Master's in Medicine in Psychiatry: Dissertation

Baseline concussion assessments can identify mental disorders: the SCAT-5 Symptom Evaluation compared to other screening tools in South African club rugby

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This dissertation will be submitted as partial fulfilment of a Master's in Medicine in Psychiatry at the University of Cape Town.

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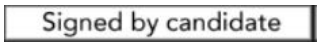
Declaration

I, James Willoughby Burger, hereby declare that the work on which this dissertation is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. This dissertation has been submitted to the Turnitin module and I confirm that my supervisor has seen my report and any concerns revealed by such have been resolved with my supervisor.



James W. Burger

3 May 2022

Acknowledgements

Thank you to my supervisors, John Joska and Lena Andersen, for your support and guidance through this project. You have always been available and responsive, despite all your other duties. Thanks for helping nurture the passion I had for this project and channel it so we could make it happen!

Thank you to Yoliswa Mtingeni for helping with conducting the UCT MINIs.

Thank you to Rasmita Ori and Leigh Gordon for your valuable input into the protocol, as well as Marc Blockman and the HREC team.

Thanks to Jono van der Walt, all the coaches, and players at False Bay Rugby Club – Up the Bay!

Thanks to Demi Davidow, UCT Rugby Football Club management, support staff, and players – congrats on the strong 2021 Varsity Cup Campaign.

And of course, thank you to my wife, Ash, for your incredible support and love, and to my parents for always being so encouraging and invested.

Format

This dissertation is being submitted in the format of a publication-ready manuscript, which has been submitted to an international journal.

The results of this study have been presented at the South African Society of Psychiatrists' 2021 Congress as well as at the International Society for Sports Psychiatry Autumn Scientific Meeting 2021. The conference abstract for ISSP Scientific Meeting has published in *Sports Psychiatry 2022;1(2)*, an open-access international journal. The conference abstract is included in the appendices.

Abstracts of the International Society for Sports Psychiatry Autumn Scientific Meeting, November 20–21, 2021. Available online March 30, 2022 (online ahead of print)**.** https://doi.org/10.1024/2674-0052/a000015

Contributions of authors

JWB conceptualised and designed this study as part of his MMed (Psychiatry), under the supervision of LSA and JAJ. JAJ was the principal investigator. JWB wrote the proposal. JWB and LSA analysed the data. JWB was the main author for the manuscript. All authors contributed to the interpretation of the data and writing of the manuscript. All authors approved the final version for journal submission and MMed dissertation submission.

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Abbreviations

ADHD	Attention Deficit Hyperactivity Disorder
APSQ	Athlete Psychological Strain Questionnaire
AUC	Area under the Curve
BDSA	Baron Depression Screener for Athletes
CES-D	Center for Epidemiologic Studies–Depression
CIDI	Composite International Diagnostic Interview
CMD	Common mental disorder
COVID-19	Coronavirus disease of 2019
DSM	Diagnostic and Statistical Manual
FBRFC	False Bay Rugby Football Club
GAD	Generalised anxiety disorder
GAD-7	Generalised Anxiety Disorder-7
HREC	Human Research Ethics Committee
IOC	International Olympic Committee
IOC SMHAT-1	International Olympic Committee Sport Mental Health Assessment Tool-1
IQR	Inter-quartile range
LMIC	Low- and middle-income countries
MINI	Mini International Neuropsychiatric Interview
PHE	Periodic Health Evaluation
PHQ-9	Patient Health Questionnaire-9
PCS	Post-Concussion Scale
ROC	Receiver Operating Characteristic
SCAT-5	Sport Concussion Assessment Tool-5
SCAT-5 SE	Sport Concussion Assessment Tool-5 Symptom Evaluation
SCAT-5 SS	Sport Concussion Assessment Tool-5 Symptom Severity
SCID	Structured Clinical Interview for DSM
SRC	Sport-related concussion
US	United States
UCTRFC	University of Cape Town Rugby Football Club
WPRU	Western Province Rugby Union

Publication-ready manuscript

Baseline concussion assessments can identify mental disorders: the SCAT-5 Symptom Evaluation compared to other screening tools in South African club rugby

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Abstract word count: 247

Article word count, excluding tables: 4138

Abstract

Mental disorders are common in athletes, but often go undiagnosed. Although mental health screenings are not routinely conducted in rugby, the Sport Concussion Assessment Tool – Fifth Edition (SCAT-5) is widely performed and measures affective, cognitive, sleep, and physical symptoms. This study investigated the psychometric properties of the SCAT-5 to explore its potential as a mental health screening tool. During preseason for the 2021 Western Province Super League A in South Africa, clinicians conducted mental health assessments of 71 adult male rugby union players. The SCAT-5 Symptom Evaluation, Baron Depression Screener for Athletes (BDSA), Athlete Psychological Strain Questionnaire (APSQ), Center for Epidemiologic Studies–Depression (CES-D), and Generalised Anxiety Disorder-7 (GAD-7) were compared to each other and to fully-structured diagnostic interviews by mental health professionals using the Mini International Neuropsychiatric Interview (MINI) 7.0.2. Lifetime MINI-defined mental disorders were common, being identified in 33.8% (95%CI 22.79 to 46.17%). Only 4.29% of these had a previous diagnosis. Exploratory Factor Analysis indicated a mental health construct of depression/anxiety being measured by the SCAT-5. The SCAT-5 had strong internal consistency ($\alpha = 0.94$) and showed moderate convergent validity with the CES-D ($r = 0.34$; $p = 0.008$) and GAD-7 ($r = 0.49$; $p < 0.0001$). The area under the curve for identifying current disorders was 0.87 ($p = 0.003$). Since the SCAT-5 has the potential to identify depression and anxiety, it may allow mental health screening without the need for additional measures. Follow-up studies should further explore its discriminative ability in larger samples.

Highlights

- Mental disorders, as assessed by clinicians, were found to be common in this sample, with a large treatment gap
- The SCAT-5 was found to measure a construct of anxiety/depression and is already being widely used in baseline assessments of rugby players
- The SCAT-5 demonstrated good internal reliability, construct validity, and convergent validity as a mental health screening tool

Introduction

While exercise has established benefits on mental health (1), mental health symptoms and mental disorders are still common in elite athletes (2–6). Overall, elite athletes have similar prevalence rates of common mental disorders (CMDs), including depressive and anxiety disorders, to the general population (2,5). Studies have generally used self-report tools to estimate the prevalence of CMDs in athletes (2,6), with limited data using clinician-administered tools (5), especially from low- and middle-income countries (LMIC)(7). Symptoms of anxiety and depression above screening thresholds are self-reported in around 30% of current and retired professional rugby players (3,4,8). However, there may be barriers to identifying and treating mental disorders, such as stigma, negative previous experiences with health-seeking, hypermasculinity, full schedules, and low mental health literacy (9). Despite half of professional rugby players reporting that their performance had been affected by mental health symptoms, just 15% had attempted to access health services for these (3).

There is an opportunity for mental health screening in Periodic Health Evaluations (PHE) (10), which could lead to improved mental health service utilisation (5). Many university and community rugby clubs, such as those participating in the Western Province Rugby Union (WPRU) Super League A in South Africa, conduct PHEs in preseason. Although mental health screenings are currently not performed in these settings, many clubs perform routine baseline testing using the Sport Concussion Assessment Tool – Fifth Edition (SCAT-5) (11,12). Since affective, cognitive, sleep, and physical symptoms are evaluated in the SCAT-5 baseline assessments, these may potentially be able to identify underlying mental disorders or pre-clinical states (13).

The SCAT-5 (11,12) is the most well-established and comprehensively developed of the available assessment tools for sideline use and is free to use (14). The SCAT-5 Symptom Evaluation (SCAT-5 SE) was derived from the Post-Concussion Scale (PCS) (15) and further developed through Concussion in Sport Group consensus meetings that included panellists from academia and clinical practice (12). Four SCAT-5 items (feeling more emotional, irritability, sadness, and feeling nervous or anxious) have been theoretically labelled the affective cluster (16). However, since the SCAT-5 was not developed for identifying depressive and anxiety disorders directly, exploring the internal structure would be required in order to determine if there is truly a mental health construct which is being assessed. A SCAT-5 factor analysis in United States high school and collegiate athletes showed additional items

loading together with these affective symptoms (17), which may indicate a broader mental health construct that could better identify mental disorders (18). Examining the factor structure in South African athletes when positioned as a mental health tool may help further elucidate the underlying constructs.

Although the SCAT-5 has not yet been compared to gold-standard interview tools for mental disorders, symptoms on the SCAT-5 have been associated with other mental health screening tools, such as the Brief Symptom Inventory-18 (19–21), Beck Depression Inventory-Fast Screen (13), and Patient Health Questionnaire-9 (PHQ-9) (18). Comparing the SCAT-5 to mental health screening tools that have been locally validated, such as the Center for Epidemiologic Studies – Depression (CES-D) (22,23), would demonstrate convergent validity. In addition to general mental health screening tools, there are athlete-specific tools available that may be useful in rugby, such as the Athlete Psychological Strain Questionnaire (APSQ) (24,25) and the Baron Depression Screener for Athletes (BDSA) (26). The International Olympic Committee (IOC) had previously proposed the use of the BDSA as a potential screening tool for depression (27) as it has been designed specifically for athletes (5). The APSQ has also recently been incorporated as the first step of IOC Sport Mental Health Assessment Tool- 1 (IOC SMHAT-1) in order to identify athletes who require mental health support and facilitate prompt treatment (28). These mental health screening tools for athletes still need to be validated for use in Sub-Saharan Africa, due to potential differences in linguistics, conceptual equivalence, and criterion equivalence (29). Furthermore, while athlete-specific tools may be intuitively appropriate for elite athletes, with early empirical evidence being supportive, we are lacking evidence to suggest whether athlete-specific tools are also appropriate for rugby environments out of the elite realm, which might have more heterogeneous player circumstances or different psychological climates. However, correlation between the SCAT-5 and these athlete-specific screening tools would still support its validity in athletes.

In this study, we first explored the prevalence of mood and anxiety disorders within a sample of club rugby players in South Africa. We then examined the factor structure, the internal reliability, and convergent validity of the SCAT-5 SE in order to investigate its use as a mental health screening tool in this setting. Additionally, we performed a preliminary investigation into the ability of the SCAT-5 in identifying true cases versus non-cases of these disorders in the sample.

Materials and Methods

Participants

Current adult male rugby union players (*n*=71) were recruited from the University of Cape Town Rugby Football Club (UCTRFC) and False Bay Rugby Football Club (FBRFC), clubs which both compete in the WPRU Super League A in Cape Town, South Africa. UCTRFC rugby players are tertiary-level students at an English-medium university. FBRFC players include a mix of students and working adults. The overall study population included a mix of competitive-elite, sub-elite, and non-elite players, including both semi-professional and non-professional players.

Participants from UCTRFC were recruited directly during scheduled preseason PHEs for UCT in October 2020. FBRFC did not have systematically organised PHEs so participants were recruited during the club rugby preseason in-person and via group message, between February and June 2021. Inclusion criteria required club rugby players to be at least 18 years old, able to communicate in English, and able to give informed consent. There were no other specific exclusion criteria. Participants were compensated for their time through entry into a lucky draw for two prizes of R250 cash (±€15).

Measurement Tools

Mini International Neuropsychiatric Interview – Seventh edition (30–32)

The MINI 7.0.2 is a fully-structured diagnostic interview designed for epidemiological studies and clinical trials (30). Due to its design, it may be administered by non-specialists with adequate training (31). The MINI has been found to be valid and reliable in identifying and differentiating mental disorders, while being shorter than other gold-standard tools (30). It has shown good specificity and sensitivity when compared with the Composite International Diagnostic Interview (CIDI)(30,31) and the Structured Clinical Interview for DSM (SCID) (31,32). It has shown good inter-rater and test-retest reliability (31,32). The MINI has been used extensively in research studies in South Africa. The following MINI 7.0.2 modules were administered: Major Depressive Disorder, Bipolar Disorder, Panic Disorder, Agoraphobia, Social Anxiety Disorder, Obsessive-Compulsive Disorder, Post-traumatic Stress Disorder, and Generalised Anxiety Disorder.

Sport Concussion Assessment Tool – Fifth edition (11,12)

The Athlete Background and Symptom Evaluation sections were used in this study. The athlete background includes pertinent demographic and clinical background. The SCAT-5 Symptom Evaluation is a self-reported symptom scale consisting of 22 symptoms of concussion. At baseline, the athlete rates their symptoms on how they have been typically feeling over the last 30 days. Each symptom is rated on a Likert scale of zero (none) to six (severe), with a maximum symptom severity score of 132.

Center for Epidemiologic Studies – Depression

The CES-D is a self-reported depression screening tool used in the general population (33) and used commonly in high-performance populations (6). The CES-D consists of 20 items to assess current symptoms of depression. It has been validated in the general population in South Africa (22,23), where it has been found to have a sensitivity of 79% and specificity of 61% in detecting gold-standard defined cases through Mini International Neuropsychiatric Interview when using a cut-off of 22 (22). It is reliable with an alpha-coefficient of 0.90 in South Africa (23).

General Anxiety Disorder-7

The GAD-7 is a self-reported anxiety screening tool, specifically designed to identify generalised anxiety disorder (GAD) (34). It consists of seven items, with the summed score being categorised as minimal anxiety (0-4), mild anxiety (5-9), moderate anxiety (10-14), and severe anxiety (15-21) (34). It is widely validated, with high sensitivity, in particular for GAD (35). Recent systematic review by Mughal et al (2020) allowed for meta-analysis of the GAD-7 results from two studies, showing sensitivity of 76% and specificity of 64% at the cut-off of 10 (35). It has also been used in athletes, where it has been shown to be reliable with an α of 0.88 to 0.91 (28). It is currently recommended for use by the IOC as a mental disorder-specific screening tool when psychological strain has been identified (28).

Athlete Psychological Strain Questionnaire

The APSQ is a brief mental health screening tool, designed specifically for use in athletes (24). It was designed by Australian psychologists in the field of athlete mental health (24) and is currently recommended by the IOC as an initial mental health triaging tool in athletes (28). The 10 items focus on behaviours that could suggest psychological distress in a sports environment, including interactions with their team, frustration tolerance, impulse control, performance worries, training stress, and stress about transitions from sport, and types of externalised coping (24,25).

Baron Depression Screener for Athletes

The BDSA is a self-reported tool, which asks about the previous two-week period. The BDSA consists of 10 items with scores of zero (never), one (some of the time), and two (most of the time) for each item. It was specifically developed by American experts in the field to be used in athletes (27).

Procedure

MINIs were performed by the first author (JWB) – a psychiatry registrar/resident – and a trained psychiatric nurse with extensive experience administering the MINI. Interviews were conducted in person initially, but later via telephonic interviews to mitigate risk in line with Human Research Ethics Committee directives on human research during COVID-19. Participants also completed the SCAT-5 SE, BDSA, APSQ, GAD-7, and CES-D, which are all designed for self-report.

Statistical Analysis

Statistical analysis was performed using Stata Statistical Software: Version 14.1 (Stata Corp., College Station, TX, USA). Continuous variables were summarised as means (± standard deviation) or medians (interquartile range, IQR), while categorical variables were summarised as counts (percentages). Confidence intervals were calculated for MINI-defined disorders.

Evaluating a screening tool involves testing of dimensionality (factor structure), reliability (internal consistency and test-retest reliability), and validity (criterion and construct validity)(36). We conducted an exploratory factor analysis (iterative principal factor analysis) on the SCAT-5 SE, using oblique oblimin rotation to allow for correlated factors, with Kaiser normalisation. The factor model was selected using eigenvalues greater than one together with assessment of the scree plot. Factors loadings of 0.32 and above were interpreted, as loadings below this are considered poor (37).

Internal consistency was assessed using Cronbach's alpha. Convergent validity of the SCAT-5 SE was investigated through correlation coefficients with the CES-D, GAD-7, BDSA, and APSQ using Spearman's correlations due to data skewness.

Concurrent criterion validity was investigated through comparison with a gold-standard tool, the MINI. We conducted a preliminarily exploration of the discriminative ability of the SCAT-

5 using Receiver Operating Characteristic (ROC) analyses, with understanding of the clear limits in this study due to sample size.

Ethical Considerations

This study was approved by the Human Research Ethics Committee at the University of Cape Town (HREC: 523/2020) and the Department of Student Affairs. The protocol conformed to the recommendations of the Declaration of Helsinki. The authors confirm that the research met the ethical guidelines, including adherence to the legal requirements, of South Africa. Informed consent was obtained from all participants prior to data collection. Following risk assessment by the psychiatry registrar/resident, participants who were identified as having mental disorders or suicidal risk were referred either to emergency care or to outpatient university, public, or private mental health services.

Results

Demographics

Table 1 reports the sample characteristics for the 71 male rugby players recruited to the study, together with their medical history reported on the SCAT-5, and the prevalence of mental disorders in the 68 participants who had complete assessments with the MINI. Participants were aged between 18 and 40, with a mean age of 24.49. Community club players made up 64.79% with the remaining 35.21% playing for the university club. 43.66% of the sample were students. Participants reported a mean of 1.31 concussions in the past, with a range of none to six. Attention Deficit/Hyperactivity Disorder (ADHD) had previously been diagnosed in 15.71%, while 4.29% reported being diagnosed previously with depression, anxiety, or other psychiatric disorders. On structured assessment with the MINI, a lifetime (past or current) disorder was identified in 33.82% of participants (95%CI 22.79 to 46.17%) with 8.96% having more than one disorder. A current disorder was identified in 10.29% (95%CI 4.24% to 20.07%). Medication use was reported in 11.43% of the rugby players, with five of the eight reporting the use of asthma medication and two reporting selective serotonin reuptake inhibitors.

Table 1: Sample characteristics, Self-reported medical history, and Prevalence of MINI-defined disorders

Participants (*n*=71)			
Age (years)	24.49	±5.72	
Club			
Community club	46	64.79%	
University club	25	35.21%	
Team			
Men's Open: 1st team squad	44	61.97%	
Men's Open: Other teams	16	22.54%	
Men's u20	11	15.49%	
Occupation			
Student	31	43.66%	
Employed full time	28	39.44%	
Employed part time	7	9.86%	
Currently unemployed	5	7.04%	
Self-reported medical history (n=70)			
Number of past concussions	1.31	±1.52	
Hospitalised for head injury	6	8.57%	
Diagnosed or treated for headache disorder or migraines	3	4.29%	
Diagnosed with learning disability	1	1.43%	
Diagnosed with ADD/ADHD	11	15.71%	
Diagnosed with depression, anxiety, or other psychiatric disorder	3	4.29%	
Currently on any medication	8	11.43%	
MINI-defined mental disorders (n=68)			
Any lifetime (past or current) disorder	23	33.82%	95%CI 22.79 to 46.17%
Any current disorder	7	10.29%	95%CI 4.24% to 20.07%
Major depressive disorder, lifetime	17	25.00%	95%CI 15.29 to 36.98%
Major depressive disorder, current episode	2	2.94%	95%CI 0.36 to 10.22%
Bipolar disorder (I, II, or other), lifetime	1	1.47%	95%CI 0.04 to 7.92%
Panic disorder, lifetime	3	4.41%	95%CI 0.92 to 12.36%
Panic disorder, current	0	0%	95%CI 0 to 5.28%
Agoraphobia, current	0	0%	95%CI 0 to 5.28%
Social anxiety disorder, current	1	1.47%	95%CI 0.04 to 7.92%
Obsessive compulsive disorder, current	0	0%	95%CI 0 to 5.28%
Post-traumatic stress disorder, current	1	1.47%	95%CI 0.04 to 7.92%
Generalised anxiety disorder, current	6	8.82%	95%CI 3.31 to 18.22%

SCAT-5 Symptom Evaluation

SCAT-5 SE Symptom Severity scores were right skewed ($p < 0.0001$) with a median of 3.5 and interquartile range of 1 to 10, with the highest severity score of 44. *Table 2* shows the symptom severity for each of the SCAT-5 items. In these baseline SCATs, 42.03% of the sample reported having fatigue or low energy and 35.71% reported feeling nervous or anxious.

Table 2: SCAT-5 Symptom Frequency

	n	%
Fatigue or low energy[a]	29	42.03%
Nervous or Anxious	25	35.71%
Difficulty concentrating	24	34.29%
Trouble falling asleep	24	34.29%
Headache	18	25.71%
Neck Pain	18	25.71%
Irritability	18	25.71%
Feeling slowed down	16	22.86%
Difficulty remembering	15	21.43%
More emotional[a]	14	20.29%
Sensitivity to light	14	20.00%
Sadness	12	17.14%
“Pressure in head”	10	14.29%
“Don’t feel right”	10	14.29%
Dizziness	9	12.86%
Balance problems	9	12.86%
Feeling like “in a fog”	9	12.86%
Drowsiness	9	12.86%
Blurred vision	7	10.00%
Confusion	6	8.57%
Sensitivity to noise	5	7.14%
Nausea or vomiting	3	4.29%

[a]69 participants for these items; others had 70 participants

Factor Analysis

In assessing suitability for factor analysis, the Kaiser-Meyer-Olkin value of 0.69 demonstrated sampling adequacy, with Bartlett’s test of sphericity being significant ($p<0.001$). The correlation matrix showed that items were correlated, such as between feeling slowed down and feeling “in a fog” ($r = 0.80$), sadness and feeling nervous or anxious ($r = 0.69$), and having difficulty remembering and sadness ($r = 0.70$). Exploratory factor analysis (iterative principal

factor analysis) yielded a three-factor model, which explained 61% of the variance. Although six factors returned Eigenvalues greater than one, the scree plot identified three being to the left of the elbow. The factor loading structure for the SCAT-5 Symptom Evaluation is presented in *Table 3*. The three factors identified were *Depression/Anxiety* (Eigenvalue 7.34, explaining 37.34% of the variance), *Migraine* (Eigenvalue 2.69, explaining 13.66% of the variance), and *Vestibular* (Eigenvalue 2.04, explaining 10.38% of the variance). Cross-loaded items were loaded onto their primary factor, as they were strongly loaded to their primary factor and had differences between their primary and alternative loading of at least 0.2 (38). Nausea or vomiting and trouble falling asleep did not meet primary loading criteria.

Table 3: SCAT-5 Symptom Evaluation Factor Loading Structure[b]

	Depression/Anxiety	Migraine	Vestibular
Headache		0.7929	
"Pressure in head"		0.6399	
Neck Pain		0.5454	
Nausea or vomiting[d]			
Dizziness		0.3961	
Blurred vision[c]			0.7170
Balance problems			0.5277
Sensitivity to light		0.7068	
Sensitivity to noise			0.4205
Feeling slowed down[c]	0.7634		
Feeling like "in a fog"	0.7327		
"Don't feel right"	0.5419		
Difficulty concentrating	0.6213		
Difficulty remembering	0.7926		
Fatigue or low energy	0.5673		
Confusion			0.6107
Drowsiness	0.7058		
More emotional	0.6691		
Irritability[c]	0.6160		
Sadness	0.9351		
Nervous or Anxious	0.7211		
Trouble falling asleep[d]			

[b]Loadings below 0.32 omitted

[c]Cross-loaded items shown for factor where they loaded most strongly

[d]Items did not meet loading criteria (>0.32)

Reliability

Cronbach's alpha ranged from acceptable to excellent, with the SCAT-5 SE Symptom Severity showing the strongest internal consistency (α = 0.94). The GAD-7 and CES-D had good internal consistency (α = 0.86 and 0.85, respectively). The BDSA and APSQ had moderate internal consistency (α = 0.72 and 0.71, respectively).

Correlations of the SCAT-5 with other mental health screening tools

The convergent validity of the SCAT-5 SE as a mental health tool was explored through comparison with the locally validated tools (CES-D and GAD-7) and athlete-specific tools (APSQ and BDSA). *Table 4* shows the correlations between the mental health screening tools, all of which showed significant positive linear correlations ($p < 0.01$). The SCAT-5 had a correlation coefficient of 0.34 with the CES-D ($p = 0.008$) and 0.49 with the GAD-7 ($p < 0.0001$). The correlation was highest between the two screening tools designed for athletes, BDSA and APSQ (0.70, $p < 0.0001$).

Table 4: Correlations between mental health screening tools (rho, p)

	SCAT-5 Symptom Severity	SCAT-5 Dep/Anx Factor	BDSA	APSQ	GAD7	CES-D
SCAT-5 Symptom Severity	1.0000					
SCAT-5 Dep/Anx Factor	0.91* p < 0.0001	1.0000				
BDSA	0.45* p = 0.0001	0.51* p < 0.0001	1.0000			
APSQ	0.39* p = 0.001	0.42* p = 0.001	0.70* p < 0.0001	1.0000		
GAD7	0.49* p < 0.0001	0.52* p < 0.0001	0.65* p < 0.0001	0.56* p < 0.0001	1.0000	
CES-D	0.34* p = 0.008	0.37* p = 0.003	0.67* p < 0.0001	0.42* p = 0.0007	0.66* p < 0.0001	1.0000

*$p < 0.05$

Preliminary Receiver Operating Characteristics Analysis

Screening tools showed varying ability in this preliminary ROC analysis to differentiate cases from non-cases defined by the MINI. The CES-D showed the ability to significantly differentiate cases from non-cases of any current disorder (AUC 0.89, $p < 0.001$), with particularly high AUC for current mood disorders (AUC 0.97, $p = 0.005$). The GAD-7

differentiated any current disorder and current anxiety disorders (both AUC 0.84, $p < 0.001$). The SCAT-5 SE demonstrated a high AUC for any current disorder (AUC 0.87, $p = 0.003$). For current anxiety disorders, the AUC of the Depression/Anxiety factor of the SCAT-5 was marginally higher than the total SCAT-5 Symptom Severity (AUC 0.85, $p = 0.009$ vs AUC 0.82, $p = 0.03$). The APSQ did not reach the level of statistical significance in this preliminary ROC analysis. It showed a higher AUC for determining cases of current mood disorders (AUC 0.89, $p = 0.08$), compared to its ability to determine cases of current anxiety disorders from non-disorders (AUC 0.62, $p = 0.30$). The BDSA demonstrated significant results for identifying any current disorder (AUC 0.79, $p = 0.002$), but with a particularly high AUC of 0.94 in current mood disorders ($p = 0.01$).

Discussion

Mental disorders were common in these South African club rugby players, with a third having a past or current disorder identified on the MINI. This rate is similar to, or slightly higher than, the rate of mental disorders found previously in the South African general population (39). One in ten of the rugby players had a current disorder, meeting the criteria for the disorder together with functional impairment or significant distress. Major depressive disorder was identified in a quarter of the sample, with 2.94% meeting criteria for a current episode. These data show a higher prevalence of depressive disorders than in the general population, where lifetime prevalence of any mood disorder is 9.8% (39). The most common current disorder was generalised anxiety disorder, identified in 8.82% of the players (95%CI 3.31 to 18.22%). This is also higher than the 2.7% of GAD found in the general population (39).

There is currently a large treatment gap that was demonstrated for those with mental disorders. Just 4.29% of participants reported having been diagnosed with depression or anxiety disorders previously, which grossly underrepresents the number with past or current psychopathology. There is a generally large treatment gap in South African mental health service delivery, with three-quarters of those with mental disorders not having accessed mental health care (40). Barriers to accessing mental health care in athletes often include low levels of mental health literacy and stigma (9). During the referral process following identifying mental disorders in this study, practical issues around where best to access services needed discussion and problem-solving. In South Africa, the majority of people are assessed and treated in the general medical sector instead of psychiatrists (40). Empowering the generalists and sports clinicians with the knowledge and ability to screen this population for CMDs may help enable task-sharing with the more specialist mental health providers, like sports psychiatrists.

World Rugby has put forward player welfare as their number one priority (41), with both brain health and mental wellbeing being areas of focus. Collision sports are at the forefront of discussions about mental health, particularly with public press warning of the dangers of repeated head injuries for mental health and cognition. For sports like rugby, determining the best way to identify players with mental health symptoms is key. At this stage, there are no published accounts of South African Rugby or other South African sports organisations incorporating routine mental health screening into their practice.

Although the SCAT-5 was not developed specifically for depression and anxiety screening, there seems to be a mental health construct within the SCAT-5 SE. The SCAT-5 demonstrated that items grouped together to form a *Depression/Anxiety* factor that includes mood, fatigue, psychomotor, and cognitive symptoms. The symptoms were: feeling slowed down; feeling like "in a fog"; "don't feel right"; difficulty concentrating; difficulty remembering; fatigue or low energy; drowsiness; more emotional; irritability; sadness; and nervous or anxious. This Depression/Anxiety factor combines the cognitive-fatigue and affective factors of the SCAT-5 in non-concussed participants found by Anderson et al (2020) (17), forming a more global mental health factor which could have potential as a mental health screening tool. The SCAT-5 item on trouble falling sleep did not load to a primary factor in this analysis and may represent its own construct.

The SCAT-5 demonstrated the best internal reliability compared to the other measures through its excellent internal consistency ($\alpha = 0.94$). Convergent validity of the SCAT-5 as a mental health tool was demonstrated by the significant positive correlations with established and locally-validated mental health screening tools for depression (CES-D)(22,23) and anxiety (GAD-7)(35), as well as the athlete-specific tools (APSQ and BDSA) (27,28). While we are well aware of the limitations of sample size in this study for ROC analysis, due to the impact of COVID-19, it is promising that the SCAT-5 showed a high and significant AUC for identifying current mental disorders in this preliminary analysis. The SCAT-5 was able to determine current disorders on par with the CES-D and GAD-7, and perhaps better than the APSQ and BDSA. These data supports previous literature that suggested promise of the SCAT-5 and concussion assessment tools to detect mental health symptoms (13,18). The IOC has incorporated the APSQ into their mental health screening tool, the IOC SMHAT-1(28). Although the APSQ also showed significant correlation with locally validated mental health

tools, the SCAT-5 outperformed the APSQ in the preliminary ROC analysis, which needs to be confirmed in larger studies.

We suggest that the SCAT-5 is the most appropriate mental health screening tool for this population. The SCAT-5 is already widely used to assess for concussion in many contact sport settings, such as South African club rugby, and baseline SCAT-5 assessments are often included in PHEs. The pragmatic use of this tool may help medical support staff screen for mental health symptoms without needing additional measures. This may be particularly beneficial with limited time and resources (13). It would also allow team medical staff to screen their athletes, rather than relying on mental health specialists, who are in particularly short supply in low-resource settings (42).

Limitations

Due to limited resources available and the time needed to conduct the MINI adequately and assess risk, only certain MINI modules were selected. Unfortunately, COVID-19 resulted in a limited number of clubs being fully functional during the rugby preseason. The decision was made to focus attention on two of the established clubs who demonstrated ongoing player and coach support. Locally, women's club rugby was particularly affected in the pandemic and this study had to focus on men's club rugby.

Future research with larger validation studies are recommended to further investigate the SCAT-5 as a mental health screening tool, in order to establish its sensitivity, specificity, and positive predictive value, as well as address whether the SCAT-5 SE Severity Score or selected items like the Depression/Anxiety factor demonstrate more clinical utility.

Affective symptoms have been found to be underreported on concussion symptom checklists compared to mental health tools (18). Further research is needed into how best to elicit true responses in the sporting environment as well as whether players find this an acceptable mental health tool. At a minimum, these data suggest that conversations about mental health can stem from the SCAT-5. With the current drive to implement interventions for improving mental health literacy in athletes and organisations (43), having an established tool which measures mental health symptoms could be a useful foundation.

This study was based in an urban population and has a higher proportion of students at an English-medium tertiary education institution. This population is likely more educated and likely more proficient in English than the broader South African general population. Further validation studies may be required in other South African populations in their respective languages. Translation of the tools and exploring understanding of different cultural contexts may be required in further studies.

Conclusion

We recommend mental health screening be incorporated into periodic health evaluations in these South African club rugby players due to the high burden of depressive and anxiety disorders with a large treatment gap. The SCAT-5 SE may be the best available screening tool due to its psychometric properties and widespread implementation as a baseline assessment in rugby. The SCAT-5 SE demonstrates internal reliability, criterion validity, construct validity, and convergent validity with other established and validated mental health screening tools. Future research should include larger validation studies to determine its sensitivity, specificity, and positive predictive value.

Statements and Declarations

Disclosure statement: The authors received no specific grant or financial support for this research. The authors have no conflicts of interest to report.

Availability of data and material: Data from the current study are available from the corresponding author on reasonable request.

Author Contributions: JWB conceptualised and designed this study as part of his MMed (Psychiatry), under the supervision of LSA and JAJ. JAJ was the principal investigator. JWB wrote the proposal. JWB and LSA analysed the data. All authors contributed to the interpretation of the data and writing of the manuscript. All authors approved the final version.

Acknowledgements: The authors thank the participants from FBRFC and UCTRFC for their assistance in the study through a very challenging year for sports. Thank you to Rasmita Ori and Leigh Gordon for their recommendations for improving the protocol; Marc Blockman and the Human Research Ethics Committee for the recommendations on the protocol; Yoliswa Mtingeni for her assistance in conducting the MINIs; Demi Davidow and the medical and coaching staff at UCTRFC; and the FBRFC medical and coaching staff for their assistance.

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Appendices

Sport Concussion Assessment Tool 5

OFFICE OR OFF-FIELD ASSESSMENT

Please note that the neurocognitive assessment should be done in a distraction-free environment with the athlete in a resting state.

STEP 1: ATHLETE BACKGROUND

Sport / team / school: _____

Date / time of injury: _____

Years of education completed: _____

Age: _____

Gender: M / F / Other

Dominant hand: left / neither / right

How many diagnosed concussions has the athlete had in the past?: _____

When was the most recent concussion?: _____

How long was the recovery (time to being cleared to play) from the most recent concussion?: _____ (days)

Has the athlete ever been:

Hospitalized for a head injury?	Yes	No
Diagnosed / treated for headache disorder or migraines?	Yes	No
Diagnosed with a learning disability / dyslexia?	Yes	No
Diagnosed with ADD / ADHD?	Yes	No
Diagnosed with depression, anxiety or other psychiatric disorder?	Yes	No

Current medications? If yes, please list:

_____

_____

_____

_____

_____

_____

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

2

STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post injury assessment the athlete should rate their symptoms at this point in time.

Please Check: ☐ **Baseline** ☐ **Post-Injury**

Please hand the form to the athlete

	none	mild		moderate		severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6

Total number of symptoms:	of 22
Symptom severity score:	of 132
Do your symptoms get worse with physical activity?	Y N
Do your symptoms get worse with mental activity?	Y N
If 100% is feeling perfectly normal, what percent of normal do you feel?	

If not 100%, why?

_____

_____

_____

Please hand form back to examiner

Davis GA, *et al. Br J Sports Med* 2017;**0**:1–8. doi:10.1136/bjsports-2017-097506SCAT5

Athlete Psychological Strain Questionnaire

Citations:

Rice SM, Parker AG, Mawren D, Clifton P, Harcourt P, Lloyd M, Kountouris A, Smith B, McGorry PD, Purcell R. Preliminary psychometric validation of a brief screening tool for athlete mental health among male elite athletes. *International Journal of Sport and Exercise Psychology*. 2019; 1-16. doi: 10.1080/1612197X.2019.1611900

Rice S, Olive L, Gouttebarge V, Parker AG, Clifton P, Harcourt P, ... & Purcell R. Mental health screening: severity and cut-off point sensitivity of the Athlete Psychological Strain Questionnaire in male and female elite athletes. *BMJ Open Sport & Exercise Medicine*. 2020; 6(1), e000712. doi:10.1136/bmjsem-2019-000712

Instructions for completion: Please think back over the last four weeks and respond to each item considering how often it applied to you. Please respond where 1 = *none of the time*; 5 = *all of the time*.

	None of the	A little	Some of the	Most of the	All of the	Unanswered
1. It was difficult to be around teammates	1	2	3	4	5	
2. I found it difficult to do what I needed to do	1	2	3	4	5	
3. I was less motivated	1	2	3	4	5	
4. I was irritable, angry or aggressive	1	2	3	4	5	
5. I could not stop worrying about injury or my performance	1	2	3	4	5	
6. I found training more stressful	1	2	3	4	5	
7. I found it hard to cope with selection pressures	1	2	3	4	5	
8. I worried about life after sport	1	2	3	4	5	
9. I needed alcohol or other substances to relax	1	2	3	4	5	
10. I took unusual risks off-field	1	2	3	4	5	

Scoring: The APSQ provides a Total Score (sum of all 10 items) and three subscale scores, that assess the following domains:

Subscale	Items
Self-regulation difficulties	1-4
Performance concerns	5-8
Externalised coping	9-10

APSQ Range*	APSQ Cutoff Scores (total score)
Moderate	15-16
High	17-19
Very high	20+

*Cut-off scores based on N=1,093 elite athletes (*n*=84 females) in Rice, Olive et al (2020, *BMJ Open – Sports & Ex Med*). Original article by Rice, Parker et al. (2019) reported a single cut-off score of 21.

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Baron Depression Screener for Athletes

In the last two weeks:	0 – Never	1 – Some of the time	2 – Most of the time	Decline to answer
1. I feel sad even after a good practice session or successful competition				
2. I rarely get pleasure from competing anymore and have lost interest in my sport				
3. I get little or no pleasure from my athletic successes				
4. I am having problems with my appetite and weight				
5. I do not feel rested and refreshed when I wake up				
6. I am having problems maintaining my focus and concentration during training and competition				
7. I feel like a failure as an athlete and person				
8. I cannot stop thinking about being a failure and quitting sports				
9. I am drinking alcohol or taking supplements to improve my mood				
10. I have thoughts of ending my life				

Generalized Anxiety Disorder 7

Over the last two weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day	Decline to answer
Feeling nervous, anxious, or on edge	0	1	2	3	
Not being able to stop or control worrying	0	1	2	3	
Worrying too much about different things	0	1	2	3	
Trouble relaxing	0	1	2	3	
Being so restless that it is hard to sit still	0	1	2	3	
Becoming easily annoyed or irritable	0	1	2	3	
Feeling afraid, as if something awful might happen	0	1	2	3	

If you checked any problems, how difficult have they made it for you to do your work, take care of things at home, or get along with other people?				
Not difficult at all ☐	Somewhat difficult ☐	Very difficult ☐	Extremely difficult ☐	Decline to Answer ☐

Center for Epidemiologic Studies – Depression

During the past week:	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)	Decline to answer
1. I was bothered by things that usually don't bother me.					
2. I did not feel like eating; my appetite was poor.					
3. I felt that I could not shake off the blues even with help from my family or friends.					
4. I felt I was just as good as other people.					
5. I had trouble keeping my mind on what I was doing.					
6. I felt depressed.					
7. I felt that everything I did was an effort.					
8. I felt hopeful about the future.					
9. I thought my life had been a failure.					
10. I felt fearful.					
11. My sleep was restless.					
12. I was happy.					
13. I talked less than usual.					
14. I felt lonely.					
15. People were unfriendly.					
16. I enjoyed life.					
17. I had crying spells.					
18. I felt sad.					
19. I felt that people dislike me.					
20. I could not get "going."					

Mini International Neuropsychiatric Interview 7.0.2

Selected modules used (shaded modules excluded from MINI 7.0.2 due to resource constraints)

Patient Name:		***Patient Number:***			
Date of Birth:		***Time Interview Began:***			
Interviewer's Name:		***Time Interview Ended:***			
Date of Interview:		***Total Time:***			

	MODULES	TIME FRAME	MEETS CRITERIA	ICD-10-CM	PRIMARY DIAGNOSIS
A	MAJOR DEPRESSIVE EPISODE	Current (2 Weeks)	☐		
		Past	☐		
		Recurrent	☐		
	MAJOR DEPRESSIVE DISORDER	Current (2 Weeks)	☐	F32.x	☐
		Past	☐	F32.x	☐
		Recurrent	☐	F33.x	☐
B	SUICIDALITY	Current (Past Month)	☐		☐
		Lifetime attempt	☐	☐ Low ☐ Moderate ☐ High	☐
	SUICIDE BEHAVIOR DISORDER	Current	☐	(In Past Year)	☐
		In early remission	☐	(1 - 2 Years Ago)	☐
C	MANIC EPISODE	Current	☐		
		Past	☐		
	HYPOMANIC EPISODE	Current	☐		
		Past	☐	☐ Not Explored	
	BIPOLAR I DISORDER	Current	☐	F31.0 - F31.76	☐
		Past	☐	F31.0 - F31.76	☐
	BIPOLAR II DISORDER	Current	☐	F31.81	☐
		Past	☐	F31.81	☐
	OTHER SPECIFIED BIPOLAR AND RELATED DISORDER	Current	☐	F31.89	☐
		Past	☐	F31.89	☐
D	PANIC DISORDER	Current (Past Month)	☐	F41.0/F40.01	☐
		Lifetime	☐	F41.0/F40.01	☐
E	AGORAPHOBIA	Current	☐	F40.00/F40.01/F40.02	☐
F	SOCIAL ANXIETY DISORDER (Social Phobia)	Current (Past Month)	☐	F40.10/F40.11	☐
G	OBSESSIVE-COMPULSIVE DISORDER	Current (Past Month)	☐	F42.2	☐
H	POSTTRAUMATIC STRESS DISORDER	Current (Past Month)	☐	F43.10	☐
I	ALCOHOL USE DISORDER	Past 12 Months	☐	F10.10 - F10.21	☐
J	SUBSTANCE USE DISORDER (Non-alcohol)	Past 12 Months	☐	F11.10 - F19.21	☐
K	ANY PSYCHOTIC DISORDER	Current	☐	F20.81-F29	☐
		Lifetime	☐	F20.81-F29	☐
	MAJOR DEPRESSIVE DISORDER WITH PSYCHOTIC FEATURES	Current	☐	F32.3/F33.3	☐
		Past	☐	F32.3/F33.3	☐
	BIPOLAR I DISORDER WITH PSYCHOTIC FEATURES	Current	☐	F31.2/F31.5/F31.64	☐
		Past	☐	F31.2/F31.5/F31.64	☐
L	ANOREXIA NERVOSA	Current (Past 3 Months)	☐	F50.01/F50.02	☐
M	BULIMIA NERVOSA	Current (Past 3 Months)	☐	F50.2	☐
MB	BINGE-EATING DISORDER	Current (Past 3 Months)	☐	F50.81	☐
N	GENERALIZED ANXIETY DISORDER	Current (Past 6 Months)	☐	F41.1	☐
O	MEDICAL, ORGANIC, DRUG CAUSE RULED OUT			☐ No ☐ Yes ☐ Uncertain	
P	ANTISOCIAL PERSONALITY DISORDER	Lifetime	☐	F60.2	☐

IDENTIFY THE PRIMARY DIAGNOSIS BY CHECKING THE APPROPRIATE CHECK BOX.
(Which problem troubles you the most or dominates the others or came first in the natural history?)

MINI 5.0 Suicidality Module

C. SUICIDALITY

Again, remember that some of the questions will apply to you and some may not. Let me now ask you a few more questions about some problems people sometimes have.

In the past month did you:

				Points
C1	Think that you would be better off dead or wish you were dead?	NO	YES	1
C2	Want to harm yourself?	NO	YES	2
C3	Think about suicide?	NO	YES	6
C4	Have a suicide plan?	NO	YES	10
C5	Attempt suicide?	NO	YES	10
	In your lifetime:			
C6	Did you ever make a suicide attempt?	NO	YES	4

IS AT LEAST **1** OF THE ABOVE CODED **YES**?

IF YES, ADD THE TOTAL NUMBER OF POINTS FOR THE ANSWERS (C1-C6) CHECKED 'YES' AND SPECIFY THE LEVEL OF SUICIDE RISK AS FOLLOWS:

NO **YES**

SUICIDE RISK CURRENT

1-5 points	Low	☐
6-9 points	Moderate	☐
≥ 10 points	High	☐

IF SUICIDE RISK IS MODERATE-HIGH, DOCUMENT PLAN IN CHART NOTE.

Consent forms

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

Title of Research Project: Psychometric properties of athlete-specific mental health screening tools in South African club rugby players

Principle investigator: Dr James W. Burger
Investigators: Dr Lena S. Andersen, Prof John Joska
Address: Department of Psychiatry and Mental Health, Groote Schuur Hospital, Anzio Road, Observatory, 7925

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff any questions about any part of this project that you do not fully understand. It is very important that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any time, even if you do agree to take part at this point.

This study has been approved by the **Human Research Ethics Committee** of the Faculty of Health Sciences of the University of Cape Town and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research. You can contact the Human Research Ethics Committee at 021 406 6087 if you have any concerns or complaints that have not been adequately addressed by the study staff. You may find their office in the Groote Schuur Hospital Old Main Building- E52.

What is this research study all about?
Mental disorders such as depression and anxiety are common in the general population, including athletes and student athletes. Athletes may present slightly differently with these common mental disorders. We are wanting to find the best way to screen for these disorders in athletes so that we can help our athletes to access support when it is needed.

What will happen in this research study?
First, you should review this form and we will discuss any questions you have. Then, if you agree to take part, you will sign this form to indicate your willingness to participate.

There is a short list of questions for you to answer about yourself, how you are doing, your mood, and other experiences that you may be having. These are in the form of tick boxes which you can answer privately. If you would prefer not to answer a question, please mark in the "unanswered" tick block. Questions are sometimes missed in error, so if we note that questions have been missed, we will contact you to try fill the gaps. Then a member of the study team will interview you and ask you additional mental health questions.

Your responses will remain confidential, and available only to study staff.
Coaching staff and medical support staff will not have access to the information you provide in the study.

What will your responsibilities be?
We ask that you answer the questions as completely and honestly as possible. However, you are free to refuse to answer any questions you do not feel comfortable answering.

Will you benefit from taking part in this research?
You may get some benefit from the study in direct and indirect ways. You will be asked questions about your mood and symptoms of depression and anxiety – if you are found to have significant symptoms of depression and anxiety, you will be referred to UCT Student Wellness, your local health clinic, or private health practitioner for a more detailed mental health interview. This will allow them to assess for mental health problems that you may have and may help find treatment for you if you require it. Additionally, by participating in this research, you may help us identify the best tools to identify teammates who may be struggling.

Are there risks involved in your taking part in this research?
This study may make you feel uncomfortable as you talk about health or mental health problems. You may feel embarrassed or shy. Sometimes painful information is shared. These are the main risks. You should feel free to mention your feelings or concerns to any member of the study team. If you do have a mental health problem, we will give you a letter for a mental healthcare service of your choice. You may be contacted by the investigator, Dr James Burger, to assess risk if there is concern about suicide or harm. If there is a high risk for suicide or harm to someone else, we would be required to facilitate transfer for an immediate assessment at a local emergency department and communicate this risk to the relevant medical professionals at the emergency department. In the case of an emergency, the team medical practitioner may need to be provided with limited information to facilitate referral for your ongoing care. Contact details for mental health helplines and mental health services are listed below in case you would like to speak to them directly. Please let us know if you would like us to arrange a referral for you.

Who will have access to your medical records?
The information collected about you will be treated as confidential and protected. If we write about this work, your identity will remain anonymous. Only the direct study team will have full access to the information. If we need to refer you to a clinic for management of a mental health problem, we will provide them with the relevant information needed to assess your condition further. As part of this study, the study team will receive a copy of the first page of your SCAT5 baseline concussion assessment.

Will you be paid to take part in this study and are there any costs involved?
There will be no costs involved for you, if you do take part. You will not be paid to participate but participants will be entered into a lucky draw for two prizes of R250 as a compensation for your time.

Feedback
Please consider giving us feedback on how you think screening for mental health should be done at your rugby club. If you have any feedback on the tools or recommendations from you as a player, please email: drjameswburger@gmail.com

When to access help:

Some of the common symptoms that people can experience when they are struggling include:

- Low mood for most days
- Not able to enjoy things you previously enjoyed
- Changes in your eating or appetite
- Difficulty sleeping
- Difficulty in concentrating or remembering things
- Low energy or feeling tired all the time
- Feeling agitated, or slowed down
- Feeling worthless
- Feeling excessively guilty
- Having thoughts about death or killing yourself
- Excessive anxiety or worry most days
- Feeling restless
- Muscle aches and headaches
- Irritability
- Having strange experiences which do not seem normal to you
- Hearing or seeing things which are not there
- Alternatively, having an abnormally elevated mood, persistently raised energy, and not needing to sleep can also be a sign you are not completely well

For more detailed brochures and information on mental health, visit: http://www.sadag.org

Contact Numbers:
Adcock Ingram Depression and Anxiety Helpline: 0800 70 80 90

Akeso Psychiatric Response Unit 24 Hour: 0861 435 787

Cipla Whatsapp Chat Line: 076 882 2775

Dr Reddy's Help Line: 0800 21 22 23

Destiny Helpline for Youth and Students: 0800 41 42 43
Lifeline Western Cape (Telephone counselling service): Landline 021 461 1111 from 09h30 to 22h00 and WhatsApp Call 063 709 2620 from 10h00 to 14h00
Pharmadynamics Police and Trauma Line: 0800 20 50 26
SADAG (South African Depression and Anxiety Group) Mental Health Line: 011 234 4837
SADAG UCT Student Care Line (24/7): 0800 24 25 26 or SMS 31393 for a call-me-back
Suicide Crisis Line: 0800 567 567

UCT Student Wellness: http://www.dsa.uct.ac.za/student-wellness/about-student-wellness
For online bookings and information about available services, please visit their website
Medical services: 021 650 1020
Counselling services: 021 650 1017

If you are not a student, please contact your local community health centre to arrange an appointment with the mental health nurse/doctor.
Should you wish to access private health care you are welcome to search **www.medpages.co.za** for psychiatrists or psychologists in a suburb of your choice

Declaration by participant

By signing below, I ……..……. agree to take part in a research study entitled: Psychometric properties of athlete-specific mental health screening tools in South African club rugby players

I declare that:
I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
I understand that I have a right to ask questions about any aspect of this study.
I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
I understand that participation in this study may elicit difficult emotions and I have been informed about pathways to care should this occur.

Signed at (*place*) .....…..…….. on (*date*) ……...…….. 20__.

.....…..……..
Signature of participant

In addition, by signing below I consent to the study staff contacting me after the completion of the study for additional study purposes. My de-identified data will be kept for a period of three years post-study completion, in order to allow for these follow-up studies.

I declare that:
I understand that I am free to change my mind at any time and that I must just inform the study team if I no longer want them to contact me.
I understand that I will not be penalized in any way for asking the team to stop all contact.

Signed at (*place*) .....…..…….. on (*date*) ……...…….. 20__.

.....…..……..
Signature of participant

Declaration by investigator/study coordinator

I *(name)* ……..…… declare that:
I explained the information in this document to ……..
I encouraged him/her to ask questions and took adequate time to answer them.
I am satisfied that he/she adequately understands all aspects of the research, as discussed above
I will maintain confidentiality at all times.
Signed at (*place*) .....…..…….. on (*date*) ……...…….. 20__.

.....…..……..
Signature of investigator

Participant information sheets

Letter to Participant

Date:

Dear

From our assessment during your participation in this study, it appears that you are experiencing mental health challenges.

To assist you in overcoming these difficulties and to help you to improve your day-to-day functioning, we recommend that you make an appointment at one or more of the following:

- Your local clinic – for mental health services
- A private practitioner of your choice – psychiatrist, psychologist, or general practitioner with an interest in mental health
- UCT Student Wellness (for UCT students)

Please note that if there has been an assessment of high suicide risk in the study, we would be required to facilitate an emergency assessment to determine the next step from here.

Please take another look through the study's information leaflet and consent form, which gives emergency contact details, as well as information on how to access mental health services. Please contact these numbers should you be struggling or need additional advice.

Thank you for participating in the study - we hope that you feel that you have benefited from the screening. If you would like any further information on the study or have any feedback on the study, please get in touch.

Kind regards

Dr James Burger
Psychiatry Registrar
MP0781576
drjameswburger@gmail.com
021 440 3120
072 695 9784

Referral Letter

Medical Practitioner
Mental Health Services

Dear Colleague

RE: Name:_____
DOB:_____
Contact number:_____

Thank you for assisting with the above student from a University of Cape Town-based study. They were screened for common mental disorders during participation and have screened positively on one of the mental disorder screening tools. They would require more comprehensive assessment and management for potential mental disorders.

The participant has been referred to you for

- ☐ Emergency assessment and management
- ☐ Non-emergency assessment and management

Risk for suicide has been assessed as low/medium/high.

Please would you kindly assist this participant with accessing the care that they require.

Please contact me if you require any further information.

Kind regards

Dr James Burger
Psychiatry Registrar
MBChB (UCT) MSc (SEM)(SU) DMH (SA) PGDipHPE (UCT)
MP0781576
drjameswburger@gmail.com
021 440 3120
072 695 9784

Original Ethics Approval

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room G50- Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
Email: hrec-enquiries@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/forms

19 October 2020

HREC REF: 523/2020

Prof J Joska
Department of Psychiatry & Mental Health
Drs Bungalows GSH
Email: - john.joska@uct.ac.za
Student: burger.james.w@gmail.com

Dear Prof Joska

PROJECT TITLE: PSYCHOMETRIC PROPERTIES OF ATHLETE-SPECIFIC MENTAL HEALTH SCREENING TOOLS IN SOUTH AFRICAN UNIVERSITY RUGBY PLAYERS-MASTER'S CANDIDATE-DR JAMES BURGER

Thank you for your response letter, addressing the issues raised by the Faculty of Health Sciences Human Research Ethics Committee (HREC).

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study, subject to the following being considered: -

It would be good to conduct the regression analyses which could be reported in an additional paper. However, if these analyses are conducted, it would be appropriate to include other variables apart from age, gender and head trauma to increase the chance of the paper being published. There are a number of other factors associated with common mental disorders in university students. There is obviously a limit on the number of variables that could be included, and this would depend on the sample size.

This approval is subject to strict adherence to the HREC recommendations regarding research involving human participants during COVID -19, dated 17 March 2020 & 06 July 2020.

Approval is granted for one year until the 30 October 2021.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

We acknowledge that the student: Dr James Burger will also be involved in this study.

Ethics Amendment Approval

Form FHS006: Protocol Amendment

HREC office use only (FWA00001637; IRB00001938)			
☑ Approved	☑ Type of review: Expedited	☐ Full committee	
This serves as notification that all changes and documentation described below are approved.			
Signature HREC Chairperson / Designee		Date	24/1/21

Note: All major amendments must include a local **PI Synopsis** justifying the changes for the amendment. Please note that incomplete amendment submissions will not be reviewed.

Please email this form and supporting documents (if applicable) in a combined pdf-file to hrec-enquiries@uct.ac.za.

Please clarify your plan for research-related activities during COVID-19 lockdown.

Comments from the HREC to the Principal Investigator:
Please submit recruitment email
Note: The approval of this protocol amendment does not grant annual approval. Please complete the FHS016 / FHS017 form for annual approval at least one month before study expiration.

Principal Investigator to complete the following:

1. Protocol information

Date (when submitting this form)	12 January 2021
HREC REF Number	523/2020
Protocol title	Psychometric properties of athlete-specific mental health screening tools in South African club rugby players

DSA approval letter

	RESEARCH ACCESS TO STUDENTS	DSA 100

NOTES

1. This form must be **FULLY** completed by all applicants who want to access UCT students for the purpose of research or surveys.
2. Return the fully completed **(a) DSA 100** application form **by email, in the same word format,** together with your: **(b) research proposal inclusive of your survey, (c) copy of your ethics approval letter / proof (d) informed consent letter** to: Moonira.Khan@uct.ac.za. Cc: Nadierah.Pienaar@uct.ac.za. You application will be attended to by the Executive Director, Department of Student Affairs (DSA), UCT.
3. The turnaround time for a reply is **approximately 10 working days.**
4. NB: It is the responsibility of the researcher/s to apply for and to obtain **ethics approval and to comply with amendments that may be requested;** as well as **to obtain** approval to access UCT staff and/or UCT students, from the following, at UCT, respectively: (a) **Ethics:** Chairperson, Faculty Research Ethics Committee' (FREC) for ethics approval, (b) **Staff access:** Executive Director: HR for approval to access UCT staff, and (c) **Student access:** Executive Director: Student Affairs for approval to access UCT students.
5. **Note:** UCT Senate Research Protocols requires compliance to the above, **even if prior approval has been obtained from any other institution/agency. UCT's research protocol requirements applies to *all* persons, institutions and agencies from UCT and external to UCT who want to conduct research on human subjects for academic, marketing or service related reasons at UCT.**
6. **Should approval be granted to access UCT students for this research study, such approval is effective for a period of one year from the date of approval (as stated in Section D of this form), and the approval expires automatically on the last day.**
7. **The approving authority reserves the right to revoke an approval based on reasonable grounds and/or new information.**

SECTION A: RESEARCH APPLICANT/S DETAILS

Position	Staff / Student No	Title and Name	Contact Details (Email / Cell / land line)
A.1 Student Number	BRGJAM001	Dr James Burger	Burger.james.w@gmail.com / brgjam001@myuct.ac.za / 0726959784 / 0214403120
A.2 Academic / PASS Staff No.			
A.3 Visitor/ Researcher ID No.			
A.4 University at which a student or employee	UCT	Address if *not* UCT:	
A.5 Faculty/ Department/School	Dept of Psychiatry and Mental Health, Faculty of Health Sciences		

A.6 APPLICANTS DETAILS If different from above	Title and Name	Tel.	Email

SECTION B: RESEARCHER/S SUPERVISOR/S DETAILS

Position	Title and Name	Tel.	Email
B.1 Supervisor	Prof John Joska	+27 21 404 2164	john.joska@uct.ac.za
B.2 Co-Supervisor/s	Dr Lena Andersen	+27 78 110 3838	lena.andersen@uct.ac.za

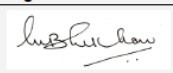
SECTION C: APPLICANT'S RESEARCH STUDY FIELD AND APPROVAL STATUS

C.1 Degree – if applicable	MMED (Psychiatry)
C.2 Research Project Title	Psychometric properties of athlete-specific mental health screening tools in South African university rugby players
C.3 Research Proposal	Attached: Yes ■ No ☐
C.4 Target population	UCT student rugby players at UCT Rugby Football Club
C.5 Lead Researcher details	If different from applicant: Prof John Joska, +27 21 404 2164, john.joska@uct.ac.za
C6. Will use research assistant/s	Yes ■ No ☐ If yes- provide a list of names, contact details : Research assistants, experienced in the use of the Mini International Neuropsychiatric Interview and to be trained in the study requirements, will be confirmed.
C.7 Research Methodology and Informed consent	**Research methodology:** Cross-sectional quantitative and qualitative questionnaires and interviews **Informed consent:** Yes – advised to participants for full participation consent
C.8 Ethics clearance status from UCT's Faculty Ethics in Research Committee /Chair (EiRC)	Approved by the UCT EiRC: Yes ■ With amendments: Yes ■ No ☐ (a) Attach copy of your UCT ethics approval. Attached: Yes ☐ No ■ (b) State date / Ref. No / Faculty of your UCT ethics approval: 19/10/2020 Ref. / Faculty: 523/2020

SECTION D: APPLICANT/S APPROVAL STATUS FOR ACCESS TO STUDENTS FOR RESEARCH PURPOSE

(To be completed by the UCT - ED, DSA or Nominee)

	Approved / With Terms / Not	* Conditional approval with terms	Applicant/s Ref. No.:
D.1 APPROVAL STATUS	(i) Approved ■ ~~(ii) With terms~~ ~~(iii) Not approved~~	a) Access to students for this research study must only be undertaken after written ethics approval has been obtained. b) In event any ethics conditions are attached, these must be complied with before access to students.	BRGJAM001 / Dr James Burger

D.2 APPROVED BY:	Designation	Name	Signature	Date of Approval
	Executive Director Department of Student Affairs	*Dr Moonira Khan*		*22 October 2020*

Conference Abstract for ISSP Scientific Meeting

Abstracts of the International Society for Sports Psychiatry Autumn Scientific Meeting, November 20–21, 2021

Published Online ahead of print: March 30, 2022

https://doi.org/10.1024/2674-0052/a000015

Mental Disorders in South African Club Rugby

James W. Burger[1], Lena S. Andersen[2], John A. Joska[1]

[1]HIV Mental Health Research Unit, Division of Neuropsychiatry, Department of Psychiatry and Mental Health, University of Cape Town

[2]Global Health Section, Department of Public Health, University of Copenhagen

Introduction

Elite athletes have similar prevalence rates of mental disorders to the general population [1,2], although these studies have generally used self-report tools to estimate the prevalence of mood and anxiety disorders. The majority of these studies utilised self-report measures, rather than clinician-administered tools [1,3]. Less is known about non-elite and sub-elite athletes, with little data from low- and middle-income countries (LMIC)[3]. Research is needed to describe the prevalence of mental disorders for South African club rugby using clinician-administered tools.

Material and Methods

We conducted a preliminary cross-sectional, observational study at two clubs in the Western Province Super League A in Cape Town, South Africa. Male rugby union players (n=71) completed preseason mental health screenings, 68 of whom were interviewed using the Mini International Neuropsychiatric Interview (MINI) 7.0.2. Players also completed the Sport Concussion Assessment Tool 5–Symptom Evaluation, Athlete Psychological Strain Questionnaire, Baron Depression Screener for Athletes, Generalised Anxiety Disorder-7, and Center for Epidemiologic Studies–Depression scale.

Results

MINI-defined disorders were identified in 33.8% (23/68; 95%CI 22.79 to 46.17%), with a current disorder identified in 10.29% (7/68; 95%CI 4.24% to 20.07%). Only 4.3% (3/70) of the sample reported being diagnosed with a mental disorder previously. A quarter of the sample met criteria for major depressive disorder (17/68), with 2.94% (2/68) having a current episode. Bipolar disorder was identified in 1.47% (1/68). Generalised anxiety disorder was the most common current disorder (8.82%; 6/68).

Discussion

These results add to the limited prevalence data on mental disorders in South African rugby using clinician-administered tools. Depressive and anxiety disorders were found to be common, supporting previous studies that mental disorders are at least as common in athletes [1,2]. Current anxiety symptoms may be particularly high during the COVID-19 pandemic, via both the environmental implications and direct viral effects [4]. Club players may also have their own particular stressors, as over 40% of this sample were students, and 17% were employed part-time or unemployed. The treatment gap that was demonstrated suggests that implementing mental health screening would be beneficial in South African club rugby, supporting the drive for its inclusion in pre-season screenings [5,6].

References

1 Rice SM, Purcell R, De Silva S, *et al.* The Mental Health of Elite Athletes: A Narrative Systematic Review. Sport. Med. 2016;**46**:1333–53. doi:10.1007/s40279-016-0492-2

2 Reardon CL, Hainline B, Aron CM, *et al.* Mental health in elite athletes: International Olympic Committee consensus statement (2019). Br. J. Sports Med. 2019;**53**:667–99. doi:10.1136/bjsports-2019-100715

3 Kuettel A, Larsen CH. Risk and protective factors for mental health in elite athletes: a scoping review. *Int Rev Sport Exerc Psychol* 2019;**0**:1–35. doi:10.1080/1750984X.2019.1689574

4 Subramaney U, Kim AW, Chetty I, *et al.* Coronavirus Disease 2019 (COVID-19) and Psychiatric Sequelae in South Africa: Anxiety and Beyond. *Wits J Clin Med* 2020;**2**:61. doi:10.18772/26180197.2020.v2n2a2

5 Nabhan D, Taylor D, Lewis M, *et al.* Protecting the world's finest athletes: Periodic health evaluation practices of the top performing National Olympic Committees from the 2016 Rio or 2018 PyeongChang Olympic Games. *Br J Sports Med* 2021;**55**:961–7. doi:10.1136/bjsports-2020-103481

6 Henriksen K, Schinke R, McCann S, *et al.* Athlete mental health in the Olympic/Paralympic quadrennium: a multi-societal consensus statement. *Int J Sport Exerc Psychol* 2020;**18**:391–408. doi:10.1080/1612197X.2020.1746379