitate help-seeking behaviours (Moreland, Coxe, & Yang, 2018).

Nevertheless, this does not mean that the global popularity of the term burnout justifies the amount of athlete burnout research conducted without considering the prevailing basic theoretical flaws. Researchers must push forward on the above-mentioned issues of the field (see chapter 3.1) and most notably find answers to the questions: (1) What is athlete burnout?

(2) How is it distinctive from other disorders? Admittedly, trying to decipher these questions necessitates taking a step back from pre-existing findings. This does not mean that they are not valuable, but the fact that the field of (athlete) burnout research has not made considerable progress on these questions over the past decades (Raedeke, 1997), suggests the necessity of novel approaches.

Meaningful information can only be derived if there is at least some agreement on what constitutes athlete burnout and further what constitutes a critical or clinical level of athlete burnout. Since burnout is not formally recognised as a psychiatric disorder, these critical levels can only be determined in two ways: One option is to assess the respective level of impairment, which may be more difficult in athletes as they are inherently high-functioning individuals. The other option is to compare athlete burnout symptoms to established clinical pictures such as depression for which clear clinical criteria exist.

Despite theoretical flaws (Schaufeli and Buunk, 2003) and a lack of cut-off criteria, the three-dimensional view of athlete burnout and its operationalization via the ABQ have become popular and widely used in the field of sport psychology. In fact, athlete burnout seems to have grown into a universal measure for athlete psychological ill-being. In order to restrict this careless trend and to advance the field, both scientifically and practically, the positioning of athlete burnout within the realm of clinical psychopathologies (including, but not limited to depression) must be re-evaluated critically.

The second research question of this dissertation was **How do symptoms of depression and burnout overlap or differentiate in a sample of elite athletes?** This question was investigated in study II and addressed the research desiderates 1 (i.e. two separate research traditions for athlete burnout and depression) and 2 (i.e. unclear distinction/overlap of athlete burnout and depression).

As described above the first desiderate concerns the separate research traditions that exist for depression and athlete burnout research. The second issue mentioned in chapter 3.1 consists of the potential overlap of burnout with established clinical pictures, most notably depression and the uncertainty of its justification as a distinct disorder. With study II, we were able to address the issue of potential overlap between burnout and depression. Here, we extended previous research in that we were the first to assess this overlap specifically for athlete burnout. Our results mirror findings of general burnout studies (Schonfeld, et al., 2019), in that

depression and athlete burnout are operationalised in a way that they share a common underlying factor. Further, and also in line with general burnout research findings (Bianchi, et al., 2020), extracted factor correlations showed considerable proximity of burnout subfactors and the depression factor, which even exceeded correlations between the separate burnout subfactors.

As previously suggested and implemented in our second study, assessing the conceptual overlap of athlete burnout with depression can provide further clarity on the question of how or whether athlete burnout is distinctive from other disorders. Additionally, if an overlap with other disorders is detected this could prospectively inform cut-off development for athlete burnout. Our findings confirmed results of studies assessing the overlap of (general) burnout and depression: The two syndromes share a common factor and subscales are closely associated with each other (cf. Bianchi, et al., 2015a). However, results do not indicate complete congruence of athlete burnout and depression.

Assuming that the instruments used for this analysis validly measure athlete burnout and depression, our results would suggest that the two constructs share an overlap but each syndrome entails some additional features that are not covered by the respective other. In this case, future research should try to uncover whether these additional features are related to the context-specificity that is presumed to be distinctive to burnout, because the ABQ inquires about ill-being related to the athletic experience and functionality while depression items are phrased generally. Also, the specificity of the assessed time frame may constitute grounds for distinction, as the PHQ assesses symptoms of the past two weeks, whereas assessment in the ABQ is not time-specific.

Alternatively, it is also possible that our results are biased due to the theoretical flaws attached to the ABQ. This instrument has been developed on the base of the MBI, which has been criticized as being “neither grounded in firm clinical observation nor based on sound theorizing” (Schaufeli, 2003, p.3 and Schirom, 2005). Instead “it has been developed inductively by factor-analyzing a rather arbitrary set of items” (Schaufeli, 2003, p.3). In this case, it may be helpful for future studies to temporarily go back to assessing and collating symptoms of mental ill-health rather than assuming a distinct burnout syndrome with insufficient theoretical underpinning. This approach would allow to compare ill-being on a symptom level, without the restrictions inherent to pre-existing labels and formal fixation.

As mentioned in chapter 2.3.2 the two research traditions have resulted in two separate research strands that have developed independently of each other, mainly due to differences regarding formalisation and scientific discipline. Keeping in mind that any diagnostic fixation and guideline is man-made and as such holds a certain level of arbitrariness, it is astonishing that while for established clinical pictures it is common to recognise subforms, mixed forms or comorbidities, for non-formalised syndromes this ‘getting into the club’ procedure is arduous. Due to the fact that official diagnostic acknowledgement is primarily decided by medical professionals, we assume that clarification on what (athlete) burnout is, can only be achieved by connecting and comparing it to and assessing overlap with pre-existing clinical pictures (such as depression, adjustment disorder, neurasthenia). Here, it could also be beneficial to consider qualitative methods to deepen the understanding of similarities and differences regarding subjective symptom experience, instead of only relying on quantitative assessment measures with previously explained flaws.

As previously mentioned, encouraging discourse and exchange of ideas between the two research strands of athlete burnout and depression constitutes a central aim of the present work. This may go as far as challenging the present athlete burnout construct to the point where syndrome conceptualisation is reconsidered and its symptoms are compared with established clinical pictures to progress from burnout’s current unacknowledged state. However, this approach could not only be beneficial to athlete burnout research, but also for depression research in athletes. It should be possible to question current formal disorder classifications in light of other non-formally recognised descriptions of ill-health. Hence, only by opening both syndromes up for review, is it possible to potentially distinguish them, re-classify them, or even construct a new combined syndrome.

Considering the unique challenges, demands, norms and values inherent to the elite athlete life experience, it is advisable to investigate burnout and depression in athletes specifically, as they may manifest differently in high level athletes compared to the general population (cf. Bär and Markser, 2013) .

The third research question was **Which characteristics do elite athletes with especially high (or respectively low) burnout symptomatology share? Are there any red flag profiles?** This questions was investigated in study III and addressed research desiderates 3 (i.e. variety of etiological models for athlete burnout) and 4 (i.e. lack of diagnostic cut-offs for athlete burnout).

The third desiderate concerns the fact that athlete burnout research suffers from conceptual disagreement on many levels. Accordingly, pre-existing burnout etiology models are conspicuously diverse. This constitutes an issue because study aims and designs are shaped by the chosen theory and this theoretical diversity may lead to very heterogeneous study designs, which in turn exacerbates the synthesis of findings in the field. To address this issue, we used Becker's more general demand resource model to align athlete burnout correlates in study III. This approach allowed us to include multiple variables of interest and offered the new perspective of considering burnout correlates as external or internal demands or resources. In addition, our exploratory approach (i.e. classification tree analysis) to deciphering potential burnout correlates grants a broader view on athlete burnout etiology and does not fall victim to the trend of determining possible correlates simply based on previous investigations.

The fourth issue consists of the fact that for both general and athlete burnout research, the lack of formal diagnostic cut-off criteria has complicated assessment and interpretation of results for decades. Unsurprisingly, we were not able to solve this long-prevailing issue. However, with study III we demonstrated an alternative person-oriented approach to decipher both dispositional (i.e. internal demands and resources) and environmental (i.e. external demands and resources) factors influential to athlete burnout. Additionally, this exploratory approach provides the chance to gain a new perspective on the field of athlete burnout research that is not restricted by a narrow theoretical model. Results of study III show that dispositional as well as environmental factors are relevant in characterising athletes with extreme burnout symptomatology and that burnout does not occur monocausally. Relevant first level factors include subjective stress outside of sport, expectancy of negative reactions to pain communication, and willingness to make psychosocial sacrifices. Other factors identified as relevant are hours of training, type of sport, coach's style of leadership, sleep, gender, and health satisfaction.

Our findings provide some insight into the lifeworld of (upcoming) elite athletes: Certainly, high performance sport is a stressful endeavor and it seems only logical that any added perceived stress from outside of the sport context simply piles onto the already existing amount of stress. Therefore, the elite sports system aims to minimise additional stress, for example through enrolling athletes in elite sport schools (i.e. minimising time pressure, reducing distances between academic and training facilities, cf. Beckmann, et al., 2006), procuring sponsorships (i.e. reducing financial pressure), or providing minutely detailed schedules (i.e. reducing self-organisational responsibility and stress). However, the more structural

adaptations are made to provide the athlete with the optimal training environment, the more his or her life is also structured by the elite sport system. In turn, this carries the risk of athletes being completely engulfed in the system, cultivating no alternative passions, and developing a unidimensional athlete identity, which leads to an increased susceptibility for depression (Doherty, Hannigan, & Campbell, 2016; I. Nixdorf, 2018). To evaluate the benefit-risk ratio of such measures, future studies could for example assess and compare mental health and athlete identity in athletes with different levels of “structural engulfment” (e.g. athletes in elite sport schools vs. normal schools). Moreover, and in addition to structural preventative measures, elite sport officials should view the athletes as individuals with certain vulnerabilities. Emotion recognition and regulation, coping strategies with stress and conflict are vital skills for anyone, but even more so for individuals who have to stay highly functional in a high-stress and high-pressure environment. As teaching psychological skills has been indicated to show positive effects (Li, Zhu, Zhang, Gustafsson, & Chen, 2019), elite sport associations should invest not only in physical training staff but also in mental training staff.

As mentioned, high performance athletes generally have a high level of commitment and dedication to their sport and their respective performance goals. However, such an extreme commitment entails making sacrifices. These sacrifices can be found on many levels, from potentially compromising physical health to sacrificing social relationships and missing out on many ‘normal’ experiences. Here, it is important for an athlete to know what kind of challenge they are embarking on and to be intrinsically motivated and willing to make these sacrifices. If athletes do not possess a certain level of willingness to sacrifice, they will likely waste well-needed energy by continuously questioning their choices. However, especially at a young age, it is important to encourage a dual career path for athletes and the development of a multidimensional identity. Athletic staff members always have to critically consider of how much they try to cater to the athlete’s individual needs and how much they interfere by providing structure and decisions for them. This is especially hazardous with youth athletes, because staff may forget that despite being high performers they are still children.

The social environment of athletes plays an important role in the athlete’s well-being. Coaches, staff, team and training mates, parents, partners and friends mould the environment and climate around the athlete. Here, it is important to note that the elite sports environment is extremely competitive, performance-oriented, demanding and relatively unforgiving. With all the inherent pressure, athletes need a safe space where they can be vulnerable and share their weaknesses, ill-being, doubts and fears without having to fear negative reactions or

consequences. But in elite sport many relationships are attached to conditions of performance. At a high level, coaches can only provide this safe space to a certain extent: They are in charge of (de)selection processes, their own job security is often dependent on the athlete's performance. Team and training mates can only provide this safe space to a certain extent because even though they may be friends, at the same time they are each others competitors.

The social circle outside of sport is generally better equipped to provide this safe space: Parents and partners should be able to create it, but often get caught up in the elite sports world themselves. They often sacrifice so much that they unconsciously put pressure on the athlete (Lindstrom Bremer, 2012) or they are not understanding enough, perceive the environment may be too stressful and try to safeguard the athletes wherever they can; both ways are not ideal.

To sum up, athletes need to feel that certain staff members are there primarily for them and their well-being, and secondarily interested in their performance. Therefore, it is crucial to employ sport psychologists or even psychotherapists. They are not as conflicted by role ambiguity as other staff and ideally trained in counselling. They also have to adhere to professional ethics, including confidentiality and thus are well-equipped to provide this much-needed safe space.

The main aims of this dissertation were to clear up the disarray around the construct of athlete burnout by addressing some of its core issues, and to link the two strands of burnout and depression research on high level athletes and encourage discussion and exchange of ideas. Hereby, it is important to note that the conducted research aims to not only advance theoretical knowledge but also to focus on providing useful information for practical mental health promotion and ill-health prevention in athletes. With this in mind, the following subchapter contains an overarching discussion of the findings of this dissertation project.

5.2 Implications for research and practice

With respect to the findings of the three studies and the related framework discussion (see chapter 5.1), five theses can be derived to conclude the present work:

- a. Athlete burnout research can only progress if fundamental issues (i.e. disagreement on conceptualisation, lack of diagnostic cut-off criteria) are no longer disregarded but**

actively addressed. In line with suggestions for general burnout research mentioned by Korczak, et al. (2010), we agree that common scientific consent on what athlete burnout constitutes is essential before any further research can and should be conducted. In many studies on athlete burnout the above-mentioned limitations are briefly mentioned but these issues are not explicitly addressed. But as demonstrated in our review (study I), the current multitude of conceptualisations of athlete burnout, the plurality of genesis models, and the diversity regarding interpretation of scores not only strongly impede progress of knowledge, but also obstruct comparison and synthesis of study findings. To put it simply, if the understanding of what athlete burnout is, differs on so many levels, how can researchers think to derive meaningful inferences from it? For example, we cannot speculate about prevalence numbers when there is no agreement on what constitutes a positive case. Thus, before assessing determinants or treatment effects, it is indispensable to tackle these fundamental issues.

b. Future athlete burnout research needs to connect to clinically established syndromes.

Even though athlete burnout research has evolved into a separate and independent research strand, in recent years it appears to be stuck with being a more popular than substantiated concept. To resolve this issue and advance the respective research to a more meaningful level, future research needs to connect and compare the idea, conceptualisation, symptoms, diagnostic criteria and theoretical genesis models of athlete burnout with established clinical pictures. As demonstrated in chapter 2.3.3.2, to date such research is still scarce. Our second study can function as a pioneer study in this regard, which future research can build on and develop further. Additionally, we found that depression research within the sport context offers only very scarce theoretical underpinning in most studies (see study I) and could therefore conversely benefit from athlete burnout research by adopting their detailed, albeit incomplete, theoretical framing.

c. Athlete burnout researchers should consider using broader theoretical etiology models as they allow to incorporate relevant factors more comprehensively.

Previous etiology models in athlete burnout research have mostly focused on rather narrow aspects, for example on the type of commitment required, on training stress, or on dysfunctional aspects of elite sport socialization (see 2.3.4). Consequently, these theories have largely shaped the study designs conducted in the field and thus the present research landscape. To date, there is empirical evidence for nearly all of these theories. Assuming that all of these studies hold

some truth, this should be a strong indication that none of these models are sufficient. Hence, athlete burnout research should invest into combining or broadening these models to be able to incorporate more relevant influencing factors. Alternatively, they could consider employing more versatile models that are already established with respect to health issues, such as the demand resource model (see study III) or a vulnerability-stress model (e.g. Nixdorf, et al., 2020) as is common for clinical psychopathologies. Such models would allow to incorporate all potentially relevant factors instead of being restricted to certain themes as most current athlete burnout models are. Additionally, it should be noted that approaching athlete burnout through the lens of a certain theoretical model does not only influence the way it is assessed, but also implies potential prevention and treatment methods. In this respect, broader models also allow to infer a more versatile range of prevention and treatment approaches.

- d. **In the spirit of mental health promotion, practitioners (physicians and psychologists) should put aside their semantics and focus on the athlete's experience of ill-health, regardless of the label.** For scientific purposes, it is vital to thoroughly define and delineate constructs in order to be sure to research the same phenomenon. For mental health practice, definitions and formal diagnosis also hold an important value as they determine the type of treatment. However, in communication with the patient it is more important to accurately describe and understand the experience of individual ill-being and loss of functionality than to meticulously define syndromes. Thus, keeping in mind the overlap demonstrated by previous and present research (see study II) and with the aim of mental health promotion, expression of ill-being of all sorts should be taken seriously and not be conditional to formal clinical recognition. Further, previous research confirms stigma to be attached to certain mental illnesses and our findings show that athletes feel pressured to conceal ill-being (see study III). Hence, mental health professionals should contemplate that labeling an athlete's symptoms or ill-being as 'burnout' as opposed to 'depression' may evoke different connotations and protect them from potential insecurities and undesirable associations. Especially in the elite sport context, it may be easier for some to label their condition as burnout and not as depression, because the first cannot as easily be construed as a weakness.
- e. **The athlete environment is inherently stressful and athletes lack a safe space to process their stressors and strains free from judgement. This shortcoming strongly vindicates the employment of sport psychologists.** It is indisputable that high level athletes are

confronted with several ambivalences and dilemmas that originate in the uniqueness of the elite sport environment. To facilitate the load, elite sports associations have introduced some structural adaptations over the years (e.g. elite sport schools, scholarships etc.). However, in order to be able to deal with the extensive strains in a healthy and constructive manner, there is also a need for measures to be taken at the individual level: The fear to communicate ill-being to avoid negative reactions (see study III) is evidence of a lack of a safe space. Paired with the high level of exclusive commitment and psychosocial sacrifice to the sport, athletes run the risk of training or competing hurt, feeling helpless, and unable to cope with extensive stressors. Appointing sport psychologists or counsellors may resolve this issue. They can offer psychoeducation and provide psychological skills training, such as for coping with stress, ill-success, anxiety, frustration or teach relaxation techniques which add considerably to the athletes' resources. Moreover, athletes need to be provided with an impartial and professionally trained figure who knows the characteristics and properties of the elite sport system (Moesch, et al., 2018) but at the same time should not be too engulfed within it. A professionally trained sport psychologist should be able to support athletes in an informed but non-judgmental way and to not be afraid to challenge the system's identity and values.

6. References

- Ahola, K., Honkonen, T., Isometsä, E., Kalimo, R., Nykyri, E., Aromaa, A., & al., e. (2005). The relationship between job-related burnout and depressive disorders - Results from the Finnish Health 2000 Study. *Journal of Affective Disorders*, 88(1), pp. 55-62.
- Åkesdotter, C., Kenttä, G., Eloranta, S., & Franck, J. (2020). The prevalence of mental health problems in elite athletes. *Journal Of Science And Medicine In Sport*, 23(4), pp. 329-335.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.) Arlington, VA: American Psychiatric Association.
- Andersen, M. B. (2011). Who's mental, who's tough and who's both. *Mental toughness in sport: Developments in theory and research*, pp. 69-88.
- Bahlmann, J., Angermeyer, M. C., & Schomerus, G. (2013). "Burnout" statt "Depression" - eine Strategie zur Vermeidung von Stigma? *Psychiatrische Praxis*, 40(02), pp. 78-82.
- Bakker, A. B., Schaufeli, W. B., Demerouti, E., Janssen, P. P., Van Der Hulst, R., & Brouwer, J. (2000). Using equity theory to examine the difference between burnout and depression.
- Bär, K.-J., & Markser, V. Z. (2013). Sport specificity of mental disorders: the issue of sport psychiatry. *European archives of psychiatry and clinical neuroscience*, 263(2), pp. 205-210.
- Barker-Ruchti, N., & Schubring, A. (2016). Moving into and out of high-performance sport: The cultural learning of an artistic gymnast. *Physical education and sport pedagogy*, 21(1), pp. 69-80.
- Beck, A. T., Ward, C., Mendelson, M., Mock, J., & Erbaugh, J. (1961). Beck depression inventory (BDI). *Arch Gen Psychiatry*, 4(6), pp. 561-571.
- Becker, P. (2003). Anforderungs-Ressourcen-Modell in der Gesundheitsförderung. *Leitbegriffe der Gesundheitsförderung*, 4, pp. 13-15.
- Beckmann, J., Elbe, A.-M., Szymanski, B., & Ehrlenspiel, F. (2006). *Chancen und Risiken: Vom Leben im Verbundsystem von Schule und Leistungssport* Köln: Sportverlag Strauß.
- Bergman, L. R., Magnusson, D., & El Khouri, B. M. (2003). *Studying individual development in an interindividual context: A person-oriented approach*: Psychology Press.
- Bianchi, R., Boffy, C., Hingray, C., Truchot, D., & Laurent, E. (2013). Comparative symptomatology of burnout and depression. *Journal of Health Psychology*, 18(6), pp. 782-787.
- Bianchi, R., & Brisson, R. (2019). Burnout and depression: Causal attributions and construct overlap. *Journal of Health Psychology*, 24(11), pp. 1574-1580.
- Bianchi, R., Laurent, E., Schonfeld, I. S., Bietti, L. M., & Mayor, E. (2018). Memory bias toward emotional information in burnout and depression. *Journal of Health Psychology*, p 1359105318765621.

- Bianchi, R., Laurent, E., Schonfeld, I. S., Verkuilen, J., & Berna, C. (2018). Interpretation bias toward ambiguous information in burnout and depression. *Personality and Individual Differences, 135*, pp. 216-221.
- Bianchi, R., & Schonfeld, I. S. (2016). Burnout is associated with a depressive cognitive style. *Personality and Individual Differences, 100*, pp. 1-5.
- Bianchi, R., & Schonfeld, I. S. (2018). Burnout-depression overlap: Nomological network examination and factor-analytic approach. *Scandinavian journal of psychology, 59(5)*, pp. 532-539.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2014). Is burnout a depressive disorder? A re-examination with special focus on atypical depression. *International Journal of Stress Management, 21(4)*, pp. 307-324.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2015a). Burnout-depression overlap: A review. *Clinical Psychology Review, 36*, pp. 28-41.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2015b). Does burnout help predict depression? A longitudinal investigation. *European Psychiatry, 30*, p 180.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2015c). Is burnout separable from depression in cluster analysis? A longitudinal study. *Social psychiatry and psychiatric epidemiology, 50(6)*, pp. 1005-1011.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2017). Physician burnout is better conceptualised as depression. *The Lancet, 389(10077)*, pp. 1397-1398.
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2019). Burnout: Moving beyond the status quo. *International Journal of Stress Management, 26(1)*, p 36.
- Bianchi, R., Schonfeld, I. S., Mayor, E., & Laurent, E. (2016). Burnout-depression overlap: A study of New Zealand schoolteachers.
- Bianchi, R., Schonfeld, I. S., & Verkuilen, J. (2020). A five-sample confirmatory factor analytic study of burnout-depression overlap. *Journal of Clinical Psychology*
- Bianchi, R., Verkuilen, J., Brisson, R., Schonfeld, I. S., & Laurent, E. (2016). Burnout and depression: Label-related stigma, help-seeking, and syndrome overlap. *Psychiatry Res, 245*, pp. 91-98.
- Bird, M. D., Chow, G. M., Meir, G., & Freeman, J. (2018). Student-athlete and student non-athletes' stigma and attitudes toward seeking online and face-to-face counseling. *Journal of Clinical Sport Psychology, 12(3)*, pp. 347-364.
- Brand, R., Wolff, W., & Hoyer, J. (2013). Psychological symptoms and chronic mood in representative samples of elite student-athletes, deselected student-athletes and comparison students. *School Mental Health, 5(3)*, pp. 166-174.
- Breuer, C., & Hallmann, K. (2013). *Dysfunktionen des Spitzensports: doping, match-fixing und gesundheitsgefährdungen aus sicht von bevölkerung und athleten*: Bundesinst. für Sportwissenschaft.
- Burlot, F., Richard, R., & Joncheray, H. (2018). The life of high-level athletes: The challenge of high performance against the time constraint. *International Review for the Sociology of Sport, 53(2)*, pp. 234-249.
- Caccese, T. M., & Mayerberg, C. K. (1984). Gender differences in perceived burnout of college coaches. *Journal of Sport and Exercise Psychology, 6(3)*, pp. 279-288.

- Chiu, L. Y., Stewart, K., Woo, C., Yatham, L. N., & Lam, R. W. (2015). The relationship between burnout and depressive symptoms in patients with depressive disorders. *Journal of Affective Disorders, 172*, pp. 361-366.
- Chyi, T., Lu, F. J.-H., Wang, E. T., Hsu, Y.-W., & Chang, K.-H. (2018). Prediction of life stress on athletes' burnout: the dual role of perceived stress. *PeerJ, 6*, p e4213.
- Coakley, J. (1992). Burnout among adolescent athletes: A personal failure or social problem? *Sociology of Sport Journal, 9*, pp. 271-285.
- Cresswell, S. L., & Eklund, R. C. (2006). The convergent and discriminant validity of burnout measures in sport: A multi-trait/multi-method analysis. *Journal Of Sports Sciences, 24*(2), pp. 209-220.
- Cresswell, S. L., & Eklund, R. C. (2007). Athlete Burnout: A Longitudinal Qualitative Study. *Sport Psychologist, 21*(1), pp. 1-20.
- De Francisco, C., Arce, C., del Pilar Vílchez, M., & Vales, Á. (2016). Antecedents and consequences of burnout in athletes: Perceived stress and depression. *International journal of clinical and health psychology, 16*(3), pp. 239-246.
- Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of research in personality, 19*(2), pp. 109-134.
- DeFreese, J., Raedeke, T. D., & Smith, A. L. (2015). Athlete burnout: an individual and organizational phenomenon. *Applied sport psychology: Personal growth to peak performance, 444*
- Delenardo, S., & Terrion, J. L. (2014). Suck it up: opinions and attitudes about mental illness stigma and help-seeking behaviour of male varsity football players. *Canadian Journal of Community Mental Health, 33*(3), pp. 43-56.
- Demerouti, E., & Nachreiner, F. (2019). Zum Arbeitsanforderungen-Arbeitsressourcen-Modell von Burnout und Arbeitsengagement–Stand der Forschung. *Zeitschrift für Arbeitswissenschaft, 73*(2), pp. 119-130.
- DGPPN et al. (2015). *S3-Leitlinie/Nationale VersorgungsLeitlinie Unipolare Depression - Langfassung*. www.depression.versorgungsleitlinien.de
- Diehl, K., Mayer, J., Thiel, A., Zipfel, S., & Schneider, S. (2019). Playing hurt: dealing with joint pain in adolescent elite athletes. *Schmerz (Berlin, Germany), 33*(1), pp. 49-56.
- Doherty, S., Hannigan, B., & Campbell, M. J. (2016). The experience of depression during the careers of elite male athletes. *Frontiers in Psychology, 7*, p 1069.
- Eades, A. M. (1990). *An investigation of burnout of intercollegiate athletes: The development of the Eades Athlete Burnout Inventory*: University of California, Berkeley.
- Egger, J. W. (2005). Das biopsychosoziale Krankheitsmodell. *Grundzüge eines wissenschaftlich begründeten ganzheitlichen Verständnisses von Krankheit. Psychologische Medizin, 16*(2), pp. 3-12.
- Eklund, R. C., & DeFreese, J. D. (2015). Athlete Burnout: What we know, what we could know, and how we can find out more. *International Journal of Applied Sports Sciences, 27*(2), pp. 63-75.
- Engel, G. L. (1976). *Psychisches Verhalten in Gesundheit und Krankheit: ein Lehrbuch für Ärzte, Psychologen und Studenten*: Huber.

- Eurofund. (2018). Burnout in the workplace: A review of data and policy responses in the EU. Luxembourg: Publications Office of the European Union.
- Fender, L. K. (1989). Athlete burnout: Potential for research and intervention strategies. *The Sport Psychologist*, 3(1), pp. 63-71.
- Fessler, N., Frommknecht, R., Kaiser, R., Renna, M., Schorer, J., & Binder, M. (2002). *Förderung des leistungssportlichen Nachwuchses - Ergebnisse der Athletenbefragung in der D-Kader-Studie Baden Württemberg 1999/2000 [Promotion of competitive youth athletes - results from the athlete evaluation cadre-d-study in Baden-Württemberg 1999/2000]* Schorndorf: Hofmann.
- Fitzpatrick, O., Biesma, R., Conroy, R. M., & McGarvey, A. (2019). Prevalence and relationship between burnout and depression in our future doctors: a cross-sectional study in a cohort of preclinical and clinical medical students in Ireland. *BMJ open*, 9(4), p e023297.
- Fogarty, G. J., & Perera, H. N. (2016). Resilience: Distinct construct or conglomerate of existing traits? *Industrial and Organizational Psychology*, 9(2), pp. 422-429.
- Frank, R., Nixdorf, I., & Beckmann, J. (2017). Analyzing the Relationship Between Burnout and Depression in Junior Elite Athletes. *Journal of Clinical Sport Psychology*, 11(4), pp. 287-303.
- Freudenberger, H. J. (1974). Staff burn-out. *Journal of Social Issues*, 30(1), pp. 159-165.
- Gerber, M., Gustafsson, H., Seelig, H., Kellmann, M., Ludyga, S., Colledge, F., . . . Bianchi, R. (2018). Usefulness of the Athlete Burnout Questionnaire (ABQ) as a screening tool for the detection of clinically relevant burnout symptoms among young elite athletes. *Psychology of Sport & Exercise*, 39, pp. 104-113. doi:10.1016/j.psychsport.2018.08.005
- Glass, D. C., & McKnight, J. D. (1996). Perceived control, depressive symptomatology, and professional burnout: A review of the evidence. *Psychology and Health*, 11, pp. 23-48.
- Golembiewski, R. T., Bourdreau, R. A., Munzenrider, R. F., & Luo, H. (1996). *Global burnout* Greenwich, CT: JAI.
- Goodger, K., Gorely, T., Lavalley, D., & Harwood, C. (2007). Burnout in sport: A systematic review. *The Sport Psychologist*, 21, pp. 127-151.
- Gould, D., Tuffey, S., Udry, E., & Loehr, J. (1996). Burnout in competitive junior tennis players: II. A qualitative analysis. *The Sports Psychologist*, 10, pp. 341-366.
- Gouttebauge, V., Jonkers, R., Moen, M., Verhagen, E., Wylleman, P., & Kerkhoffs, G. (2017). The prevalence and risk indicators of symptoms of common mental disorders among current and former Dutch elite athletes. *Journal Of Sports Sciences*, 35(21), pp. 2148-2156. doi:10.1080/02640414.2016.1258485
- Gulliver, A., Griffiths, K. M., & Christensen, H. (2012). Barriers and facilitators to mental health help-seeking for young elite athletes: a qualitative study. *BMC psychiatry*, 12(1), p 157.
- Gulliver, A., Griffiths, K. M., Mackinnon, A., Batterham, P. J., & Stanimirovic, R. (2015). The mental health of Australian elite athletes. *Journal Of Science And Medicine In Sport*, 18(3), pp. 255-261.

- Gustafsson, H., DeFreese, J. D., & Madigan, D. J. (2017). Athlete burnout: review and recommendations. *Current Opinion in Psychology, 16*, pp. 109-113.
- Gustafsson, H., Hancock, D. J., & Côté, J. (2014). Describing citation structures in sport burnout literature: A citation network analysis. *Psychology of Sport and Exercise, 15*, pp. 620-626.
- Gustafsson, H., Hassmén, P., Kenttä, G., & Johansson, M. (2008). A qualitative analysis of burnout in elite Swedish athletes. *Psychology of Sport and Exercise, 9*(6), pp. 800-816.
- Gustafsson, H., Kenttä, G., & Hassmen, P. (2011). Athlete burnout: An integrated model and future research directions. *International Review of Sport and Exercise Psychology, 4*, pp. 3-24.
- Gustafsson, H., Kenttä, G., Hassmen, P., & Lundqvist, C. (2007). Prevalence of burnout in adolescent competitive athletes. *The Sport Psychologist, 21*(1), pp. 21-37.
- Gustafsson, H., Lundkvist, E., Podlog, L., & Lundqvist, C. (2016). Conceptual confusion and potential advances in athlete burnout research. *Perceptual and Motor Skills, 123*(3), pp. 784-791.
- Gustafsson, H., Madigan, D. J., & Lundkvist, E. (2018). Burnout in athletes *Handbuch Stressregulation und Sport* (pp. 489-504). Berlin, Heidelberg: Springer.
- Gustafsson, H., Martinent, G., Isoard-Gautheur, S., Hassmén, P., & Guillet-Descas, E. (2018). Performance based self-esteem and athlete-identity in athlete burnout: A person-centered approach. *Psychology of Sport and Exercise, 38*, pp. 56-60.
- Hamann, J., Parchmann, A., Mendel, R., Bühner, M., Reichhart, T., & Kissling, W. (2013). Understanding the term burnout in psychiatry and psychotherapy. *Nervenarzt, 84*(7), pp. 838-843.
- Hammond, T., Gialloireto, C., Kubas, H., & Davis IV, H. H. (2013). The prevalence of failure-based depression among elite athletes. *Clinical Journal of Sport Medicine, 23*(4), pp. 273-277.
- Harris, B. S., & Watson, J. C. (2014). Developmental considerations in youth athlete burnout: A model for youth sport participants. *Journal of Clinical Sport Psychology, 8*(1), pp. 1-18.
- Havighurst, R. J. (1956). Research on the developmental-task concept. *The School Review, 64*, pp. 215-223. doi:10.1086/442319
- Hodge, K., Lonsdale, C., & Ng, J. Y. Y. (2008). Burnout in elite rugby: Relationships with basic psychological needs fulfilment. *Journal of Sports Science, 26*(8), pp. 835-844.
- Holden, S. L., Keshock, C. M., Forester, B. E., & Pugh, S. F. (2014). Athlete Burnout: Is the Type of Sport a Factor? *Sport Journal*
- Holmberg, P. M., & Sheridan, D. A. (2013). Self-determined motivation as a predictor of burnout among college athletes. *The Sport Psychologist, 27*(2), pp. 177-187.
- Hughes, L., & Leavey, G. (2012). Setting the bar: athletes and vulnerability to mental illness. *British Journal of Psychiatry, 200*(2), pp. 95-96.
- Ingrell, J., Johnson, U., & Ivarsson, A. (2019). Developmental changes in burnout perceptions among student-athletes: An achievement goal perspective. *International Journal of Sport and Exercise Psychology, 17*(5), pp. 509-520.

- Kaier, E., Cromer, L. D., Johnson, M. D., Strunk, K., & Davis, J. L. (2015). Perceptions of mental illness stigma: Comparisons of athletes to nonathlete peers. *Journal of College Student Development, 56*(7), pp. 735-739.
- Kellmann, M., & Kallus, K. W. (1999). Mood, recovery-stress state, and regeneration *Overload, performance incompetence, and regeneration in sport* (pp. 101-117): Springer.
- Kenttä, G., Hassmén, P., & Raglin, J. (2001). Training practices and overtraining syndrome in Swedish age-group athletes. *International Journal Of Sports Medicine, 22*(06), pp. 460-465.
- Kleinemas, M. (2010, 10.09.2010). Jan Frodeno war kurz davor, alles hinzuschmeißen. *WELT online*. Retrieved from <https://www.welt.de/sport/article9531703/Jan-Frodeno-war-kurz-davor-alles-hinzuschmeissen.html>
- Kontos, A. P., Covassin, T., Elbin, R., & Parker, T. (2012). Depression and neurocognitive performance after concussion among male and female high school and collegiate athletes. *Arch Phys Med Rehabil, 93*(10), pp. 1751-1756.
- Korczak, D., Huber, B., & Kister, C. (2010). Differential diagnostic of the burnout syndrome. *GMS Health Technol Assess, 6*, p Doc09. doi:10.3205/hta000087
- Koutsimani, P., Anthony, M., & Georganta, K. (2019). The relationship between burnout, depression and anxiety: A systematic review and meta-analysis. *Frontiers in Psychology, 10*, p 284.
- Kristof-Brown, A., & Guay, R. P. (2011). Person–environment fit *APA handbook of industrial and organizational psychology, Vol 3: Maintaining, expanding, and contracting the organization*. (pp. 3-50): American Psychological Association.
- Laursen, B. P., & Hoff, E. (2006). Person-centered and variable-centered approaches to longitudinal data. *Merrill-Palmer Quarterly, 52*(3), pp. 377-389.
- Lavallee, D., Goodger, K., Gorely, T., & Harwood, C. (2005). Burnout in sport: Understanding the process-from early warning signs to individualized intervention.
- Leiter, M. P., & Durup, J. (1994). The discriminant validity of burnout and depression: A confirmatory factor analytic study. *Anxiety, Stress, And Coping, 7*(4), pp. 357-373.
- Lemyre, P.-N., Roberts, G. C., & Stray-Gundersen, J. (2007). Motivation, overtraining, and burnout: Can self-determined motivation predict overtraining and burnout in elite athletes? *European Journal Of Sport Science, 7*(2), pp. 115-126.
- Li, C., Wang, C. J., & Kee, Y. H. (2013). Burnout and its relations with basic psychological needs and motivation among athletes: A systematic review and meta-analysis. *Psychology of Sport and Exercise, 14*, pp. 692-700.
- Li, C., Zhu, Y., Zhang, M., Gustafsson, H., & Chen, T. (2019). Mindfulness and athlete burnout: a systematic review and meta-analysis. *International journal of environmental research and public health, 16*(3), p 449.
- Lindstrom Bremer, K. (2012). Parental involvement, pressure, and support in youth sport: A narrative literature review. *Journal of Family Theory & Review, 4*(3), pp. 235-248.
- Lonsdale, C., Hodge, K., & Rose, E. (2009). Athlete burnout in elite sport: A self-determination perspective. *Journal of Sports Science, 27*(8), pp. 785-795.
- Löwe, B., Kroenke, K., & Gräfe, K. (2005). Detecting and monitoring depression with a two-item questionnaire (PHQ-2). *Journal of psychosomatic research, 58*(2), pp. 163-171.

- Lundgren-Nilsson, Å., Jonsdottir, I. H., Pallant, J., & Ahlborg, G. (2012). Internal construct validity of the Shirom-Melamed Burnout questionnaire (SMBQ). *BMC Public Health*, *12*(1), p 1.
- Mäkikangas, A., & Kinnunen, U. (2016). The person-oriented approach to burnout: A systematic review. *Burnout Research*, *3*(1), pp. 11-23.
- Malcolm, N. L. (2006). "Shaking it off" and "Toughing it out" - Socialization to pain and injury in girl's softball. *Journal of Contemporary Ethnography*, *35*(5), pp. 495-525to.
- Maske, U. E., Riedel-Heller, S. G., Seiffert, I., Jacobi, F., & Hapke, U. (2016). Prevalence and Comorbidity of Self-Reported Diagnosis of Burnout Syndrome in the General Population-Results of the German Health Interview and Examination Survey for Adults (DEGS1). *Psychiatrische Praxis*, *43*(1), pp. e1-e1.
- Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *The Maslach Burnout Inventory Manual, 2nd Ed.* Palo Alto, CA: Consulting Psychologists Press.
- Maslach, C., Jackson, S. E., & Leiter, M. P. (1997). Maslach, Burnout Inventory 3rd Edition. In C. P. Zalaquett & R. J. Wood (Eds.), *Evaluating stress: A book of resources* (pp. 191-218). London: The Scarecrow Press.
- Mitchell, T. O., Nesti, M., Richardson, D., Midgley, A. W., Eubank, M., & Littlewood, M. (2014). Exploring athletic identity in elite-level English youth football: A cross-sectional approach. *Journal Of Sports Sciences*, *32*(13), pp. 1294-1299.
- Moesch, K., Kenttä, G., Kleinert, J., Quignon-Fleuret, C., Cecil, S., & Bertollo, M. (2018). FEPSAC position statement: mental health disorders in elite athletes and models of service provision. *Psychology of Sport and Exercise*, *38*, pp. 61-71.
- Monroe, S. M., & Simons, A. D. (1991). Diathese-stress theories in the context of life-stress research: Implications for the depressive disorders. *Psychological Bulletin*, *110*, pp. 406-425.
- Moreland, J. J., Coxe, K. A., & Yang, J. (2018). Collegiate athletes' mental health services utilization: A systematic review of conceptualizations, operationalizations, facilitators, and barriers. *Journal of Sport and Health Science*, *7*(1), pp. 58-69.
- Neely, K. C. (2017). Understanding Deselection in Competitive Female Youth Sport.
- Ng, J. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-determination theory applied to health contexts: A meta-analysis. *Perspectives on Psychological Science*, *7*(4), pp. 325-340.
- Nil, R., Jacobshagen, N., Schächinger, H., Baumann, P., Höck, P., Hättenschwiler, J., . . . Holsboer-Trachsler, E. (2010). Burnout—eine Standortbestimmung. *Schweizer Archiv für Neurologie und Psychiatrie*, *161*(2), pp. 72-77.
- Nixdorf, I. (2018). Zu viel des Guten? Erkenntnisse über Depression und Burnout im Leistungssport *Was treibt uns an?* (pp. 143-154): Springer.
- Nixdorf, I., Beckmann, J., & Nixdorf, R. (2019). Prevention of burnout and depression in junior elite swimmers. *Mental Health and Well-being Interventions in Sport: Research, Theory and Practice*, p 31.
- Nixdorf, I., Beckmann, J., & Nixdorf, R. (2020). Psychological predictors for depression and burnout among German junior elite athletes. *Frontiers of Psychology*, *11*(601)

- Nixdorf, R. (2018). *Depression and burnout in (junior) elite athletes: Reviewing the state of knowledge and analysing their relationship* (Technische Universität München).
- Nixon, H. L. (1992). A social network analysis of influences on athletes to play with pain and injuries. *Journal of Sport and Social Issues*, 16(2), pp. 127-135.
- O'Neill, M., Allen, B., & Calder, A. M. (2013). Pressures to perform: An interview study of Australian high performance school-age athletes' perceptions of balancing their school and sporting lives. *Performance Enhancement & Health*, 2(3), pp. 87-93.
- Ohlert, J. (2013). Konzeption und Evaluation einer sportpsychologischen Lehrgangsbetreuung im Mädchenfußball. *Leistungssport*, 43(37-42)
- Ohlert, J., & Kleinert, J. (2014). Entwicklungsaufgaben jugendlicher Elite-Handballerinnen und -Handballer. *Zeitschrift für Sportpsychologie*, 21(4), pp. 161-172.
- Orosz, A., Federspiel, A., Haisch, S., Seeher, C., Dierks, T., & Cattapan, K. (2017). A biological perspective on differences and similarities between burnout and depression. *Neuroscience & Biobehavioral Reviews*, 73, pp. 112-122.
- Paykel, E. S. (2008). Basic concepts of depression. *Dialogues in clinical neuroscience*, 10(3), p 279.
- Pearson, C., Janz, T., & Ali, J. (2013). Mental and substance use disorders in Canada: Statistics Canada Ottawa, ON.
- Puffer, J. C., & McShane, J. M. (1992). Depression and chronic fatigue in athletes. *Clinics in Sports Medicine*, 11(2), pp. 327-338.
- Raedeke, T. D. (1997). Is athlete burnout more than just stress? A sport commitment perspective. *Journal Of Sport & Exercise Psychology*, 19(4), pp. 396-417.
- Raedeke, T. D., & Smith, A. L. (2001). Development and preliminary validation of an athlete burnout measure. *Journal Of Sport & Exercise Psychology*, 23, pp. 281-306.
- Raedeke, T. D., & Smith, A. L. (2009). *The athlete burnout questionnaire manual* Morgantown, WV: Fitness Information Technology.
- Rice, S. M., Purcell, R., De Silva, S., Mawren, D., McGorry, P. D., & Parker, A. G. (2016). The mental health of elite athletes: A narrative review. *Sports Medicine*, 46(9), pp. 1333-1353.
- Roderick, M., Waddington, I., & Parker, G. (2000). Playing hurt: Managing injuries in English professional football. *International Review for the Sociology of Sport*, 35(2), pp. 165-180.
- Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behaviour change and its maintenance: Interventions based on self-determination theory. *The European health psychologist*, 10(1), pp. 2-5.
- Ryba, T. V., Stambulova, N. B., Selänne, H., Aunola, K., & Nurmi, J.-E. (2017). "Sport has always been first for me" but "all my free time is spent doing homework": Dual career styles in late adolescence. *Psychology of Sport and Exercise*, 33, pp. 131-140.
- Sanders, G., & Stevinson, C. (2017). Associations between retirement reasons, chronic pain, athletic identity, and depressive symptoms among former professional footballers. *European Journal Of Sport Science*, 17(10), pp. 1311-1318.

- Schaal, K., Tafflet, M., Nassif, H., Thibault, V., Pichard, C., Alcotte, M., . . . Simon, S. (2011). Psychological balance in high level athletes: gender-based differences and sport-specific patterns. *PLoS One*, *6*(5), p e19007.
- Schaufeli, W. B., Bakker, A. B., Hoogduin, K., Schaap, C., & Kladler, A. (2001). On the clinical validity of the Maslach Burnout Inventory and the Burnout Measure. *Psychology & health*, *16*(5), pp. 565-582.
- Schaufeli, W. B., & Buunk, B. P. (2003). Burnout: An overview of 25 years of research and theorizing. In M. J. Schabracq, J. A. M. Winnubst & C. L. Cooper (Eds.), *The handbook of work and health psychology* (pp. 383-425). London: Wiley.
- Schaufeli, W. B., & Enzmann, D. (1998). *The burnout companion to study and practice: A critical analysis* London, UK: Taylor & Francis.
- Schmidt, G. W., & Stein, G. L. (1991). Sport commitment: A model integrating enjoyment, dropout, and burnout. *Journal Of Sport & Exercise Psychology*, *13*(3), pp. 254-265.
- Schneider, A., Köhler, J., & Schumann, F. (2016). Medien und Psychologie im Spitzensport *Sport im Spannungsfeld zwischen Medien und Psychologie* (pp. 11-33): Springer.
- Schonfeld, I. S., & Bianchi, R. (2016). Burnout and depression: Two entities or one? *Journal of Clinical Psychology*, *72*(1), pp. 22-37.
- Schonfeld, I. S., Verkuilen, J., & Bianchi, R. (2019). An exploratory structural equation modeling bi-factor analytic approach to uncovering what burnout, depression, and anxiety scales measure. *Psychological assessment*
- Schubring, A., Bub, E.-M., & Thiel, A. (2015). "How much is too much?" The social construction of elite youth athlete exercise tolerances from the coaches' perspective. *Journal of Sport and Social Issues*, *39*(4), pp. 308-331.
- Schwenk, T. L. (2000). The stigmatisation and denial of mental illness in athletes. *British Journal Of Sports Medicine*, *34*(1), pp. 4-5.
- Silva, J. M. (1990). An analysis of the training stress syndrome in competitive athletics. *Journal of Applied Sport Psychology*, *2*(1), pp. 5-20.
- Smetanin, P., Briante, C., Stiff, D., Ahmad, S., & Khan, M. (2015). *The life and economic impact of major mental illnesses in Canada*: Mental Health Commission of Canada.
- Smith, E. P., Hill, A. P., & Hall, H. K. (2018). Perfectionism, Burnout, and Depression in Youth Soccer Players: A Longitudinal Study. *Journal of Clinical Sport Psychology*, *12*(2), pp. 179-200.
- Smith, R. E. (1986). Towards a cognitive-affective model of athlete burnout. *Journal of Sport Psychology*, *8*, pp. 36-50.
- Thiel, A., Diehl, K., Giel, K. E., Schnell, A., Schubring, A. M., Mayer, J., . . . Schneider, S. (2011). The German young olympic athletes' lifestyle and health management study (GOAL study): Design of a mixed-method study. *BMC Public Health*, *11*, p 410. doi:10.1186/1471-2458-11-410
- Vallerand, R. J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation *Advances in experimental social psychology* (Vol. 29, pp. 271-360): Elsevier.
- Vargas, G., Rabinowitz, A., Meyer, J., & Arnett, P. A. (2015). Predictors and prevalence of postconcussion depression symptoms in collegiate athletes. *Journal of Athletic Training*, *50*(3), pp. 250-255.

- Wainwright, D., & Wainwright, E. (2019). The Problem of Work Stress and the Need to Re-imagine the Bio-Psycho-Social Model *Stress and Suffering at Work* (pp. 129-154): Springer.
- Weigand, S., Cohen, J., & Merenstein, D. (2013). Susceptibility for depression in current and retired student athletes. *Sports Health, 5*(3), pp. 263-266.
- Wittchen, H.-U., & Hoyer, J. (2011). Was ist Klinische Psychologie? Definitionen, Konzepte und Modelle *Klinische Psychologie & Psychotherapie* (pp. 3-25): Springer.
- Wolanin, A., Gross, M., & Hong, E. (2015). Depression in athletes: Prevalence and risk factors. *Current Sports Medicine Reports, 14*(1), pp. 56-60.
- World Health Organization. (2018). International classification of diseases for mortality and morbidity statistics. Retrieved Date from <https://icd.who.int/browse11/l-m/en>.
- Wurm, W., Vogel, K., Holl, A., Ebner, C., Bayer, D., Mörkl, S., . . . Hofmann, P. (2016). Depression-burnout overlap in physicians. *PLoS One, 11*(3)
- Wylleman, P., Alfermann, D., & Lavallee, D. (2004). Career transitions in sport: European perspectives. *Psychology of Sport and Exercise, 5*(1), pp. 7-20.
- Yang, J., Peek-Asa, C., Corlette, J., Cheng, G., Foster, D., & Albright, J. (2007). Prevalence of and risk factors associated with symptoms of depression in competitive collegiate student athletes. *Clinical Journal of Sport Medicine, 17*(6), pp. 481-487.
- Yang, J., Peek-Asa, C., Covassin, T., & Torner, J. C. (2015). Post-concussion symptoms of depression and anxiety in division I collegiate athletes. *Dev Neuropsychol, 40*(1), pp. 18-23. doi:10.1080/87565641.2014.973499
- Ziemainz, H., Abu-Omar, K., Raedeke, T., & Krause, K. (2004). Burnout im Sport. Zur Prävalenz von Burnout aus bedingungsbezogener Perspektive. *Leistungssport, 34*(6), pp. 12-17.

Declaration of own contribution

Declaration of the publication-based dissertation of Hanna Granz:

This dissertation consists of three manuscripts:

- I. Granz, H.L., Gustafsson, H., Schnell, A., Leyhr, D., & Thiel, A. (under review). Exhausted: A systematic review on the predictors of burnout and depression in competitive and elite athletes. *International Review of Sport and Exercise Psychology*.
- II. Granz, H.L., Gustafsson, H., & Thiel, A. (submitted). Burnout and depression in athletes: One and the same? *Translational Sports Medicine*.
- III. Granz, H.L., Schnell, A., Mayer, J., & Thiel, A. (2019). Risk profiles for athlete burnout in adolescent elite athletes: A classification analysis. *Psychology of Sport and Exercise*, 41, 130-141. doi.org/10.1016/j.psychsport.2018.11.005

In manuscripts II and III, analyses are based on data from the “GOAL”-project (“Individuelles Gesundheitsmanagement im Olympischen NACHwuchsLEistungssport”), which was funded by the Bundesinstitut für Sportwissenschaft (BISp). The project was headed by Prof. Dr. Ansgar Thiel. The following table presents an overview of the PhD candidate’s share of independently conducted work within the manuscripts. The specifications are guided by the “Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals“ from the International Committee of Medical Journal

Editors (ICMJE, 2018).

Nr.	Manuscript	Own share	Publisher	Journal peer review	Impact factor	Status
I	Granz, H.L., Gustafsson, H., Schnell, A., Leyhr, D., & Thiel, A. (under review). Exhausted: A systematic review on the predictors of burnout and depression in competitive and elite athletes. <i>International Review of Sport and Exercise Psychology</i> .	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	Taylor & Francis	peer review, double blind	IF: 6.905	Under review Submitted: Sept 25 th 2019
II	Granz, H.L., Gustafsson, H., & Thiel, A. (submitted). Burnout and depression in athletes: One and the same? <i>Translational Sports Medicine</i> .	4, 5, 6, 7, 8, 9, 10, 11, 12,	John Wiley & Sons Ltd.	peer review, double blind	IF: 3.631	Submitted Submitted: Dec 1st 2020
III	Granz, H.L., Schnell, A., Mayer, J., & Thiel, A. (2019). Risk profiles for athlete burnout in adolescent elite athletes: A classification analysis. <i>Psychology of Sport and Exercise</i> , 41, 130-141. doi.org/10.1016/j.psychsport.2018.11.005	4, 5, 7, 8, 9, 10, 11, 12	Elsevier	peer review, double blind	IF: 2.710 5-Year IF: 3.662	Published Submitted: Jan 19 th 2018 Resubmitted: Nov 6 th 2018 Published online: Nov 10 th 2018 Published in print: March 2019

1 = Development of study design

2 = Development of instruments/ data collection strategy

3 = Data collection and preparation

4 = Data analysis

5 = Discussion and interpretation of data

6 = Conceptualization/ idea of manuscript

7 = Drafting manuscript

8 = Formulating of manuscript

9 = Submission of manuscript

10 = Critical editing of manuscript

11 = Resubmission(s)

12 = Final approval

Plagiarism Disclaimer

I hereby declare that this dissertation thesis is my own and autonomous work. All sources and aids used have been indicated as such. All texts either quoted directly or paraphrased have been indicated by in-text citations. Full bibliographic details are given in the reference list. This dissertation includes three manuscripts, of which all have been submitted and one has been published. Aside from that, this work has not been submitted to any other examination authority.

(Signature)