The correlation between the five-factor model of personality traits and symptoms of common mental disorders in multi-national elite rugby players

H Randeree

orcid.org/0000-0002-8107-3468

Dissertation accepted in fulfilment of the requirements for the degree Master of Sciences in Psychology at the North-West University

Supervisor:	Prof P Kruger
Co-supervisor:	Prof K du Plooy

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Student number:	27295028

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بسم الله الرحمن الرحيم

"In the name of God, the Most Gracious, the Most Merciful."

I begin with the couplets taught to us by the Prophet Muhammed (Peace be upon him). Herewith, I would like to express my sincere gratitude to those that supported me along this journey:

- **God, Almighty**, for his grace and mercy every step of the way. Without whom, none of this would have been possible;
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SUMMARY

The correlation between the five-factor model of personality traits and symptoms of common mental disorders in multi-national elite rugby players

Keywords: personality, common mental disorders (CMDs), elite rugby, rugby performance, social skills, mental wellbeing, mental health, sports psychology, five-factor model

Symptoms of common mental disorders (CMDs) affect a large proportion of the general population worldwide with the prevalence of CMDs and related symptoms ranging from 16,5% to 45% amongst the general global population. Clinically diagnosed CMDs and symptoms of CMDs cause marked emotional distress and interfere with the emotional wellbeing, as well as the daily functioning of affected individuals, resulting in socio-economic impact for the individual and devastating cost for a country's economy. Recent literature indicates a drive towards understanding symptoms of CMDs and the moderating factors that play a role in their manifestation amongst various populations.

Although elite athletes are often a high functioning, very select subgroup of the general population, they are not immune to the effects of CMDs. Literature in the field of sports psychology indicates a similar prevalence of CMDs in elite athletes compared to the general population. Furthermore, personality trait variation has shown to correlate with CMDs amongst the general population and recent studies conducted amongst elite athletes in soccer, basketball and hockey have found similar correlations to the general population. However, no study could be found that explored the correlation between symptoms of CMDs and personality traits in elite rugby players. Therefore, this study aimed to investigate the prevalence of symptoms of CMDs amongst a sample of multi-national elite rugby players from England, South Africa and Ireland and to determine if any correlations exist between CMD symptoms and personality traits.

This study made use of a quantitative, cross-sectional research design with a convenience sample. This research study forms part of a larger service delivery project, facilitated by the Director of the Centre for Health & Human Performance (CHHP) at the North-West University that provides psychological support to elite rugby players internationally. Before conducting psychological interventions with various elite rugby teams, the study leader of this project assessed players using a battery of standardised psychometric assessments. The battery of assessments is packaged as the WebNeuro Sport online assessment and is facilitated by the Brain Resource Company® (BRC). Only data from players that gave informed consent for their data to be used for research purposes was utilised in this study. The data was analysed making use of descriptive and inferential statistics, namely Spearman's correlation coefficient test to determine if there were any correlations between the five-factor model of personality traits and symptoms of CMDs.

This research study revealed similar prevalence of symptoms of CMDs compared to the general population. Furthermore, the research study revealed correlations between certain personality traits and symptoms of CMDs. Neuroticism was found to have a medium to strong positive correlation with symptoms of CMDs whilst Conscientiousness, Extraversion and Agreeableness were found to have a low to moderate negative correlation with symptoms of CMDs. Since personality traits remain relatively stable throughout an individual's life, these findings provide useful information. It is recommended that elite sports personnel include a personality assessment in their preseason intervention strategy as a means of identifying players that are more likely to develop symptoms of CMDs to allow proactive interventions that are preventative rather than reactive. It is recommended that future studies investigate these correlations further by conducting longitudinal research that allow for more precise findings.

PREFACE

- This mini-dissertation is in article format complying with the requirements of rules A.5.4.2.7 as determined by the North-West University which states: According to the NWU General Academic Rules: "5.4.2.7 Where a candidate is permitted to submit a thesis in the form of a published research article or articles or as an unpublished manuscript or manuscripts in article format and more than one such article or manuscript is used, the thesis must still be presented as a unit, supplemented with an inclusive problem statement, a focused literature analysis and integration and with a synoptic conclusion, and the guidelines of the journal concerned must also be included."
- In addition, the referencing and editorial style of this mini-dissertation conform to the established guidelines provided by the Publication (7th edition) of the American Psychological Association (APA).
- There are three chapters contained within this mini-dissertation with each chapter clearly demarcated. Chapter 2 adheres to the author guidelines of the *British Journal of Sports Medicine,* an accredited and peer-reviewed journal with the intent to submit this article for publication.
- The researcher, Hasan Randeree, obtained approval from the primary investigator, Prof Pieter Kruger, to use the data before obtaining approval from the Scientific Committee (COMPRES) of the Faculty of Health Sciences at the North-West University. Furthermore, ethical approval was then granted by the Health Research Ethics Committee (HREC), to conduct the proposed study.
- Prof Pieter Kruger and Prof Kobus du Plooy, co-authors of the article comprising this mini-dissertation, have provided consent for the submission of this article for examination purposes as partial fulfilment of the requirement of the degree Master of Sciences in Clinical Psychology.

SOLEMN DECLARATION

Declaration by the researcher:

I, Hasan Randeree, hereby declare that this mini-dissertation, titled "The correlation between the five-factor model of personality traits and symptoms of common mental disorders in multi-national elite rugby players" is my own effort and has never been submitted for examination before. I further declare that the sources utilised in this dissertation have been referenced and acknowledged. Furthermore, I declare that this mini-dissertation was edited and proofread by a qualified language editor, as prescribed. I lastly declare that this research study was submitted to the Turnitin software system, and a satisfactory report was received concerning plagiarism (See Addendum C).

24/11/2020

Hasan Randeree

Student number: 27295028

LETTER OF PERMISSION

I, the supervisor of this study, hereby declare that the article, titled "The correlation between the five-factor model of personality traits and symptoms of common mental disorders in multi-national elite rugby players" written by Hasan Randeree, does reflect the research regarding the subject matter. I hereby grant permission that he may submit the mini-dissertation for examination purposes, and I confirm that the mini-dissertation submitted is in fulfilment of the requirements for the degree Master of Sciences in Clinical Psychology at the Potchefstroom Campus of the North-West University. The article may also be sent to the *British Journal of Sports Medicine* for publication purposes.

_____ 24/11/2020

Prof. Pieter Kruger PhD, C.Psych., AFBPsS

PROOF OF LANGUAGE EDITING

Dr Althéa Kotze

Independent, qualified language practitioner

Language editing (English & Afrikaans)

Translation (English–Afrikaans–English)

22 November 2020
althea.erasmus@gmail.com
4 Ixia Close
Yzerfontein
7351
South Africa

To whom it may concern

This document confirms that the title listed below was edited for appropriate English language use, spelling, grammar, punctuation and style by Dr Althéa Kotze.

MANUSCRIPT TITLE: *The correlation between the five-factor model of personality traits and symptoms of common mental disorders in multi-national elite rugby players*

STUDENT: Hasan Ahmed-Salim Randeree

STUDENT NUMBER: 27295028

DATE ISSUED: 22 November 2020

Althéa Kotze · Accredited language practitioner · APEd (South African Translators' Institute, no 1001073) · PhD Afrikaans and Dutch · MA Afrikaans and Dutch · MA Applied Linguistics · BA Hons · BA · PGCE · 4 Ixia Close · Yzerfontein · 7351 · South Africa
+27 (0) 823518509 (m)

STRUCTURE OF RESEARCH MINI-DISSERTATION

Chapter 1 presents an overall introduction and contextualisation of the study, followed by the literature review and rationale for this study. Chapter 2 contains the article: *The correlation between the five-factor model of personality traits and symptoms of common mental disorders (CMDs) amongst multi-national elite rugby players*, which was prepared according to the author's guidelines of the *British Journal of Sports Medicine*. See addendum for the guidelines used by the author, as stipulated by the *British Journal of Sports Medicine.* Chapter 3 presents a critical reflection by the researcher on the current study before concluding with the complete reference list and addendums.

CHAPTER 1: INTRODUCTION

1.1 Introduction

This chapter of the mini-dissertation provides the reader with an in-depth overview of the literature to ensure a complete understanding of the important concepts presented in this research study. The main topics of discussion include 1) symptoms of common mental disorders (CMDs); 2) prevalence of symptoms of CMDs; 3) defining elite athletes; 4) the five-factor model of personality, and 5) elite sports industry. This section also includes the problem statement, aims and overview of the methodology used for this study.

1.2 Defining common mental disorders (CMDs)

Common mental disorders (CMDs) typically present as clinically significant symptoms of stress, anxiety, and depression, with other disorders such as substance abuse often occurring comorbidly (Petersen et al., 2016). CMDs cause marked emotional distress and interfere with the daily functioning of affected individuals, resulting in socio-economic impact for the individual and devastating cost for a country's economy (Kessler et al., 2009; Trautmann et al., 2016). Henceforth, for the purpose of this mini-dissertation, the World Health Organisation's (WHO) definition of CMDs will be used which defines CMDs as clinically significant symptoms of depression, anxiety and accompanying stress that are highly prevalent in the global population (2017). This definition includes mood and anxiety disorders which meet the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5) as well as mental health symptoms that may be significant but do not meet the criteria for a full diagnosis (American Psychiatric Association (APA) (2013). Although symptoms of CMDs may not meet the full criteria for a formal DSM-5 diagnosis, these symptoms may still impair the quality of life and daily functioning of an individual (Gouttebarge et al., 2017a).

1.3 Prevalence amongst the general population

Research indicates that up to 16,5% of South Africans struggle with a common mental disorder (CMD) during an average year, with close to a third of the population having experienced a CMD at least once during their lifetime (Petersen et al., 2016). This number seems to be even higher in developed countries where more accurate and comprehensive statistics are being recorded. In England, for example, statistics indicate that around one in six adults (17%) surveyed during a 12-month period met the criteria for a CMD (Stansfeld et al., 2016). O'Doherty et al. (2020) found in a study looking at a sample of 3845 active patients around 100 general practices in Ireland, that approximately 16% of the patients presented with a CMD. It has been estimated by the Australian Institute of Health and Welfare (2018), that 1 in 5 Australians (20%) between the ages of 16-85 will experience a CMD each year with 45% of the population experiencing a CMD at least once in their lifetime. A systematic review and meta-analysis using a combined population of 829 673 respondents with surveys undertaken in 63 countries concluded that almost 20% of adults experienced a CMD within the previous 12 months and 29% across their lifetime (Steel et al., 2014). Considering the occurrence of CMDs amongst the general population, sporting personnel have sought to investigate the prevalence of CMDs amongst elite athletes.

1.4 Defining elite athletes

Several definitions in sports psychology research are used to define elite athletes that cause confusion and have implications for studies conducted in this field. Swann et al. (2015) conducted a systematic review of available literature to synthesise and suggest a definition for elite athletes. They found that more than 60% of articles included in their study defined elite athletes as those competing at international or national level of any sport (Swann et al., 2015). Therefore, for the purpose of this study, elite athletes will be defined as athletes competing in sport at international or national level. The participants of this study are rugby players participating at trans-national or national level rugby and are therefore considered elite athletes.

1.5 CMD prevalence amongst elite athletes

Amongst Australian, Dutch, and French elite athletes, the prevalence of symptoms of CMDs ranged broadly from 17% to 45% (Gouttebarge et al., 2016; Gulliver et al., 2015; Schaal et al., 2011). A study conducted on elite Dutch soccer players found CMDs in the form of anxiety/depression in 38% of cases with associated substance abuse in 9% of cases (Gouttebarge et al., 2015). A recent study on elite South African rugby players indicated prevalence rates of 4.2% for anxiety and depression with almost half (47.9%) of the players indicating some sort of excessive alcohol use (Grobler et al., 2019). Gouttebarge et al. (2016) investigated the prevalence and determinants of symptoms of CMDs in retired elite rugby players from France, Ireland, and South Africa. They found the prevalence of symptoms of CMDs to range from 15-62% amongst retired elite rugby players. Although the studies mentioned above indicate that the prevalence of CMD symptoms amongst elite athletes may be high when compared with the general population, it may be even higher than reported. Underreporting could be due to inconsistent methodology, erratic reporting and stigma (Newman et al., 2016). Seeking help is often perceived by elite athletes as a sign of weakness and due to a lack of understanding of the potential influence of psychology on performance, athletes are also reluctant to seek support for mental health problems (Rice et al., 2016).

1.6 Factors impacting the health of the elite athlete

Due to the many stressors present during a professional sport career, it might not be surprising that the occurrence of CMD related symptoms amongst elite athletes are so high. Literature has indicated that an elite sport career is characterised by more than 640 distinct stressors that could induce symptoms of CMDs (Arnold & Fletcher, 2012). However, different types of sports have unique demands with divergent moderating factors that differentiate the stressors athletes experience (Steinfeldt & Steinfeldt, 2012). As a result, further research may benefit from exploring the moderating factors (e.g., sense of self, coping skills and personality traits)

influencing the occurrence of CMDs amongst elite athletes in a specific sport in more depth (Doherty et al., 2016). Therefore, this study aimed to explore the moderating factor of personality and its relationship with the occurrence of symptoms of CMDs amongst elite rugby players.

1.7 Defining personality

Personality trait variation is one of the moderating factors which has been of interest in research which explored CMDs, due to its close link with a wide variety of major life outcomes (Hengartner, 2015; Krueger & Eaton, 2010). Allport (1961) defines personality as "a dynamic organisation, inside the person, of psychophysical systems that create the person's characteristic patterns of behaviour, thoughts and feelings" (p. 28). This definition implies that personality consists of a pattern of relatively stable traits (Kaiseler et al., 2019). Furthermore, personality trait variation is a biological mechanism that influences not only interpersonal functioning, but also physical functioning and mental health (Ormel et al., 2013). Personality can be assessed in different ways, one of which is through employing personality inventories. Such inventories refer to structured methods of personality assessment which usually contain several fixed statements or questions. Participants are required to indicate their responses to each statement or question by indicating to what extent each statement or question applies to them. In describing personality, such assessment measures can highlight a person's personality tendencies, attributes, or traits. One such inventory that is often used to determine personality is the five-factor model of personality.

1.8 The five-factor model of personality

Psychology on personality traits has a long history with many different proposed theories (Lombardo & Foschi, 2003). However, the five-factor model of personality has been shown to capture much of the variance in personality trait ratings, independent of culture and language, and provides a common framework in which the different and diverse systems of personality can be investigated (Kaiseler et al., 2012). The five traits represent personality at the broadest level of

abstraction in which each trait provides several more distinct personality facets (Carver & Scheier, 2008). Extraversion measures how outgoing and gregarious an individual is, and those who score high in this personality trait are generally energetic, talkative, passionate, joyful, sometimes even dominant. Also, they generally enjoy seeking the company of others (Allen et al., 2011). The Openness personality trait refers to an individual's tendency to be inventive, imaginative, curious and in search of new experiences (Allen et al., 2011). Agreeableness refers to an individual's concern for cooperation and social harmony with others (Allen et al., 2011) while the Conscientiousness trait describes an individual's ability to work hard, be methodical and organised, while also displaying healthy, assertive goal-directed behaviour (Allen et al., 2011). It tends to measure and indicate how thorough, diligent, and efficient an individual is. The last of the five personality traits is Neuroticism. This trait assesses an individual's tendency to be emotionally unstable, frequently worried, tensed, and fearful and it includes facets of anxiety, hostility, depression, self-consciousness, impulsivity, and vulnerability (Allen et al., 2011).

1.9 Five factor Personality traits and related aspects in elite athletes

Personality is not only important in the management of interpersonal relationships, but also has an impact on behavioural patterns which are related to the functioning and integration of individuals into sports teams (Allen et al., 2013). According to Obmiński et al. (2011), an athlete's personality profile may be of importance in estimating their ability to cope with typical future challenges. Therefore, researchers have explored the relationship between personality and various aspects of athletes' functioning, using a variety of research designs (Allen et al., 2013).

Qualitative findings indicate that coaches believe that personality is a key aspect for predicting the development of an athlete's sporting career (Obmiński et al., 2011). In particular, the Neuroticism trait was found to be associated with a selection of less adaptive coping strategies and lower levels of reported coping effectiveness (Kaiseler et al., 2012). The other four traits used more adaptive coping strategies which were rated as effective (Kaiseler et al., 2012). Therefore,

these personality traits can be considered as protective factors against the development of CMDs. In a meta-analysis of 22 to 39 independent samples and 1439 to 2243 teams, it was revealed that a positive correlation exists between the average levels of Agreeableness, Conscientiousness and Extraversion in a team and the team's performance (Bell, 2007). On the other hand, a study conducted in Italy with a sample of 133 elite athletes from soccer, basketball, and hockey, found an association between Neuroticism and its significant role in anxiety and depression symptomatology (Petito et al., 2016). The above findings provide evidence that personality traits play a significant role in individual wellbeing and overall team performance in elite sport.

1.10 Theoretical models for understanding the role of personality in CMD occurrence

Research indicates that there are specific personality traits that substantially relate to the development of CMD symptoms (Petito et al., 2016; Hengartner et al., 2016b). Previous studies have established that personality traits significantly relate to major depression (Hengartner et al., 2016a; Kendler et al., 2006), substance use (Turiano et al., 2012), burnout (Rössler et al., 2015) and individual resilience capabilities (Overstreet et al., 2017; Hengartner et al., 2016a). Neuroticism particularly has been found to have a positive correlation with the occurrence of CMDs (Jeronimus et al., 2016). In a meta-analysis on 59 longitudinal studies with 443 313 participants, the results indicated that Neuroticism explained 51% of the total variance in the repeatedly assessed severity of psychopathology over time (Jeronimus et al., 2016). Findings from a longitudinal community study over 30 years found that Neuroticism related significantly to major depression, anxiety disorders, substance use disorders and general severity of psychopathology (Hengartner et al., 2016b). These findings suggest that high levels of Neuroticism and psychopathology are not only closely interwoven, but that Neuroticism may also be a key risk factor for the development of CMDs.

Furthermore, due to personality trait variation being a moderating factor influencing CMDs, psychopathological research has advocated for personality-centred models of CMDs

(Hengartner et al., 2016b; Ormel et al., 2013). Whilst there are several theoretical etiological models, there is no consensus regarding the exact relationship between personality and psychopathology (Hengartner et al., 2016b). Some of the prominent models are the predisposition model, scar model, shared factor model and pathoplasty model (Ormel et al., 2013; Hengartner et al., 2016b). Each model is significantly valid in predicting a relationship between personality and the occurrence of symptoms of CMD. However, they each differ regarding the dynamics of the relationship. The predisposition model theorizes that personality is an independent causal risk factor for the development of CMDs (Ormel et al., 2013). Whilst the pathoplasty model postulates that personality affects only the severity and course of a CMD, but has no direct effect on the onset of CMDs (Hengartner et al., 2016b). On the other hand, the scar model refers to enduring effects of psychopathology, that may alter personality traits, causing individuals who have experienced CMDs to have similar personality traits (Hengartner et al., 2016b). Finally, the shared-factor model hypothesizes that personality and psychopathology share the same underlying aetiological factors, stating that both conditions have a common cause (Clark, 2005). Confirmation of a causal link between personality traits and CMDs would provide a unique opportunity for effective and sustainable prevention and intervention programmes (Barlow et al. 2014; Soskin et al. 2012).

Longitudinal research conducted over 30 years indicates that the aetiological model, which is most relevant for public mental health is the predisposition model (Hengartner et al., 2016b). In their longitudinal study, Hengartner et al. (2016b) found compelling evidence for a temporally sequenced relationship between Neuroticism and depression that may be suggestive of this causal relationship. There is also evidence that suggests Neuroticism plays a significant role in the aetiology of CMDs that may develop in response to stressful sports-related events (Petito et al., 2016). Therefore, the predisposition model provides a valuable explanation for the role of Neuroticism as an independent risk factor causally related to psychopathology. Therefore, personality must be incorporated into our understanding of CMD aetiology when developing

interventions and support programs for elite athletes. This understanding will allow prevention and intervention strategies to be targeted at personality traits, and not at their secondary CMDs. This would allow sport psychology consultants to proactively equip at-risk individuals with coping mechanisms to bolster their mental health and reduce the occurrence of CMDs.

1.11 Orientation and problem statement

In the general population, CMDs cause marked emotional distress and interfere with the emotional wellbeing as well as the daily functioning of affected individuals, resulting in socio-economic impact for the individual and devastating cost for a country's economy (Trautmann et al., 2016; Kessler et al., 2009). The prevalence of CMDs amongst the general global population is significant, ranging from 16,5% to 45% (Petersen et al., 2016; Stansfeld et al., 2016; Steel et al., 2014). Accordingly, given the high prevalence of CMDs in the wider community, it is of interest to sports personnel (performance directors, administrators, coaches and sport psychologists) to ascertain whether the prevalence of CMD incidence in the athletic population and the factors relating to it are comparable to the general population or whether there are any significant differences (Gouttebarge et al., 2017a). Increased understanding of the prevalence of CMDs and an understanding of the related factors amongst elite athlete may provide sporting personnel with the knowledge to adequately provide mental health support to this group of individuals.

The sport industry is a prominent and important phenomenon in many countries, capable of uniting people from various cultures, races and political affiliations with billions of dollars being spent each year on the industry (Chari, 2017; Giampiccoli et al., 2015). The athletes in this environment are expected to perform under high pressure and experience a wide range of stressors which make them susceptible to CMD's (Grobler et al., 2019). Recently, there is a growing concern for the mental health of elite athletes, with a recent review indicating that further research is required in the development of appropriate mental health support systems for elite athletes (Rice et al., 2016). Although elite athletes are often a high functioning, very select subgroup of the

general population, they are not immune to the effects of CMDs. Research shows that when the mental health of an athlete is compromised, it has an influence on the players' performance consequently impacting the rest of the team in team sports (Grobler et al., 2019).

Besides, there are moderating factors that play a role in the development of CMDs, such as personality trait variation. Personality trait variation is one of the moderating factors of interest in research that explored CMDs due to its close link with a wide variety of major life outcomes (Hengartner et al., 2015; Krueger & Eaton, 2010). Personality is not only important in the management of interpersonal relationships, but also has an impact on behavioural patterns related to the functioning and integration of individuals into sports teams (Allen et al., 2013). Certain personality traits have shown to correlate with CMDs amongst the general population (Hengartner et al., 2016a). Researchers have even advocated for personality-centred models of CMDs due to the moderating influence of personality trait variation on CMDs (Hengartner et al., 2016b; Ormel et al., 2013).

Despite the significant role of personality in elite athlete mental health and performance, no studies could be found that specifically investigated personality and its relationship with symptoms of CMDs amongst elite rugby players. Therefore, this study aimed to investigate the prevalence of symptoms of CMDs amongst elite rugby players and the relationship between symptoms of CMDs and personality trait variation. These aims are in line with the challenge set by the International Society of Sport Psychology that called for sport psychology researchers and practitioners to apply a holistic view on athletes' mental health and to be aware of the full range of their current and potential stressors and risk factors (Schinke et al., 2018). Such an investigative study is important to raise awareness for all stakeholders in professional rugby about the occurrence of symptoms of CMDs and the associated factors amongst elite rugby players. Findings from this and similar studies will aid the relevant administrators and coaching personnel to ensure better performance and enhance the mental health and wellbeing of individuals within their

professional environments. This understanding may then be incorporated into the development of interventions and support programs for elite rugby players. Accordingly, the primary aim of this study is to determine the prevalence of symptoms of CMDs amongst multi-national elite rugby players, while the secondary aim is to explore the relationship between the five-factor model of personality and symptoms of CMDs amongst multi-national elite rugby players.

1.12 Aim of the study

This study aims to investigate the prevalence of symptoms of common mental health disorders (CMDs) amongst a sample of multi-national elite rugby players from England, South Africa and Ireland and determine if there are any correlations between the prevalence of CMD symptoms and personality traits. This quantitative study was done through the Faculty of Health Sciences at the North-West University in conjunction with the Director of the Centre for Health & Human Performance (CHHP) at North-West University (Prof P Kruger). The CHHP delivers performance enhancement and clinical services to elite athletes globally, including interventions in the form of psychological support. This study made use of secondary data that was gathered by the Director of the CHHP and principal investigator as part of several service delivery projects which aimed to provide psychological support to elite rugby players. This study used a quantitative, cross-sectional research design with a convenience sample to achieve the following research objectives:

1. To assess the prevalence of symptoms of CMDs amongst multi-national elite rugby players.

2. To determine the relationship between the five-factor model of personality traits and the prevalence of symptoms of CMDs amongst multi-national elite rugby players.

The study made use of descriptive and inferential statistics, namely Spearman's correlation coefficient test, to determine the prevalence of symptoms of CMD's and to investigate if there was a correlation between personality traits and the occurrence of CMDs. Spearman’s correlation was

selected over Pearson's product-moment correlation because the distribution of the data was skewed.

1.13 Methodology and Research paradigm

Scientific research is guided by a basic set of beliefs which the researcher abides by, based on their world view or paradigm (Creswell, 2007). This quantitative study is based on a positivistic world view characterised by empirical research where most phenomena can be reduced to quantifiable variables. Quantitative research makes use of logical positivism through experimental methods and quantitative measures to test hypothetical generalizations (Golafshani, 2003). Replicated findings are thus considered true and allow for phenomena to be explained in a manner that represents the truth (Sale et al., 2002).

Furthermore, through the combination of deductive reasoning and empirical observations, researchers seek to discover and confirm hypotheses that can be used to explain and predict general patterns (Tuli, 2011). This study is empirical and therefore makes use of systematic collection and analysis of data collected through formal assessment measures (Stangor, 2011). The specific methods used to collect, analyse, and understand the data will be discussed below.

1.14 Research design

This study used a quantitative, cross-sectional research design with a convenience sample. The study was conducted on secondary data that was gathered during several service delivery projects with multi-national teams, performing in trans-national and national competitions between 2009 to 2019.

A cross-sectional study design is a type of observational study design that is used to examine the relationship between mental health disorders and other variables of interest (Setia, 2016). In a cross-sectional study, the investigator measures the variables as they exist in a defined

population at a single point in time (Setia, 2016). This type of study can usually be conducted relatively fast and is considered inexpensive (Setia, 2016). With this design, we estimated the prevalence of symptoms of CMD in a cross-sectional measure of the given sample at a single point in time. Since it is a single measurement of exposure and outcome, it is difficult to derive causal relationships from cross-sectional analysis (Setia, 2016). However, since personality is a relatively stable construct and because even a single occurrence of CMDs can negatively impact a rugby player's performance, it was a useful design to address the research aims of this study. This design has been used in a recent study that sought to determine the interactive effects of personality and coping effectiveness in sport and another study which looked at the prevalence of CMDs and the inference of potential risk factors amongst elite Dutch athletes (Kaiseler et al., 2019; Gouttebarge et al., 2017b).

1.15 Participants and context

As standard protocol during service delivery, the principal investigator PI of this project (Prof P Kruger) assessed each elite rugby player using the WebNeuro Sport online assessment (The Brain Resource Company [BRC], 2008). Thereafter the data was used to tailor interventions according to each player's individual psychological needs. The participants formed part of multi-national teams who performed in trans-national and national competitions between 2009 to 2019 (Pro14 in Ireland, Premiership in England and Super Rugby in South Africa).

Furthermore, informed consent was obtained from players for their data to be used for future research. The aim of the procedure was explained to each participant and they were informed that the data would be used for future research. The players who agreed to their data being used for future research purposes were required to complete an informed consent form. Players had to be male, participating at elite level rugby at the time of assessment and able to use their dominant hand during the data collection procedure. Players completed the WebNeuro Sport online assessment consisting of a demographic questionnaire and seven additional assessments.

However, for this study, only two of the seven assessments were used, namely the NEO five-factor personality scale (NEO-FFI -3) and the Depression, Anxiety and Stress scale (DASS42). Only the players who consented for their results to be used for research purposes were used for further analysis. The following inclusion criteria was used when selecting the sample for analysis:

- All participants were contracted professional rugby players and part of their respective elite rugby teams participating in trans-national or national level competitions.
- All participants had to be literate in English and capable of using a standard computer.
- All participants had to be injury free on their dominant hand at the time of the assessment.

The following exclusion criteria was applied to the population when selecting participants for data analyses:

- Participants who were illiterate in English and unable to use a computer.
- Participants who declined giving voluntary consent for their data to be used for research purposes.
- Participants who sustained an injury to their dominant hand.
- Participants that did not complete the assessment protocol.

1.16 Data collection

The standardised assessment for each elite team of rugby players occurred during the preseason before the start of the respective competitions. The study leader was contracted as a performance psychologist for the respective teams between 2009 and 2019 and the assessments coincided with the preseason service delivery project. As part of the standard assessment protocol, the procedure for each of the assessments remained the same for each team during this period. Participants from each team were tested using an online assessment in either a computer laboratory, the team room, or analyses room at their respective clubs. All the venues were set up

to ensure that participants had the necessary privacy with limited distractions. On the day of the assessment, the procedures were explained to all the participants and thereafter, the players were given time to ask questions. The collected data was stored on BRC's database and later exported in Excel format and coded for the purpose of anonymization. Thereafter it was emailed to the primary investigator and stored on the primary investigator's password protected computer.

1.17 Assessment instruments

The primary investigator preferred the use of WebNeuro Sport because of its practical value. It is also one of the few online sport-specific assessments comprising relevant assessments combined into a single battery. Another advantage of this assessment is the comprehensive computer-generated report produced for each participant upon completion. These reports allowed for timely feedback from the consulting psychologist to the players once the assessments were completed.

1.17.1.1 Validity and reliability:

The WebNeuro Sport protocol consists of a demographic questionnaire and seven psychometric assessment instruments. Namely the Carlstedt Subliminal Attention, Reactivity and Coping Scale-Athlete Version (CSARCS-A); a cognitive functioning assessment; the Brain Resource Inventory for Screening Cases (BRISC); a Depression Anxiety Stress Scale (DASS); a sleep scale; Brain Resource Inventory for Emotional Intelligence Factors (BRIEF) and the NEO-FFI-3 Personality assessment (BRC, 2008). However, for the purpose of this study, only the NEO five-factor personality scale (NEO-FFI -3) and Depression, Anxiety and Stress scales (DASS42) were used.

1.17.1.2 DASS (42)

The Depression, Anxiety and Stress Scale (DASS) is a mental health screening tool and forms part of the WebNeuro Sport battery. The scale was designed and proposed by the Australian Psychological Society to efficiently measure the core symptoms of stress, anxiety and depression and has demonstrated positive psychometric properties in adult patients with anxiety and depression (Gloster et al., 2008; Lovibond & Lovibond, 1995). It has been translated into more than 40 languages and has shown acceptable internal consistency across racial groups (Norton, 2007). It consists of a four-point Likert scale, consisting of 42 items that examine the level of depression, anxiety, and accompanying stress of the subject (Basha & Kaya, 2016). During administration, each player completed the 42 items of the DASS, and the respective items were then added to calculate their depression, anxiety and stress scores. Items measuring stress include statements such as “I found that I was very irritable” and “I found it hard to wind down” (Lovibond & Lovibond, 1995). Items measuring depression included statements such as “I felt that life was meaningless” and “I felt sad and depressed” (Lovibond & Lovibond, 1995). The items measuring anxiety included statements such as “I felt I was close to panic” and I felt scared without any good reason” (Lovibond & Lovibond, 1995). Construct validity was calculated using the explanatory factor analysis and loaded as .36 to .80 for depression, .31 to 64 for anxiety and .40 to .76 for stress (Lovibond & Lovibond, 1995). The correlation between sub-dimensions is calculated as .38 for depression-anxiety, .46 for anxiety-stress, and .54 for depression-stress (Lovibond & Lovibond, 1995). As a result of compliance validity between The Beck Depression Inventory and The Beck Anxiety Inventory, two widely used assessments, it has been determined that the DASS is highly related (.74 and .81 respectively) (Lovibond & Lovibond, 1995). The Cronbach's Alpha internal consistency coefficients of .96, .89 and .93 have been determined for depression, anxiety, and stress scales, respectively (Lovibond & Lovibond, 1995).

Furthermore, in terms of the population size used when carrying out research on the validity and reliability of the DASS, it was determined that the number of participants was efficient for statistical analysis (Tabachnick, & Fidell, 2007). No specific research has been conducted to validate the DASS-42 in South Africa or the United Kingdom (UK). However, there have been studies conducted using the DASS-21 which is a shortened version of the DASS-42 and has been found to adequately capture the sub-scales of the DASS-42 (Lovibond & Lovibond, 1995). A recent study confirmed that the DASS-21 is a valid and reliable instrument for measuring depression, anxiety, and stress of working adults in South Africa (Dreyer et al., 2019). Research also indicates that the DASS-21 is a valid measure of depression, anxiety, and stress in the general adult UK population (Henry & Crawford, 2011).

1.17.1.3 NEO-FFI-3

The NEO-FFI -3 is a shortened version of the NEO PI-R and has only 60 items (McCrae & Costa, 2010). The shortened NEO only provides information on the five broad domains of personality, which is of interest in the proposed study and it does not include the detailed facets scores (McCrae & Costa, 2010). The NEO-FFI-3 is used more often for research purposes and the internal consistencies reported in the manual were Neuroticism = .79, Extraversion = .79, Openness = .80, Agreeableness = .75 and Conscientiousness = .83 (McCrae & Costa, 2010). Furthermore, the psychometric properties of the NEO scales have been found to generalize across ages, cultures, and methods of measurement (McCrae et al., 2011). The NEO-FFI-3 revealed Cronbach Alpha values of .68 (Agreeableness), .73 (Openness), .77 (Extraversion), .81 (Conscientiousness) and .86 (Neuroticism) (McCrae & Costa, 2010). Finally, a study conducted on 11985 students from 50 different cultures supports the hypothesis that features of personality traits are common to all human groups (McCrae et al., 2005).

1.18 Data analysis

The Statistical Package for the Social Sciences (SPSS) for Windows (Version 26.0) was used to process the data and was facilitated by the NWU statistical consultation services of the North-West University (NWU). Before conducting all statistical computations, the underlying assumptions of the parametric statistical techniques were evaluated, and the data did not meet the criteria for parametric analysis. Initially, the data were screened for missing values, and, depending on whether the missing cases were random or not, an appropriate method for missing value replacement was used. The missing values were due to formatting error on the excel sheet. Therefore, missing values were replaced by manually scoring the profiles of participants that had not been automatically computed by the excel formula. Thereafter, the distribution of the data was evaluated through histograms and q-q plots. A total of 251 completed DASS 42 profiles were analysed for the fulfilment of the first aim of the study. However, for the second aim of the study, 18 NEO-FFI-3 profiles were incomplete and as a result only the remaining 233 profiles were analysed for the correlation between personality traits and CMD symptoms.

Firstly, the data was analysed to identify the mean scores and standard deviation of the 3 sub-scales of the DASS-42. Thereafter, the prevalence of symptoms of CMDs amongst the selected sample was determined using the cut-off scores for normal, mild, moderate, severe and extremely severe symptoms for each of the 3 sub-scales of the DASS 42 (Lovibond & Lovibond, 1995). The cut-off scores for clinically significant symptoms were determined using the relevant values established in the DASS-42 manual (Lovibond, & Lovibond, 1995). The results from the analysis were compared with the general population using descriptive statistics to achieve the first objective of the study. Factor scores were then calculated for the five traits of the NEO-FFI-3 questionnaire. Thereafter, these results were analysed using Spearman's correlation coefficient to determine if a correlation exists between any of the five personality traits and the prevalence of

symptoms of CMDs. Through a process using inferential statistics, the results from the data analysis were used by the researcher to achieve the second objective of the study.

1.19 Ethical considerations

The researcher firstly acquired approval from the Department of Psychology, North-West University, Potchefstroom Campus (NWU) to commence with the application process to COMPRES, the research and ethics committee of the School of Psychosocial Health NWU. Thereafter, ethical approval was obtained from the Health Research Ethics Committee (HREC), North-West University, Potchefstroom Campus. The clearance number is NWU-00327-20-A1 (See addendum E). Written permission was also obtained from the PI (Prof P Kruger) to make use of the dataset.

During the data collection phase, the data was gathered by a registered clinical psychologist, the PI, during the period from 2009 to 2019, as part of service delivery projects. The data was collected using the programme software provided by the Brain Resource Company (BRC). All consenting participants were made aware at the time of the assessments, that the data may be used in future to conduct further research. They were furthermore ensured regarding anonymity, confidentiality, and privacy of their data. The data captured from the completed assessment was automatically entered into a database of the BRC after which a comprehensive report was generated. On request the raw data was sent by the BRC whereupon it was received by the PI on an Excel sheet (password protected) and only included participant numbers instead of personal information of the participants. No alterations or changes were made to the data since it was gathered. Only the PI who served as the study leader, co-researchers and the data analyst had access to the data which was stored on a password-protected computer.

During the data collection phase participants were verbally explained the details of the BRC online service and the manner in which their data may be used in the future. It was explained to them that the data would be stored and possibly be used in an anonymised research study in the

future. Participants were given the opportunity to ask questions and clarify any uncertainties regarding their personal information. Only those participants that agreed to the terms set out by BRC completed the online questionaries and in doing so consented for their data to be used in the current research study which was overseen by the PI that provided the service delivery intervention during the respective elite rugby seasons.

More recently, since 2015 the PI made use of a more comprehensive participant informed consent form for service delivery projects and possible future research for elite rugby players. This document further explains the outcomes and objectives of the possible future research. Included in these outcomes and objectives is a clause stating that, "Data will be used to explore various correlations and or relationships between all the various constructs that were measured". This study falls within this specific clause and was therefore encompassed in the informed consent form.

An individual report and individual feedback had been provided to all participants by the PI, and ongoing psychological support was available during each respective season. No significant negative reactions were recorded during the service delivery process, and any questions or difficulties were effectively dealt with by a registered clinical psychologist. To prevent the loss of anonymity, participant numbers were used, and other personal information which could lead to the identification of a participant was not included in the dataset. The teams included in the study were anonymised to reduce the risk of any possible identification.

1.20 Conclusion

This chapter presents an overall introduction and contextualisation of the study, followed by the literature review and rationale for this study. Chapter 2 is presented in article format and will include an abstract, a brief literature review, the methodological process followed, a discussion of the results obtained, ethical considerations, recommendations and limitations, and a

conclusion. The article is written with the intention of being submitted to the *British Journal of Sports Medicine* and is thus written to fit its specific requirements.

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CHAPTER 2: ARTICLE

The correlation between the five-factor model of personality traits and symptoms of common mental disorders (CMDs) amongst multi-national elite rugby players

2.1 Abstract

Aims: This study aimed to investigate the prevalence of symptoms of common mental disorders (CMDs) amongst a sample of multi-national elite rugby players from England, South Africa, and Ireland and to determine if any correlations existed between CMD symptoms and personality traits.

Design: This study used a quantitative, cross-sectional research design with a convenience sample of 251 rugby players.

Setting and Participants: The study was conducted on secondary data that was gathered during several service delivery projects with multi-national teams, performing in trans-national and national level competitions from 2009 to 2019 (Pro14, English Premier Rugby and Super Rugby). Before commencement of any psychological intervention strategies, rugby players completed the WebNeuro Sport (BRC) online psychometric assessment battery, including the DASS and NEO-FFI. Only the data from players who provided informed consent for research purposes was included in this study. A total of 18 data sets were missing some values for the NEO-FFI, so the remainder (N=233) were analysed for the correlation analysis.

Results: A total of 98 players (39%) displayed CMD symptoms above the normal range, with 153 players (61%) reporting normal levels on all three of the subscales of the DASS-42 (depression, anxiety, and stress). There was also a moderate to strong positive correlation found between the three CMD symptoms and Neuroticism on the NEO-FFI: depression ($r = 0.435$), anxiety ($r = 0.356$) and stress ($r = 0.389$). Conscientiousness displayed a low negative correlation with depression ($r = -0.215$) and anxiety ($r = -0.16$). Extraversion also displayed a low negative correlation with depression ($r = -0.177$) and anxiety ($r = -0.179$). Whilst Agreeableness displayed a low negative

correlation with all three symptoms of CMDs: stress (r = -0.266), anxiety (r = -0.187) and depression (r = -0.141).

Conclusion: Elite rugby players are as likely to develop symptoms of CMDs, if not more, than the general population. Neuroticism appeared to correlate with the tendency to develop CMD symptoms, and hence assessing the personality traits of elite rugby players and incorporating mental health screenings throughout the season can help coaches and management in planning supportive interventions. Based on the results we recommend that screening players may prove to be a valuable proactive approach towards reducing the symptoms of mental health disorders that could affect the wellbeing and performance of elite rugby players.

Keywords: common mental disorders, elite athletes, personality, correlation, rugby, five-factor model

2.2 Introduction

Common mental disorders (CMDs) typically present as clinically significant symptoms of stress, anxiety, and depression, with other disorders such as substance abuse often occurring comorbidly (Petersen et al., 2016). In this article, the description of CMDs by the World Health Organisation (WHO) (2017) will be used and is defined as clinically significant symptoms of depression, anxiety and accompanying stress ranging from mild to severe that are highly prevalent in the global population. This definition includes mood and anxiety disorders which meet the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5) as well as mental health symptoms that may be significant but do not meet the criteria for a full diagnosis (American Psychiatric Association, 2013). Recent studies carried out internationally indicate that symptoms of anxiety, depression, and distress are common amongst elite athletes (Grobler et al., 2019; Kilic et al., 2017; Gouttebarge et al., 2016). Amongst Australian, Dutch, and French elite athletes, the prevalence of symptoms of CMDs ranged broadly from 17% to 45% (Gouttebarge et al., 2016; Gulliver et al., 2015; Schaal et al., 2011). A study conducted with elite rugby players found a prevalence of CMDs to range from 4.2% to 30% (Grobler et al., 2019; Gouttebarge et al., 2017a).

2.3 Impact of compromised mental health on performance

To date, numerous research projects have shown that when the mental health of an athlete is compromised, it influences the players' performance, which in team sports impacts on the rest of the team and, ultimately, on the outcome of matches (Grobler et al., 2019; Rice et al., 2016). Furthermore, although a rugby union team consists of fifteen players and up to eight substitutions, if one of the players experiences significant symptoms of CMDs that influence their performance, it may have an unfavourable impact on the performance of the team as a unit in a specific game (Grobler et al., 2019). A range of poor performances from a specific individual can potentially then, in turn, influence dynamics in a team, the player's view of him/herself and over time

exacerbate and further impact the player's mental health detrimentally (Grobler et al., 2019).. More recently, the International Olympic Committee (IOC) consisting of a multidisciplinary panel of experts analysed the current best evidence to provide a consensus statement aimed at advancing the management of mental health among elite athletes including two aims which relate to the current study. Firstly, they called for an increased focus on not only full disorders, but rather symptoms of CMDs since these are problematic for athletes. Secondly, the IOC also alluded to a better understanding of the risk factors and additional preventative strategies for mental health symptoms and disorders (Reardon et al., 2019). The consensus statement by the IOC supports the rationale for conducting the present study.

2.4 Personality and mental health amongst elite athletes

Moderating factors play a role in the occurrence of CMDs, such as personality trait variation. Personality can be defined as "a dynamic organisation, inside the person, of psychophysical systems that create the person's characteristic patterns of behaviour, thoughts and feelings" (Allport, 1961, p. 28). Personality can be assessed in different ways, one of which is through personality inventories. The NEO-FFI -3 is an example of such a personality inventory that was utilised in the present study. Years of research on personality traits have led researchers to conclude that personality can be broadly condensed into five domains each with specific facets, namely Extraversion, Neuroticism, Agreeableness, Conscientiousness and Openness to experience (McCrae & Costa, 2010). These five domains have also been referred to as the ‘big-five’ personality traits or, as the ‘five-factor’ model of personality (Foxcroft & Roodt, 2009).

In brief, people who rate high on Extraversion will generally be outgoing and gregarious, energetic, talkative, passionate, joyful, and sometimes even dominant. They generally appear to enjoy seeking the company of others and functioning in groups (Allen et al., 2011). The Openness personality trait refers to an individual’s tendency to be inventive, imaginative, curious and in search of new experiences (Allen et al., 2011). Agreeableness refers to an individual’s concern for

cooperation and social harmony with others (Allen et al., 2011). The Conscientiousness trait describes an individual's ability to be methodical, hardworking, be organised, and generally display goal-directed behaviour (Allen et al., 2011). It also tends to indicate how thorough, diligent, and efficient an individual is. The last of the five personality traits is Neuroticism, and it indicates an individual's tendency to be emotionally unstable, frequently worried, tense, and fearful and it includes facets of anxiety, hostility, depression, self-consciousness, impulsivity, and vulnerability (Allen et al., 2011).

Some studies indicated that certain personality traits contribute to and correlate with the development of CMDs amongst elite athletes (Petito et al., 2016; Hengartner et al., 2016; Kaiseler et al., 2012). In particular, the Neuroticism dimension was found to be associated with a selection of less adaptive coping strategies and lower levels of reported coping effectiveness (Kaiseler et al., 2012). The other four dimensions used more adaptive coping strategies which were rated as effective (Kaiseler et al., 2012). Furthermore, an increased understanding of CMDs and related factors may be incorporated into the development of interventions and support programs for elite rugby players, which could assist them from both a wellbeing and a performance perspective. However, while symptoms of CMDs among professional athletes are explored in various sports, no studies exploring the relationship between CMDs and personality traits in elite rugby players could be found when conducting a literature search. The literature search was conducted on Google Scholar and EBSCOhost search platform via the North West University Library, using a combination of keywords with Boolean operators. Considering the discussion above, the objectives of this study were to determine the prevalence of symptoms of CMDs amongst multi-national elite rugby players and determine the relationship between the five-factor model of personality traits and the prevalence of symptoms of CMDs amongst multi-national elite rugby players.

2.5 Methodology

2.5.1.1 Design

This study used a quantitative, cross-sectional research design which included a convenience sample of 251 rugby players. With this design, the study estimated the prevalence of symptoms of CMDs in a cross-sectional measure of the given sample at a single time. Since it is a single measurement of exposure and outcome, it is difficult to derive causal relationships from this cross-sectional analysis. However, since personality is a relatively stable construct and even a single occurrence of CMDs can detrimentally impact a rugby player's performance, it was a useful design to address the research aims of this study.

2.5.1.2 Participants

The study was conducted on secondary data from 251 male rugby players with an average age of 25 years an average of 14 years education. The data was gathered during several service delivery projects with multi-national teams, performing in trans-national and national competitions. All players in the senior elite squad of the respective teams participated in the research. The teams participated in the elite level competitions in their respective countries, namely the Pro14 (Ireland), Premier Rugby (England) and Super Rugby (South Africa). The second author was contracted as a performance psychologist for the respective teams between 2009 and 2019 and the assessments coincided with the service delivery project starting in the respective competition preseason. As part of the standard assessment protocol, the procedure for each of the assessments remained the same for each team during the period between 2009 to 2019. Before commencement of the assessment, each participating player completed an informed consent form as part of the standard assessment protocol, which included permission to use their data for research purposes. Since a convenience sample was used, the sample size was limited by the available data set, which included 251 participants. The sample of 251 used for this study is relative

to the total population of 1491 elite rugby players from South Africa (699), Ireland (264) and England (528) at the 90% confidence level with a 5% margin of error (IRPA, 2020).

2.5.1.3 Assessment instruments

Participants completed the battery of assessment measures from the Brain Resource Company (BRC) namely the WebNeuro Sport online assessment (BRC, 2008). The WebNeuro Sport consists of a demographic questionnaire as well as seven subtests, however for this study only two subtests were included. Firstly, the Depression, Anxiety and Stress Scale 42 (DASS-42) which was designed and proposed by the Australian Psychological Society to efficiently measure the core symptoms of anxiety and depression and has demonstrated positive psychometric properties in adult samples of anxiety and depression patients (Gloster et al., 2008; Lovibond & Lovibond, 1995). The second test is the NEO-FFI -3, which is a shortened version of the NEO-PI-R and has only 60 items (McCrae & Costa, 2010). The shortened NEO provides information on the five broad domains of personality that is of interest in the proposed study, and it does not include the detailed facets scores (McCrae & Costa, 2010). (See addendum for detailed information on assessment instruments.)

2.6 Procedure

The standardised assessment for each elite team of rugby players occurred during the preseason before the start of the respective competitions. The study leader was contracted as a performance psychologist for the respective teams between 2009 and 2019 and the assessments coincided with the preseason service delivery project. As part of the standard assessment protocol, the procedure for each of the assessments remained the same for each team during this period. Participants from each team were tested in either a computer laboratory, the team room, or analyses room at their respective clubs. All the venues were set up to ensure that participants had the necessary privacy with limited distractions. On the day of the assessment, the procedures were

explained to all the participants and thereafter, the players were given time to ask questions. The collected data was stored on BRC's database and later exported in Excel format and coded for the purpose of anonymization. Thereafter it was emailed to the primary investigator and stored on the primary investigator's password protected computer.

Ethical approval was obtained from the Health Research Ethics Committee (HREC) of the Faculty of Health Sciences, North-West University, Potchefstroom Campus (clearance number: NWU-00327-20-A1). Written permission was also obtained from the lead clinician and Director of the Centre for Health & Human Performance (Prof P Kruger), who had conducted the data gathering.

2.6.1.1 Data analysis

The data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 26. Statistical Services at the North-West University, Potchefstroom Campus, assisted with quantitative data management. Preliminary analysis (internal consistency, normality) were performed to determine whether the data were appropriate for parametric analyses. The distribution of the data was evaluated using histograms and q-q plots that indicated that the data was skewed. A total of 251 completed DASS 42 profiles were analysed for the fulfilment of the first aim of the study. However, for the second aim of the study, 18 NEO-FFI-3 profiles were incomplete and as a result only the remaining 233 profiles were analysed for the correlation between personality traits and CMD symptoms. Prevalence of symptoms of CMDs was calculated as the proportion of the number of participants with any of the three symptoms measured by three sub-scales of the DASS 42 symptom ranging from normal to extremely severe. Thereafter, factor scores were calculated for the five factors of the NEO-FFI-3 questionnaire. Spearman's rank-order correlations were then applied to determine whether the five-factor personality traits were associated with the occurrence of symptoms of CMDs. The following correlation coefficient values were interpreted to have the accompanying effect size:: ~0.1 indicates a low effect or

practical non-significant difference, ~0.3 indicates a medium effect or practical-visible difference and ~0.5 indicates a large effect or practical-significant difference (Cohen, 1992). The statistical significance was set at 5%.

2.6.1.2 Results

The data set comprised of 251 male elite rugby players from South Africa, UK and Ireland competing at national and international level. However, 18 participants only completed the DASS 42 without completing the NEO FFI. Therefore, the data from these 18 players was used in the descriptive results of CMD symptoms but was excluded from the correlation analysis between CMD symptoms and personality traits. The Cronbach's Alpha internal consistency coefficients of .96, .89 and .93 have been determined for depression, anxiety, and stress scales, respectively (Lovibond & Lovibond, 1995). The NEO-FFI-3 revealed Cronbach Alpha values of .68 (Agreeableness), .73 (Openness), .77 (Extraversion), .81 (Conscientiousness) and .86 (Neuroticism) (McCrae & Costa, 2010).

Data from the table below indicates the mean values of symptoms of CMDs amongst the 251 participants that completed the DASS42.

Table 1 Symptoms of CMDs amongst a sample of 251 elite rugby players

Item	Minimum	Maximum	Mean	Std. Deviation
Depression	**0**	**20**	**3.65**	**4.46**
Anxiety	**0**	**34**	**5.43**	**4.93**
Stress	**0**	**38**	**8.88**	**6.53**

Table 1 indicates that most players presented with normal levels of depression, anxiety and stress as measured against the standardised norms of the DASS42, with the lowest possible score being 0 and the highest possible score for each symptom being 42. Lovibond and Lovibond (1995)

have allocated labels in order to indicate the severity of symptoms expressed by participants. The following range of scores are considered normal; for depression a range between 0-9, for anxiety the range is between 0-7 and for stress the range is between 0-14. Scores higher than normal are allocated the following labels: Mild (10-13 for depression; 8-9 for anxiety and 15-18 for stress), Moderate (14-20 for depression; 10-14 for anxiety and 19-25 for stress), Severe (21-27 for depression; 15-19 for anxiety and 26-33 for stress), Extremely severe (28+ for depression, 20+ for anxiety and 34+ for stress). Although, these norms are for an Australian population they are largely accepted by researchers as being applicable to English speaking populations for screening purposes (Scholten et al, 2017). The mean for each of the symptoms was further found to be within the normal range as per the labels defined by Lovibond and Lovibond (1995). Although the average scores of all the CMDs seemed to be within the normal range, it is also important to consider the proportion of players who experience higher than normal levels of symptoms of CMDs.

Table 2 Prevalence of players with symptoms of CMDs amongst a sample of 251 elite rugby players

DASS 42	Normal	Mild	Moderate	Severe	Extremely severe
Depression	**219 (87%)**	**17 (7%)**	**15 (6%)**	**0**	**0**
Anxiety	**172 (69%)**	**31 (12%)**	**38 (15%)**	**6 (2%)**	**4 (2%)**
Stress	**212 (84%)**	**22 (9%)**	**12 (5%)**	**3 (1%)**	**2 (1%)**

Table 2 presents the all the players who reported symptoms of depression, anxiety, and stress ranging from normal to extremely severe. Players are grouped according to the labels provided in the Manual for the Depression Anxiety Stress Scale (DASS) (Lovibond, & Lovibond, 1995). These labels provide a description of the severity of symptoms experienced by the participants ranging from normal to extremely severe. A total of 98 players (39%) displayed CMD

symptoms above the normal range, with 153 players (61%) reporting normal levels on all three of the subscales (anxiety, depression, and stress). The most common category of symptoms which players experienced above the normal range was anxiety, with 79 of the total number of players (31%) presenting with higher-than-normal levels of anxiety. This was followed by stress, with 39 players (15%) presenting with a stress level above the normal range. On the DASS, *anxiety* generally describes the physiological symptoms people experience, whereas the *stress* component refers mainly to cognitive symptoms of worry. Finally, depression was the lowest reported symptom amongst the selected sample of elite rugby players with 32 players (13%), indicating a higher than normal level of depression. Anxiety was also the most severe set of symptoms which players experienced, with ten players (4%) indicating severe or extremely severe symptoms of anxiety. Anxiety was followed by stress with five players (2%) indicating a severe or extremely severe level of stress.

Table 3 Correlation of Personality Traits with CMDs amongst 233 elite rugby players

	Neurot	**Extra**	**Open**	**Agree**	**Consc**
Depression	**0.435***	**-0.177***	**0.098**	**-0.141***	**-0.215***
Anxiety	**0.356***	**-0.179***	**-0.032**	**-0.187***	**-0.164***
Stress	**0.389***	**-0.041**	**0.030**	**-0.266***	**-0.006**

Neurot – Neuroticism; Extra – Extraversion; Open – Openness; Agree – Agreeableness; Consc – Conscientiousness
*r_s with $p<0.05$

Table 3 highlights the relationships between the above-mentioned CMD symptoms and the five-factor personality traits. Players were included in the correlation analysis even if their symptoms of CMD were in the normal range. Thereby, allowing the study to understand the relationship between normal levels of CMD symptoms and personality traits. There was a moderate to high, positive association between neuroticism and increased levels of depression ($r = 0.435$), anxiety ($r = 0.356$) and stress ($r = 0.389$) which was statistically significant. The next most significant finding was higher levels of Agreeableness which was associated with lower

levels of stress (r = -0.266). Agreeableness also displayed a statistically significant negative correlation with a low effect with regards to anxiety (r = -0.187) and depression (r = -0.141). Conscientiousness is statistically significantly associated with lower levels of depression (r = -0.215). and anxiety (r = -0.16) with a low effect size. Finally, Extraversion was shown to have a low negative correlation with depression (r = -0.177) and anxiety (r = -0.179).

2.7 Discussion

This study aimed to gain insight into the prevalence of symptoms of CMDs amongst a multinational sample of elite rugby players and to determine if there were any correlations between the five-factor model of personality traits and the prevalence of CMD symptoms among these players. Results indicate that more than a third (39%) of the players in the study sample presented with clinically significant symptoms of depression, anxiety, and stress. These results are noteworthy for sports administrators and coaching staff, who expect players to be at their best for every match. Research indicates that even mild CMD symptoms may detrimentally impact a player's performance (Grobler et al., 2019; Rice et al., 2016)

2.7.1.1 Comparison with other elite athletes

These findings are in line with research on CMDs amongst elite athletes that ranged broadly from 17% to 48% (Gouttebarge et al., 2017a; Gouttebarge et al., 2016; Gulliver et al., 2015; Schaal et al., 2011). The results obtained in this study, however, seemed to be slightly higher than previous research findings amongst an international sample of elite rugby players which found the four-week prevalence of symptoms to have been 30% for anxiety and depression (Gouttebarge et al., 2017b). Elite rugby players are generally considered to be "tough-minded" by most and, thus, their mental health is often overlooked (Grobler et al., 2019). Nonetheless, "tough-mindedness" does not necessarily equate to being mentally healthy, and elite rugby players are just as susceptible to mental health challenges as the general population. Even though they may not be

formally diagnosed, their CMD symptoms may also hinder them from optimally performing, regardless of their physical health and skill level. The findings in this study should hopefully alert coaches and rugby administrators to the presence of CMDs among elite rugby players and warrants a structured approach to support players throughout a season. Just as renowned organisations such as *UK Sport* appointed an Expert Panel consisting of psychiatrists and psychologists to support the mental health of all athletes in their elite programmes (UK Sport, 2020), rugby administrators globally should ideally also invest in a deliberate and structured approach to support elite rugby players. This approach can include education programmes, a robust and regular mental health screening protocol, as well as the availability of clinical services if and where indicated.

2.7.1.2 Correlation between Neuroticism and CMDs

The findings from this study further observed correlations between certain personality traits and CMD symptoms among this elite rugby sample. However, the exact causal relationship is unknown due to this study being a cross-sectional correlation study from which causation cannot be inferred. The results nevertheless indicated a positive correlation between elevated levels of Neuroticism and CMD symptoms. Supporting evidence from other research for the correlation between Neuroticism and symptoms of CMDs was found in a longitudinal epidemiological community study spanning over 30-years from a sample of 591 participants. This particular longitudinal study concluded that Neuroticism is in part an independent risk factor predisposing people to experience severe and impairing CMD symptoms (Hengartner et al. 2016; Petito et al., 2016; Kaiseler et al., 2012). The findings from our study support the notion that the Neuroticism trait appears to be a potential precursor for the development of CMDs.

2.7.1.3 The possible role of Neuroticism in CMDs

There are multiple explanations for this correlation with varying models suggesting how Neuroticism can influence either an individual's predisposition, appraisal of stressors or selection

of appropriate coping strategies (Hengartner et al. 2016; Petito et al., 2016; Kaiseler et al., 2012). Individuals who typically score higher on the Neuroticism trait are less likely to select appropriate coping strategies and are likely to experience stressors more intensely than their counterparts who score lower on this trait. In support of this, a study conducted with 481 athletes from a variety of sports found that athletes scoring higher on the Neuroticism scale selected less adaptive coping strategies and reported lower levels of coping effectiveness. In contrast, those higher on the other four personality traits were associated with more adaptive coping strategies (Kaiseler et al., 2012). Since personality traits are regarded to be relatively stable throughout life, a screening process conducted during the preseason can identify players that score high on the Neuroticism trait. Equipping these players with adaptive coping strategies may prove helpful in preventing symptoms of CMDs from occurring. Clinicians working with elite players will, however, need to be very cautious not to create a stigma around anyone who has higher levels of Neuroticism and instead proactively and confidentially offer the necessary support to ensure the players' optimal mental health.

Athletes scoring higher in Neuroticism are also more likely to interpret ambiguous events as more threatening (Hengartner et al. 2016; Semmer, 2006). Following a stressful event, athletes higher in Neuroticism are as a result more vulnerable to the occurrence of CMD symptoms and tend to take longer to recuperate (Quilty et al., 2009). Since players with higher scores on Neuroticism showed greater risk and poorer long-term prognosis once they experienced significant symptoms of CMDs, it is best to take a preventative approach as far as possible. Therefore, elite rugby players who have been identified with higher levels of Neuroticism early in the season may be earmarked. Thereafter, if these players experience stressors such as injury or interpersonal difficulty during the season, they can be supported accordingly, hopefully preventing the onset of CMDs.

2.7.1.4 Personality traits in a team sport

Research also indicates that individuals with higher levels of Neuroticism report more interpersonal stressors, whereas those with higher levels of Extraversion report more positive daily interpersonal events (Hengartner et al. 2016). Since personality remains relatively stable throughout an individual's life, it would be wise to determine which players are more likely to experience interpersonal stressors and support them accordingly. In a team sport such as rugby, players experiencing higher levels of interpersonal difficulty, without appropriate coping strategies may be more at risk of developing CMD symptoms. This risk can potentially be negated by introducing appropriate interventions to support players that are more likely to experience interpersonal difficulty based on their personality profiles.

The results of this study further indicate Extraversion to have a low to moderate negative correlation with CMDs. In earlier research, moderate correlations were found between low extraversion and both having few close friends and low social support (Kalish & Robins, 2006). Therefore, it can be deduced that rugby players scoring higher on Extraversion are more likely to have helpful relationships which could serve as a source of social support, potentially buffering them from experiencing CMD symptoms during stressful events. On the other hand, players scoring lower on Extraversion may benefit from having supportive interventions that encourage and equip them to develop supportive relationships within the team context.

Finally, both Conscientiousness and Agreeableness indicate a low to moderate negative correlation with CMD symptoms in this study. Agreeableness refers to an individual's concern for cooperation and social harmony with others (Allen et al., 2011). Since rugby is a team sport consisting of a squad of 45 to 50 players, elite players require some level of interpersonal effectiveness due to the significant social component of the sport. Interestingly, both Conscientiousness and Agreeableness have been found to distinctively contribute to better interpersonal skills (Hengartner et al., 2016). This correlation implies that lower scores on these

personality traits may reduce a rugby player's access to interpersonal resources and social support within a team context. This is an important finding with clear mental health significance since both the quality and quantity of social relationships could ultimately relate to improved mental health (Saeri et al., 2017). Players scoring low on these personality traits may need to be supported to develop the necessary skills to make their social life easier and healthier in a team environment. Developing the necessary skills can help them to protect their mental health and improve social cohesiveness. People who are low on these two traits will probably be more introverted and therefore expending more energy during team interactions. Different strategies and approaches can also be taken to support these players to maximise their recuperation and manage the challenges created by spending immense amounts of time in large groups.

2.7.1.5 Correlation between Conscientiousness and CMDs

The Conscientiousness trait describes an individual's ability to work hard and methodically. It gives an indication of their goal-directed behaviour, and it tends to measure how thorough, diligent, and efficient an individual is (Allen et al., 2011). Although these skills come more naturally to players scoring high on the Conscientiousness trait, thus allowing them to deal better with stressors, these skills can be developed in other players through well-planned interventions. Furthermore, research supports this finding and indicates that elite athletes that score high on Conscientiousness have higher levels of perceived stressor control compared to those with high Neuroticism (Kaiseler et al., 2012). Therefore, players scoring lower on the Conscientiousness trait are less likely to deal well with stressful situations when compared with their fellow players. The players that score low on Conscientiousness may benefit from supportive interventions that will assist them in developing the skills mentioned above.

2.8 Limitations and recommendations

Firstly, since the data was self-reported by players, there could be potential bias in the answers due to social desirability, so the results should be interpreted carefully. The data was also only collected at the beginning of each season when players were not yet exposed to some of the stressors faced by elite rugby players such as overtraining and injury. Results collected later in the season may differ and may present higher levels of CMD symptoms due to the higher number of stressors players face during the season. Another limitation is the cross-sectional design chosen for this study which does not allow for causal relationships between dependent and independent variables because it is only a single snapshot of the sample at a given time. Future studies may benefit from conducting psychometric assessments on multiple occasions during the rugby season to monitor changes in a longitudinal way. As further evidence of a causal link between Neuroticism and symptoms of CMDs may provide an opportunity for more sustainable and effective interventions and prevention programmes.

Furthermore, it is worth noting that different psychometric instruments were used in the various research studies mentioned in this article. This factor may have contributed to the variance of results between studies on CMDs amongst elite athlete. Future studies in the field of sport psychology may benefit from the use of standardized instruments that have been comprehensively normed amongst elite athlete populations internationally. Lastly, we recommend that a personality inventory, such as the NEO-FFI which is relatively short and easy to administer, be used as a source of information for mental health care providers working with elite athletes to guide interventions and prevention programmes.

2.9 Conclusion

A total of 39% of the elite rugby players from England, Ireland and South Africa in this cross-sectional study displayed CMD symptoms (depression, anxiety and stress) ranging from

mild to extremely severe. These findings seemed to be in the high range when compared to the general population and similar to findings from previous studies conducted with elite athletes from other sporting codes. These findings drew attention to the need for enhanced awareness and preventative/supportive interventions aimed at promoting the mental health of elite rugby players.

Based on the moderate to strong correlations between symptoms of CMDs and personality traits as highlighted from the findings of this study, it appears that personality traits could play an important role in the development of psychopathology and should, therefore, be addressed in preventative and supportive intervention. Through equipping players with appropriate skills, the role that personality plays in the development of symptoms of CMDs may be mitigated. A robust mental health strategy, including screening tools and a protocol for monitoring the ongoing mental health of elite rugby players, should ideally be a serious consideration for all rugby administrators across the globe. Screening and monitoring can be followed up with customised proactive programmes to support players in developing the necessary skills and techniques to optimise their mental health. Like in most modern organisations where leaders have a duty of care towards their employees, so to do rugby administrators have a duty of care towards their players to support them in their work environment. Looking after the mental health of players can also indirectly promote the team's performances and, in such a way, the core business of the organisation.

2.10 Acknowledgement

Dear reader, kindly acknowledge that the word count for the article has exceeded the limit specified by the British Journal of Sports Medicine. It was done this way in order to fulfil the academic requirements of the mini dissertation given that it will be evaluated as such. Feedback from the examiners will be taken into consideration in the final draft of the article and the author will thereafter adjust and shorten the article in accordance with the journal guidelines prior to submitting it for potential publication.

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CHAPTER 3: PERSONAL REFLECTION

3.1 Introduction

This final chapter offers a personal reflection of the researcher regarding the overall experience of completing this mini-dissertation in partial fulfilment of the Master's degree in Clinical Psychology.

3.2 Personal reflection

My research journey began the day that I had been accepted into the North-West University, Potchefstroom campus Master's programme. Having heard from previous students that the research component is what usually holds people back from registering as a psychologist, I became weary. I intended to begin planning a research topic and finding a possible supervisor as soon as possible. However, the honours year was an extremely competitive one, with loads of work that needed to be submitted on due dates that were sometimes a day or two apart. And on other occasions, multiple due dates on the same day. So, my intention to plan for my research never took to fruition until late 2018. At the same time, I had been selected to attend a 1-month student exchange programme in the Netherlands, co-ordinated by Prof Van Rensburg at the North-West University (NWU) in conjunction with Dr Sterkenberg from Vrije University Amsterdam (VU). I saw this student exchange programme as an opportunity, not only for self-growth but also to soundboard my research ideas with other highly acclaimed researchers in the field; notably, Prof Cuijpers and Prof Schuengel, both lecturers at the VU and who were to be lecturing us during the exchange programme. Prof Cuijpers is ranked as the world's number one expert on research in psychotherapy and is one of the top three experts in research on depression (Expertscape Inc., 2020).

My initial idea was to do my research on a topic that I was passionate about, as I hoped this would be a driving force in pushing me to complete my mini-dissertation within two years. I

began downloading articles, searching institutes and networking with professionals in the field of Equine-assisted psychotherapy. Having grown up riding and training horses, I had a personal love for, and understanding of the handling opportunity that horses had to offer and I figured it would be a field that I would love to practice in at some point in my career. I also determined that the institute for disabled people in the Netherlands who would be completing 50% of the student exchange program was equipped with stables and Equine-assisted therapists. I had spent time during my undergraduate years as part of the NWU horse-riding club that conducted weekly community engagement programmes at a local stable to provide therapeutic horse riding for underprivileged children from a school of disabilities. My passion for horses combined with my years of experience working with horses provided a potential research study in this field. However, much to my disappointment, none of the supervisors available to me was interested in such a topic. I quickly learnt that as much as a mini-dissertation was about engaging in a topic that I was passionate about; many other factors would contribute towards a successful research study. Fortunately, I have other interests and passions that could be useful to identify a research gap that was within the scope of the supervisors available to me.

The topic that I identified was the broad field of Adventure therapy (AT) suggested as an umbrella term for a multitude of related approaches described in the literature, such as wilderness therapy, outdoor behavioural healthcare, bush adventure therapy therapeutic recreation, eco-therapy, and adventure-based counselling, to name a few. Described as either complementary to an existing therapy or a stand-alone treatment, AT literature has substantially increased over the last two decades yet struggles to move to an evidence-based modality due to its lack of a unified theoretical foundation. I had always found nature and the challenges posed by adventure-based activities to be revitalising and serving an important component of my self-care routine. As such, this topic resonated strongly with me, and I became passionate about completing my mini-dissertation in this field. During my student exchange programme, which lasted the month of

January 2019, a classmate and I would spend time every week completing our research proposals. During the day, we would either be attending lectures at the VU or activities scheduled with the institute for disabled people (Bartimaeus). During one of our lectures conducted by Prof Cuijpers, we were asked to compile a presentation on our research topic and present it before the end of the month. Presenting to Prof Cuijpers was a once in a lifetime opportunity to present to an internationally acclaimed researcher and receive valuable feedback regarding my topic. My classmate and I worked tirelessly to cover all the available literature on each of our topics. We began compiling a presentation that would allow us to gain much-welcomed feedback. Having not had contact of this nature with any of our supervisors before, we were equally nervous and excited about this opportunity. I put together an elaborate presentation on AT and why I thought it was a worthy topic to research while simultaneously working on completing my COMPRESS research proposal form. It felt invigorating to know that whilst others would be enjoying their vacation, I was out here getting ahead with my research.

The day of the presentation, I was nervous yet confident. I knew that I could expect valuable feedback, and I felt that I would be able to respond to any questions asked regarding my topic. As I was presenting, I could see the eyes of my audience light up as I spoke of AT and what it meant as a field of study. I received positive remarks and curiosity fuelled questions from the class. At last, the moment came I had been anticipating, feedback from Prof Cuijpers. His words were calculated, and in not more than three sentences he pointed out that as wonderful as my topic was and as passionate as I felt about it, it was not something he felt would add clinical value to the already over-gratified field of AT. He acknowledged that it was valuable for hospitals and clinics to include gardens and nature in and around their facilities; however, he was wary of the clinical impact such a study would have. His response did not convince me, but he had planted a tiny seed of doubt that would later bloom into yet another change of research focus.

Back in South Africa in early February 2019, the Department of Psychology coordinated a day of presentations by all the supervisors in the department on their fields of interest followed by questions from the students. It was during these presentations that Prof Pieter Kruger discussed the field of sport psychology and his keen interest in elite athletes. Having been an avid athlete all my life and understanding that mental health is an important yet underestimated aspect in the life of athletes, I was immediately drawn towards the possibilities. The seed of doubt which was planted by Prof Cuijpers was in full bloom, and I felt that I had a promising option in front of me; one that I was passionate about and could prove substantial relevance for the field of clinical psychology. I immediately began educating myself on the field of sport psychology by consuming all available literature to determine whether there was a gap that I could identify that would make a significant contribution towards expanding the field. I stumbled across research in a field that had grown exponentially in the past two decades and presented an opportunity for much future research. After much deliberation, I eventually approached Prof Kruger knowing that I had spent a full month familiarising myself with the field of AT and developed a good working relationship with my proposed supervisor at the time, Prof Johan Potgieter. I first approached Prof Potgieter and explained my dilemma to him, and after a lengthy discussion, we departed amicably. However, I was still filled with doubt regarding whether I was making the right decision.

I began consulting with Prof Kruger, and our early meetings were mind-boggling. I felt extremely overwhelmed and experienced days when I regretted having changed my research direction. Prof Kruger is an expert in his field, having worked with elite athletes internationally and locally, including the 2015 Springboks Rugby World Cup squad. Although I grew up playing many sports, rugby was never a sport that I had an opportunity to play. It was considered in my community as a sport for “whites only”, and I knew little about the sport besides that it involved an oblong-shaped ball, two high posts and a big squad of extremely large, muscular players. Besides this, at the time Prof Kruger was running multiple projects, including a company in the

UK that allowed me little access to him. My limited time with him was a privilege, and in our meetings, I felt the pressure that I needed to get the most out of our limited time together. As my knowledge on the field grew, we discussed gaps in the literature. We identified our current study as suitable given the data set and the currently available literature. Furthermore, my fascination with numbers and statistics and a top performer in mathematics influenced my choice of a quantitative study. Although my classmates all discussed statistics as a taboo topic, I felt a strong inclination and willingness to take on a quantitative study.

3.3 Deciding on the current research topic

Although the available data set limited the research topic, at first, it seemed like a negative. However, I later realised that it helped me narrow down onto a topic more easily given my broad range of interest. The data set was accumulated over ten years of interventions conducted by Prof Kruger and comprised of data results from a battery of seven assessment instruments. Initially, I had first to get up to speed with the field of sport psychology and then follow through by understanding what each of the seven instruments measured and how I could translate those results into a useful contribution to the scientific world. Many ideas and gaps presented themselves to me. After much deliberation and discussions with Prof Kruger, we were able to narrow it down to the current study - an investigation into the symptoms of CMDs and the correlation between these symptoms and personality traits. Although there were more exciting topics out there, which could be derived from the data set, such as performance indicators, the recent shift in the field of sport psychology has been towards preventing CMDs and improving mental health. Mental health has for decades been a disregarded aspect, stigmatised, and at times trivialised in the sporting arena. The focus has always been optimising performance at all costs that have sometimes come at the expense of athletes' mental health. Recently, iconic elite athletes have come forward, exposing their vulnerabilities and increased awareness regarding the mental health of a population that has

often thought to be untouchable and almost godlike. Athletes performing in the global arena are thought to be tough-minded and unlikely to experience mental health-related problems.

Having grown up playing sports, I am well versed in the benefits of sports on overall well-being. Even though I have only competed at the provincial level where the level of competition is less intense, I have experienced the stress, anxiety and sleepless nights associated with overtraining and fear of underperforming. Elite athletes, those who are competing at the highest levels, participating in sport as a profession with thousand and millions of supporters looking up to them, face innumerable amounts of stressors. These stressors make them susceptible to developing mental health-related issues, doing the very same thing considered a mental health-enhancing activity. I realised that this would be an ideal area to investigate and began delving into the literature to find a suitable topic that was within the scope of the data available. Having read many articles that researched various moderating factors of CMDs, I decided to study the correlation between personality traits and CMD symptoms amongst elite rugby players. Although in recent years, the topic of mental health amongst elite athletes has reached an increasing amount of attention, it seemed like rugby players were a subgroup that has been out of reach. Considering that rugby players are considered the hardiest and mentally toughest athletes by the general population, one can imagine how difficult it would be to research topics of mental health with this group. There are many internal and external barriers due to stereotyping, that prevent rugby players from receiving the same attention compared to athletes from other sports. At least according to my own previous misunderstanding, I considered rugby players too tough ever to experience symptoms of CMDs. As much as this study was quantitative, it was very much explorative and epidemiological in that it highlighted the importance of furthering our understanding of the mental health of elite rugby players and promoting the enhancement of supportive systems.

3.4 Application process and ethics

The application process was probably the most anxiety-provoking since it involved planning and compiling a document which would be the blueprint for the next two years. Understandably, to ensure rigour and scientific integrity, the research proposal had to pass through various scientific committees before it could be approved. The feedback from these committees was, in many ways, frustrating but also important for developing me as a researcher. Having had so many experienced eyes scrutinise my work was a meaningful process.

3.5 Data analyses process

Having chosen to do a quantitative study was considered a brave move by many of my classmates. I felt it was a way to harness some of my earlier developed skills and understanding of empirical science. Once the three scientific committees had approved the research proposal, Prof Kruger granted me access to the raw data. At first, I was excited to receive it, but once I opened it and realised that I would need to make sense of multiple excel sheets of numbers, it seemed like an overwhelming task. As with any academic challenge I face, I turned to the literature and began making sense of what tasks would be involved in deciphering the data set. After much reading and consulting with various lecturers, I began to form an understanding of how to approach the data set. I began by first "cleaning up" the data set and making it more presentable. Once I had a fair grasp on the what and why I began searching for the how in the form of a suitable statistician that would be willing to work with me. It was not long before I became acquainted with Marieke Cockeran, who was just the statistician I sought. She was clear, concise, and patient in her approach, and this made me feel comfortable enough to continue challenging myself in understanding the data. After many consultations and email interactions, I was able to make sense of the data and write up the results section of this study.

3.6 Writing up of mini-dissertation.

Having completed all the technical aspects of the research study, I assumed that the final write-up would be a breeze. My assumption could not have been further from the truth. It was during the early days of the national lockdown in South Africa that I started writing up my mini-dissertation and at first it was a pleasant process since I had more days available than I would have expected. However, with the challenges posed by the pandemic, such as not being able to see my family for three months and not having access to my self-care routines, the process took a sudden halt, and I found it difficult even to type a single sentence. My timeline shifted from July to September and eventually to November. Fortunately, my supervisor offered valuable support that allowed me to pick up the pieces and continue writing. I eventually managed to continue from where I had left off and compiled my mini-dissertation. When reflecting on the findings of the study, it seems that there was much work to be done in the field of clinical sport psychology.

Based on the findings in this study, CMDs pose a serious problem to the well-being of elite rugby players. Also, the moderate to strong correlations between symptoms of CMDs and personality traits, support the notion that personality traits could predispose players to the development of psychopathology and should therefore be addressed in preventative and supportive intervention.

These findings support the notion that a robust screening protocol to assess players' personality traits and ongoing mental health status may prove useful in allowing elite rugby administrators and coaches to identify players with a higher risk of developing CMDs. This can be followed by a customised proactive programme to support players in developing the necessary skills and techniques to optimise their mental health. However, this information will need to be utilised responsibly and carefully to avoid any potential stigma while maximising players' mental health. And finally, there will be a significant benefit in screening players weekly for mental health

symptoms in a similar way that most sports science and medical teams will screen players with physical measures.

3.7 The end

Two years later, I am grateful for the opportunity of having worked on data that is extremely difficult to come by since elite rugby players are such a difficult population to reach. Reflecting on all that I've learnt and the doors it has opened for me makes it all the much more meaningful and appreciable. I look forward to continuing my research journey in a PhD soon and intend to write many more research articles.

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ADDENDUM A: DASS (42)

The Depression, Anxiety and Stress Scale (DASS) forms part of the WebNeuro Sport battery and assesses the mental health status of the players. The scale was designed and proposed by Australian Psychological Society to efficiently measure the core symptoms of anxiety and depression and has demonstrated positive psychometric properties in adult samples of anxiety and depression patients (Gloster et al., 2008; Lovibond & Lovibond, 1995). It has been translated into over 40 languages and has shown acceptable internal consistency across racial groups (Norton, 2007). It consists of a four-point Likert scale, with 42 items that examine the level of depression, anxiety and stress of the subject (Basha & Kaya, 2016). During administration each player self-reported by selecting the most appropriate option in response to questions about their emotional state which was then added together for each scale and their depression, anxiety and stress scores were calculated. Regarding the construct validity, the factor load is .36 to .80 for depression, .31 to. 64 for anxiety and .40 to .76 for stress, which was calculated using the explanatory factor analysis (Lovibond & Lovibond, 1995). The Cronbach's Alpha internal consistency coefficients have been determined for depression, anxiety and stress scales respectively .96, .89 and .93 (Lovibond & Lovibond, 1995).

Lovibond and Lovibond (1995) have allocated labels in order to indicate the severity of symptoms expressed by participants. The following range of scores are considered normal; for depression a range between 0-9, for anxiety the range is between 0-7 and for stress the range is between 0-14. Scores higher than normal are allocated the following labels: Mild (10-13 for depression; 8-9 for anxiety and 15-18 for stress), Moderate (14-20 for depression; 10-14 for anxiety and 19-25 for stress), Severe (21-27 for depression; 15-19 for anxiety and 26-33 for stress), Extremely severe (28+ for depression, 20+ for anxiety and 34+ for stress).

ADDENDUM B: NEO-FFI-3

The NEO-FFI -3 is a shortened version of the NEO-PI-R and has only 60 items (McCrae & Costa, 2010). The shortened NEO provides information on the 5 broad domains of personality which is of interest in the proposed study and it does not include the detailed facets scores (McCrae & Costa, 2010). The NEO-FFI-3 is used more often for research purposes and the internal consistencies reported in the manual are: Neuroticism = .79, Extraversion = .79, Openness = .80, Agreeableness = .75 and Conscientiousness = .83 (McCrae & Costa, 2010). The NEO-FFI-3 revealed Cronbach Alpha values of: Neuroticism = .86, Extraversion = .77, Openness = .73, Agreeableness = .68 and Conscientiousness = .81 (McCrae & Costa, 2010). Furthermore, the psychometric properties of NEO scales have been found to generalize across ages, cultures, and methods of measurement (McCrae et al., 2011).

ADDENDUM C: TURNITIN REPORT

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ORIGINALITY REPORT

17%	13%	9%	7%
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PRIMARY SOURCES

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2	www.cambridge.org Internet Source	1%
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6	docobook.com Internet Source	1%
7	Vincent Gouttebarge, Ruud Jonkers, Maarten Moen, Evert Verhagen, Paul Wylleman, Gino Kerkhoffs. "The prevalence and risk indicators of symptoms of common mental disorders among current and former Dutch elite athletes", Journal of Sports Sciences, 2016 Publication	1%

ADDENDUM D: GUIDELINES FOR AUTHORS:

British Journal of Sports Medicine

Instructions to authors

Original research should not exceed 3000 words; Additional data may be presented as supplementary information, which will be published online only should the article be accepted (this can be in any format: text, tables, images, videos, etc.).

Main body of the paper: We encourage short introductions when the rationale of the study is obvious, i.e. it may be as short as 3 short paragraphs that addresses "Why we did it".

We encourage the use of subheadings in the methods, results, and discussion. We find it hard to imagine a discussion that has fewer than two subheadings.

Following the lead of The BMJ and its patient partnership strategy, BJSM is encouraging active patient involvement in setting the research agenda. As such, we require authors of Research Articles to add a Patient and Public Involvement statement in the Methods section. Please see more details above.

Word count: up to 3000 words

Abstract: up to 250 words and structured including the headings Objectives, Methods, Results and Conclusion

Tables/illustrations: up to 6 tables and/or figures

Please include a summary box summarising in 3-4 bullet points "what are the new findings" and "how might it impact on clinical practice in the future".

Statements: have you included the necessary statements relating to contribution ship, competing interests and funding, data sharing, ethical approval, and patient involvement?

ADDENDUM E – ETHICAL APPROVAL LETTER

Private Bag X1290, Potchefstroom
South Africa 2520

Tel: 086 016 9698
Web: http://www.nwu.ac.za/

North-West University Health Research Ethics Committee (NWU-HREC)

Tel: 018 299-1206
Email: Ethics-HRECApply@nwu.ac.za (for human studies)

14 June 2020

ETHICS APPROVAL LETTER OF STUDY

Based on approval by the North-West University Health Research Ethics Committee (NWU-HREC) on 14/06/2020, the NWU-HREC hereby approves your study as indicated below. This implies that the NWU-HREC grants its permission that, provided the general conditions specified below are met and pending any other authorisation that may be necessary, the study may be initiated, using the ethics number below.

Study title: The correlation between the five-factor model of personality traits and symptoms of common mental disorders (CMDs) in multi-national elite rugby players
Principal Investigator/Study Supervisor/Researcher: Prof P Kruger
Student: HAS Randeree-27295028
Ethics number: NWU-00327-20-A1
Institution – Study Number – Year – Status
Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Application Type: Single study
Commencement date: 14/06/2020
Expiry date: 30/06/2021
Risk: Minimal

Approval of the study is provided for a year, after which continuation of the study is dependent on receipt and review of an annual monitoring report and the concomitant issuing of a letter of continuation. A monitoring report is due at the end of June annually until completion.

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, the following general terms and conditions will apply:

- *The principal investigator/study supervisor/researcher must report in the prescribed format to the NWU-HREC:*
  - *annually on the monitoring of the study, whereby a letter of continuation will be provided annually, and upon completion of the study; and*
  - *without any delay in case of any adverse event or incident (or any matter that interrupts sound ethical principles) during the course of the study.*
- *The approval applies strictly to the proposal as stipulated in the application form. Should any amendments to the proposal be deemed necessary during the course of the study, the principal investigator/study supervisor/researcher must apply for approval of these amendments at the NWU-HREC, prior to implementation. Should there be any deviations from the study proposal without the necessary approval of such amendments, the ethics approval is immediately and automatically forfeited.*
- *Annually a number of studies may be randomly selected for active monitoring.*
- *The date of approval indicates the first date that the study may be started.*
- *In the interest of ethical responsibility, the NWU-HREC reserves the right to:*

- *request access to any information or data at any time during the course or after completion of the study;*
- *to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process;*
- *withdraw or postpone approval if:*
  - *any unethical principles or practices of the study are revealed or suspected;*
  - *it becomes apparent that any relevant information was withheld from the NWU-HREC or that information has been false or misrepresented;*
  - *submission of the annual monitoring report, the required amendments, or reporting of adverse events or incidents was not done in a timely manner and accurately; and/or*
  - *new institutional rules, national legislation or international conventions deem it necessary.*

- *NWU-HREC can be contacted for further information via Ethics-HRECApply@nwu.ac.za or 018 299 1206*

Special COVID-19 arrangements:

There may be certain changes that you may need to make to your study, after it has been approved, due to the impact of the COVID-19 pandemic or the lockdown e.g.:

a. Changing the recruitment strategy e.g. from an in-person process to a telephonic process
b. Changing the approved methodology to use data collection methods that ensure physical distancing
c. The implementation of risk-mitigating strategies to prevent infection and not entering communities for data collection
d. Changes in time schedules etc.

Please note that any 1) amendments, 2) request for extensions or 3) any other kind of modification to the proposal or other associated documentation must be submitted for review by the NWU-HREC, Faculty of Health Sciences, and must be approved, prior to these changes being implemented.

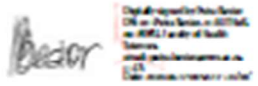
These amendment requests will be handled via the *expedited process*.

Process to be followed:

a. Ensure all your amendments are indicated in yellow highlight in the amended documents.
b. Submit your request to Ethics-HRECApply@nwu.ac.za with a *cover letter* with a specific subject title indicating, "Amendment request (COVID-19): NWU-XXXXX-XX-XX". The letter should include the title of the approved study, the names of the researchers involved, the nature of the amendment/s being made (indicating what changes have been made as well as where they have been made), which documents have been attached and any further explanation to clarify the amendment request being submitted.
c. Name the emails, to which you attach the documents that you send, with a *specific subject line* indicating that it is an amendment request e.g. "Amendment request (COVID-19): NWU-XXXXX-XX-XX". This e-mail should indicate the nature of the amendment.
d. Send a short email to Prof Wayne Towers and Prof Petra Bester indicating to them that you have submitted an amendment request due to the COVID-19 impact.

The NWU-HREC would like to remain at your service and wishes you well with your study. Please do not hesitate to contact the NWU-HREC for any further enquiries or requests for assistance.

Yours sincerely,



Chairperson NWU-HREC

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20 August 2019

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