Mental health symptoms among Dutch elite athletes and their coaches: a cross-sectional study

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ABSTRACT

Objective To establish the prevalence of mental health symptoms (MHSs) among Dutch elite athletes and their coaches, to examine the association between potential contributing factors and MHS among Dutch elite athletes and their coaches and to explore the view and needs of Dutch elite athletes and their coaches regarding mental health resources and support.

Methods A cross-sectional study was conducted by distributing an electronic questionnaire based on validated screening questionnaires for the assessment of MHS.

Results In total, 156 athletes (55% female) and 95 coaches (79% male) across various sports participated in this study. The most prevalent MHS among athletes and coaches were distress (73% and 41%) and alcohol misuse (52% and 53%). Adverse life events showed an association with anxiety, depression, sleep disturbance, alcohol misuse and disordered eating while severe injuries showed an association with distress and sleep disturbance in elite athletes. Among coaches, no significant associations were found between potential contributing factors and MHS. 60% of the athletes and 60% of the coaches (totally) agreed that they could openly address their mental health issues within their sport while 53% of the athletes and 41% of the coaches (totally) agreed a need for increased attention regarding mental health/guidance in their sport.

Conclusions MHSs are prevalent among Dutch elite athletes and coaches. Recent adverse life events and severe injuries have a potential intersection with MHS in elite athletes. There is a need for increased attention regarding mental health/guidance among Dutch elite athletes and coaches within their sport so that subsequent treatment/support can be provided.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Mental health symptoms among elite athletes and coaches are prevalent.
⇒ Elite athletes are vulnerable to the occurrence of mental health symptoms due to contributing factors such as severe injuries, surgeries and adverse life events.

WHAT THIS STUDY ADDS

⇒ The most prevalent mental health symptoms among the Dutch elite athletes and coaches are psychological distress and alcohol misuse. Recent adverse life events in elite athletes showed a significant association with anxiety, depression, sleep disturbance, alcohol misuse and disordered eating. Additionally, recent severe injuries in elite athletes showed a significant association with distress and sleep disturbance.
⇒ This is the first study to explore the views and needs regarding mental health support and guidance among Dutch elite athletes and coaches.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study highlights the importance of addressing mental health symptoms among Dutch elite athletes and coaches. Moreover, it provides insights into the associations between mental health symptoms and potential contributing factors so that preventive measures or subsequent treatment can be provided for both athletes and coaches when they are at risk. Our findings indicate a need for thorough and sustainable attention regarding mental health support among Dutch elite athletes and their coaches.

INTRODUCTION

Mental health symptoms are defined as adverse thoughts, feelings, behaviours and/or psychosomatic symptoms that might lead to subjective distress or functional impairments in daily life, work and/or sport.[1 2] Recent meta-analysis as well as many anecdotal reports show that prevalence rates of mental health symptoms (eg, distress, anxiety, depression and alcohol misuse) among elite athletes are equivalent to or exceeding those of non-athletes.[2 3] These prevalence rates are largely explained by an increased incidence of severe injuries and adverse life events in elite athletes.[2 4] Two Olympic cycles ago, a research project was conducted in The Netherlands showing that the prevalence of mental health symptoms among Dutch elite athletes ranged from 6% for adverse alcohol use to 45% for anxiety/depression.[5 6] These cross-sectional analyses showed that elite athletes were vulnerable for the occurrence of mental health symptoms due to contributing factors such as severe injuries, surgeries, lower level

of social support and adverse life events.[5][6] In parallel to this research project, a mental health programme (eg, awareness campaign, nationwide network of mental health professionals) was implemented years ago by the Netherlands Olympic Committee*Netherlands Sports Confederation (NOC*NSF) in order to support Dutch elite athletes. Coaches have not been included in such programmes, despite their crucial role in protecting and promoting athlete's mental health and the recent literature showing that they are also likely to report mental health symptoms.[7][8] Recently, there has been an increasing number of initiatives related to mental health symptoms in elite sports, for instance, the publication of the first International Olympic Committee (IOC) consensus statement on mental health in elite athletes as well as the development of the Sport Mental Health Assessment Tool 1 (SMHAT-1).[1][2][9] With regard to all these recent activities, and in analogy to the research project conducted two Olympic cycles ago, alongside the lack of research on coaches, it has become imperative for NOC*NSF to initiate a new study. Therefore, the aim of our study was threefold, namely (1) to establish the prevalence of mental health symptoms (eg, anxiety, depression) among Dutch elite athletes and their coaches, (2) to examine the association between potential contributing factors (eg, severe injuries, adverse life events) and mental health symptoms (eg, anxiety, depression) among Dutch elite athletes and their coaches, and (3) to explore the view and needs of Dutch elite athletes and their coaches regarding mental health resources and support.

METHODS

Design
An observational study based on a cross-sectional design by means of an electronic survey was conducted, following the Strengthening the Reporting of Observational Studies in Epidemiology statement to guarantee the quality of reporting.[10][11] This study was conducted in accordance with the Declaration of Helsinki and the Dutch Personal Data Protection Act.[12]

Participants
The study population consisted of Dutch elite athletes and their coaches who were actively involved at the NOC*NSF. NOC*NSF is the Dutch association that provides financial, material, performance or social advice and support to both athletes and coaches involved in elite sports at the Olympic and Paralympic games. The inclusion criteria for participants were (1) being active in the Dutch Olympic or Paralympic team as an elite athlete or coach; (2) an age of 18 years or older and (3) being fluent in Dutch. Active elite athletes or coaches from NOC*NSF are defined as committing significant time to elite sports and are competing (athletes) or coaching (coach) at international or highest national sport level (eligible for Olympic/Paralympic games and national team competitions). Sample size calculation (one-sample

method) indicated that at least 75 participants per group were needed to reach a power of 80% (CI of 95% and absolute precision of 5%) under the assumption of an anticipated population proportion (prevalence) of 5%.[11]

Mental health symptoms
According to the IOC SMHAT-1, mental health symptoms were operationalised in the constructs of psychological distress, anxiety, depression, sleep disturbance, alcohol misuse, drug misuse and disordered eating. To assess these constructs, the IOC SMHAT-1 relies on validated screening questionnaires that were developed to assess mental health symptoms but not mental health disorders.[9]

Psychological distress
Among athletes, distress in the previous 4 weeks was assessed using the Athlete Psychological Strain Questionnaire (APSQ) based on 10 items (eg, 'During the past 4 weeks, I could not stop worrying about injury or my performance') scored on a 5-point scale (from 'none of the time' to 'all of the time').[13][14] The APSQ has been validated in the athletic population (internal consistency: 0.5–0.9; criterion-related validity: area under receiver operating characteristic(ROC) curve >0.9).[13][14] A total score ranging from 10 to 50 was calculated as the sum of the answers on the 10 items, in which a score of 17 or more indicates an elevated or high risk for (athletic) distress.[9] Among coaches, distress in the previous 4 weeks was assessed using the Kessler-10 (K-10).[15] The K-10 includes 10 items (eg, 'During that 4 weeks, how often did you feel tired out for no good reason?') scored on a 5-point scale (from 1 'none of the time' to 5 'all of the time').[15] A total score ranging from 10 to 50 was calculated, with a sum score of 21 or more indicating the presence of global psychological distress.[15]

Anxiety
The seven-item General Anxiety Disorder-7 (GAD-7) was used to assess symptoms related to anxiety in the previous 4 weeks (eg, 'Have you been feeling nervous, anxious, or on edge?') scored on a 4-point scale (from 'not at all' to 'nearly every day').[16][17] The GAD-7 has been validated in several populations and European languages (internal consistency: 0.9; test–retest reliability: 0.8; criterion-related validity: sensitivity 0.9, specificity 0.8, area under ROC curve >0.9).[16][17] A cumulative score ranging from 0 to 21 was calculated as the sum of the responses across the seven items, with a score of 10 or more indicating the presence of moderate anxiety.[16][17]

Depression
The Patient Health Questionnaire-9 (PHQ-9) was used to assess the presence of symptoms of depression in the previous 4 weeks (eg, 'Have you been feeling down, depressed or hopeless?') scored on a 4-point scale (from 'not at all' to 'nearly every day').[18][19] The PHQ-9 has been validated in several populations and European languages (internal consistency: >0.8; criterion-related validity:

sensitivity >0.8, specificity >0.8, area under ROC curve >0.9).[18 19] A total score ranging from 0 to 27 was calculated as the sum of the answers on the nine items, with a score of 10 or more indicating the presence of moderate depression.[18 19]

Sleep disturbance

Sleep disturbance over the previous 4 weeks was evaluated using the shortened Athlete Sleep Screening Questionnaire (ASSQ), consisting of five items (eg, 'How satisfied/dissatisfied are you with the quality of your sleep?') scored on 4-point and 5-point scales.[20 21] The ASSQ has been validated in athletes (internal consistency: >0.7; test–retest reliability: >0.8; criterion-related validity: sensitivity >0.8, specificity >0.9).[20 21] By summing the responses to the five items, a total score ranging from 1 to 17 was calculated. A score of 8 or higher indicated the presence of moderate sleep disturbance.[20 21]

Alcohol misuse

Level of alcohol consumption was detected using the validated three-item Alcohol Use Disorders Identification Test (AUDIT-C; eg, 'How many standard drinks containing alcohol do you have on a typical day?').[22] The AUDIT-C has been validated in several populations and European languages (test–retest coefficients: 0.6–0.9; criterion-related validity: area under ROC curve 0.70 to <1.0).[22] A total score ranging from 0 to 12 was calculated as the sum of the answers on the three items, a score of 3 or more (female) and 4 or more (male) indicating the presence of alcohol misuse.[22]

Drug misuse

Based on the Cutting Down, Annoyance by Criticism, Guilty Feeling and Eye-openers Adapted to Include Drugs (CAGE-AID), drug(s) misuse in the previous 3 months was assessed through four items (eg, 'In the last 3 months, has anyone annoyed you or gotten on your nerves by telling you to cut down or stop using drugs?') scored as yes or no.[23] The CAGE-AID has been validated in several populations and European languages (reliability: >0.9; sensitivity: >79%; specificity: >97%).[23] A total score ranging from 0 to 4 was calculated as the sum of the answers to the four questions, a score of 2 or more indicating the presence of drug misuse.[23]

Disordered eating

Among athletes, the Brief Eating Disorder in Athletes Questionnaire (BEDA-Q) was used to assess the presence of disordered eating in the previous 4 weeks through nine items (eg, 'I feel extremely guilty after overeating') scored on several scales.[24] The BEDA-Q has been validated in athletes (internal consistency: >0.8; criterion-related validity: sensitivity >0.8, specificity >0.8, area under ROC curve >0.7).[24] A total score ranging from 0 to 18 was calculated as the sum of the answers on the first six items, with a score of 2 or more indicating the presence of disordered eating.[9] Among coaches, the Eating disorder Screen for Primary care (five items scored as 'yes' or 'no';

'0' for favourable answer, '1' for unfavourable answer) was used as a screening instrument to detect disordered eating in the 4 weeks prior to assessment (eg, 'In the past 4 weeks, were you satisfied with your eating patterns?').[25] The Eating disorder Screen for Primary care has been validated in several languages including English, French and Spanish (criterion-related validity: sensitivity 100%, specificity 0.71).[25] A total score ranging from 0 to 5 was calculated as the sum of the answers on the five items, a score of 2 or more indicating the presence of eating disorders.[25]

Concussion, severe injury and related surgery (only for athletes)

History (over the whole career and in the previous 6 months) of concussion, severe injury and related surgery was examined through single questions (eg, 'How many severe injuries have you had so far as elite athlete?'). Concussion was defined as a blow to the head resulting in symptoms such as headache, nausea, vomiting, dizziness/balance problems, fatigue, trouble sleeping, drowsiness, sensitivity to light or noise, blurred vision, difficulty remembering and difficulty concentrating.[26] Severe injury was defined as an injury that involved the specified joint (hip or knee or ankle), occurred during team activities (training or match) and resulted in an absence from both training and matches for more than 28 days.[27] The number of concussions, severe injuries and related injuries was aggregated and categorised based on their incidence within the last 6 months or those that occurred longer than 6 months ago.

Adverse life events

The occurrence of adverse life events (eg, 'death of spouse', 'change in financial state') in the previous 6 months and more than 6 months ago was explored using the altered (eg, adding the life event 'Harassment and abuse') Social Athletic Readjustment Rating Scale (in total 15 questions scored as yes or no).[28] Two total scores were obtained by summing up the adverse life events that occurred.

Views and needs towards mental health resources and support among Dutch elite athletes and coaches

The authors developed the following five statements to explore the participants' view and needs towards mental health resources and support (four questions scored on 5-point Likert scale from 'Totally disagree' to 'totally agree' and 1 scored as 'yes' or 'no').

1: On an organisational level, TeamNL/NOC*NSF pays sufficient attention to the mental health/guidance.

2: At the level of athletes, TeamNL/NOC*NSF provides sufficient attention to the mental health/guidance.

3 In my team/sport I can be open about my mental health issues.

4: In my team/sport, there is a need for more attention to the mental health/guidance.

Table 1 Participant characteristics

Variables	Athletes N=156	Coaches N=95
Age (years), mean (SD)	26.1 (7.5)	45.3 (10.4)
Male/female (%)	45.5/54.5	78.9/21.1
Height (cm), mean (SD)	178.9 (12.5)	180.3 (9.4)
Body weight (kg), mean (SD)	74.5 (12.0)	82.2 (14.7)
Duration of sports career (years), mean (SD)	7.3 (4.6)	13.1 (8.9)
Team/individual sport (%)	54.2/45.8	
Olympic games/Paralympic games, mean (SD)	0.53 (0.9)	
Participation in world championships, mean (SD)	2.19 (2.8)	
National Championships, mean (SD)	6.48 (5.0)	
Highest education level, (%)		
None	2.0	
Primary education	4.1	
Secondary education	38.1	9.7
Higher professional education	17.0	14.0
Research-oriented education	38.8	76.3
Currently working/studying (%)	28.7/46.2	
Working/studying hours per week, mean (SD)	10.8 (8.2) / 15.8 (9.4)	
Occurrence of adverse life events, mean (SD)		
In the past 6 months	1.5 (2.0)	1.0 (1.4)
Longer than 6 months ago	2.2 (2.4)	4.0 (3.3)
Number of severe Injuries, mean (SD)		
In the past 6 months	0.6 (0.7)	
Longer than 6 months ago	1.8 (1.5)	
Number of surgeries, mean (SD)		
In the past 6 months	0.2 (0.4)	
Longer than 6 months ago	1.8 (1.6)	
Number of concussions, mean (SD)		
In the past 6 months	0.1 (0.3)	
Longer than 6 months ago	1.3 (0.8)	

5: I know whom to approach within TeamNL/NOC*NSF to discuss my mental health issues.

Procedures

Two anonymous electronic questionnaires (one for athletes and one for coaches) were set up in Dutch (CastorEDC, CIWIT B.V, Amsterdam, the Netherlands). Both questionnaires included all variables relevant to the study. Additionally, the following descriptive variables were added (if applicable): gender, age, height, body weight, career duration, type of sport, participation in key events (eg, Olympic/Paralympic Games), level of education, study and occupational activity. The information about the study was electronically sent to potential participants by NOC*NSF while ensuring that the procedures remained hidden from the principal researcher for privacy reasons. All interested participants provided informed consent and were granted access to the questionnaire, which took approximately 20 min to complete. Once completed, the electronic questionnaires were automatically saved on a secure electronic server accessible only to the principal researcher. Athletes and coaches participated voluntarily in the study and did not receive financial compensation for their participation.

Statistical analyses

The statistical software IBM SPSS V.29.0 (IBM Corp) and GraphPad Prism V.8 (GraphPad Software) were used to perform all data analyses. Separate data analyses were done for elite athletes and coaches. Descriptive analyses (mean, SD, frequency and range) were performed for all variables included in the study. For our first objective, prevalence (expressed as percentage) of mental health symptoms was calculated, using the (adjusted) Wald

Table 2 Prevalence of mental health symptoms among Dutch elite athletes and coaches

	Athletes N=156			Coaches N=95		
	N	Prevalence (%)	(95% CI)	N	Prevalence (%)	(95% CI)
Psychological distress	102	73.4	(66.5 to 80.3)	35	40.7	(31.4 to 50.8)
Anxiety	18	13.5	(8.2 to 18.9)	4	4.7	(1.9 to 11.0)
Depression	22	17.2	(11.3 to 23.1)	4	4.7	(1.9 to 11.0)
Sleep disturbance	30	24.6	(17.9 to 31.4)	19	23.5	(16.1 to 33.0)
Alcohol misuse	62	51.7	(43.9 to 59.6)	43	53.1	(43.2 to 62.8)
Drug misuse	2	1.7	(0.5 to 5.2)	1	1.3	(0.3 to 6.1)
Disordered eating	19	15.7	(10.8 to 22.2)	0	0.0	(0.0 to 3.9)

method for CIs (95% CI).[11] Prevalence was calculated by determining the proportion of participants with a given mental health condition in relation to the total number of participants.[11] For our second objective, we performed separate univariate logistic regression analyses, expressing the results as OR with corresponding 95% CIs. Hereby, mental health condition was introduced as the dichotomous dependent variable while contributing factors were included as continuous and categorical independent variables.[11] The significance threshold was set at 0.05. For our third objective, frequency was calculated.

RESULTS
Participants characteristics
Out of 800 athletes and coaches approached by the NOC*NSF, 156 athletes and 95 coaches provided their informed consent and successfully completed the questionnaire (overall response rate of 31%). The group of elite athletes (55% female) were on average 26 years (SD=7.5) and the duration of their sports career (mostly in team sports) was on average 7 years (SD=4.6). The group of coaches (79% male) were on average 45 years (SD=10.4). Their average career duration as coach was approximately 13 years (SD=8.9). All participant characteristics are presented in table 1.

Prevalence
Elite athletes
The (4-week) prevalence of mental health symptoms among Dutch elite athletes ranged from 73% for psychological distress to 14% for anxiety (table 2). Additionally, 17% reported symptoms of depression, 25% experienced sleep disturbance and 16% reported disordered eating. In terms of substance misuse, the prevalence was 52% for alcohol misuse and 2% for drug misuse.

Coaches
The (4-week) prevalence of mental health symptoms among coaches ranged from 41% for psychological distress to 5% for anxiety (table 2). Additionally, 5% reported symptoms of depression, 24% experienced sleep disturbance and 0% reported disordered eating. In terms of substance misuse, the prevalence was 53% for alcohol misuse and 1% for drug misuse.

Associations
Elite athletes
Adverse life events that occurred within the 6 months before the assessment of mental health symptoms showed a significant association with anxiety (OR 1.8, 95% CI 1.3 to 2.4), depression (OR 1.9, 95% CI 1.4 to 2.6), sleep disturbance (OR 1.4, 95% CI 1.1 to 1.7), alcohol misuse (OR 1.0, 95% CI 0.8 to 1.2) and disordered eating (OR 1.3, 95% CI 1.0 to 1.6). However, no significant associations were found with distress and drug misuse. Severe injuries that occurred 6 months before the assessment showed a significant association with distress (OR 3.6, 95% CI 1.2 to 11.0) and sleep disturbance (OR 2.4, 95% CI 1.1 to 5.0) while no significant associations were found with anxiety, depression, alcohol misuse, drug misuse and disordered eating. All associations between contributing factors and mental health symptoms among elite athletes are presented in table 3.

Coaches
No significant associations were found between the potential contributing factors and mental health symptoms among coaches (table 3).

Views and needs towards mental health resources and support
Elite athletes
27% (totally) agreed that TeamNL/NOC*NSF pays sufficient attention to the mental health/guidance of athletes on organisational level while 38% (totally) agreed on the level of athletes. Additionally, 60% (totally) agreed that they could be open about their mental health problems within their team/sport while 53% (totally) agreed that more attention is needed for mental health/guidance in their team/sport (figure 1). Additionally, 38% reported that they do not know whom to approach within TeamNL/NOC*NSF to discuss their mental health issues.

Coaches
42% (totally) disagreed that TeamNL/NOC*NSF pays sufficient attention to the mental health/guidance of

Table 3 Association (OR and 95% CI) between potential contributing factors and mental health symptoms among Dutch elite athletes and coaches

|	Distress	Anxiety	Depression	Sleep disturbance	Alcohol misuse	Drug misuse	Disordered eating
Athletes							
Concussions (n)							
In the past 6 months	1.3 (0.1 to 13.5)	2.0 (0.2 to 22.6)	1.3 (0.1 to 13.2)	1.3 (0.1 to 13.3)	1.5 (0.2 to 10.1)	8.8 (0.5 to 168.6)	*
>6 months ago	1.5 (0.5 to 4.5)	0.7 (0.2 to 3.2)	1.2 (0.4 to 3.3)	0.9 (0.3 to 2.8)	0.8 (0.4 to 1.9)	1.3 (0.3 to 6.6)	1.1 (0.3 to 3.6)
Severe injuries (n)							
In the past 6 months	3.6 (1.2 to 11.0)	1.2 (0.5 to 3.0)	1.1 (0.5 to 2.5)	2.4 (1.1 to 5.0)	0.4 (0.2 to 0.9)	2.2 (0.2 to 22.0)	1.7 (0.8 to 3.8)
>6 months ago	0.8 (0.6 to 1.1)	1.2 (0.8 to 1.8)	1.1 (0.8 to 1.6)	1.1 (0.8 to 1.5)	1.4 (1.0 to 1.90)	1.1 (0.3 to 3.7)	1.0 (0.7 to 1.5)
Surgeries (n)							
In the past 6 months	*	1.3 (0.2 to 9.2)	3.9 (0.7 to 20.2)	3.8 (0.7 to 21.0)	2.0 (0.4 to 10.0)	*	2.9 (0.5 to 15.3)
>6 months ago	0.9 (0.5 to 1.4)	0.9 (0.4 to 1.9)	0.8 (0.4 to 1.7)	0.6 (0.3 to 1.3)	0.9 (0.6 to 1.5)	*	1.1 (0.6 to 1.9)
Adverse life events (n)							
In the past 6 months	2.0 (1.4 to 2.8)	1.8 (1.3 to 2.4)	1.9 (1.4 to 2.6)	1.4 (1.1 to 1.7)	1.0 (0.8 to 1.2)	2.0 (0.9 to 4.3)	1.3 (1.0 to 1.6)
>6 months ago	1.0 (0.9 to 1.2)	0.9 (0.8 to 1.2)	1.0 (0.9 to 1.3)	1.1 (0.9 to 1.3)	0.9 (0.8 to 1.0)	0.9 (0.5 to 1.7)	0.9 (0.8 to 1.2)
Coaches							
Adverse life events (n)							
In the past 6 months	1.2 (0.9 to 1.7)	1.2 (0.6 to 2.2)	0.8 (0.3 to 2.0)	1.1 (0.8 to 1.6)	1.0 (0.7 to 1.3)	2.1 (0.8 to 5.3)	*
>6 months ago	1.0 (0.9 to 1.1)	1.2 (0.8 to 1.7)	1.2 (0.8 to 1.7)	1.1 (0.9 to 1.3)	1.1 (1.0 to 1.3)	1.0 (0.6 to 6.4)	*

*Logistic regression could not converge.
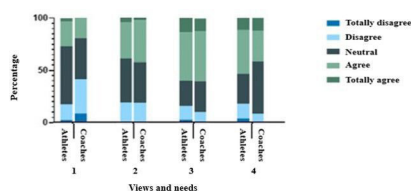
Figure 1 Views and needs towards mental health resources and support among Dutch elite athletes and coaches. Views and needs: (1) On an organisational level, TeamNL/NOC*NSF pays sufficient attention to the mental health/guidance.(2) At the level of athletes, TeamNL/NOC*NSF provides sufficient attention to the mental health/guidance. (3) In my team/sport, I can be open about my mental health issues. (4) In my team/sport, there is a need for more attention to the mental health/guidance. NOC*NSF, Netherlands Olympic Committee*Netherlands Sports Confederation.

coaches on organisational level while 42% (totally) agreed with this view on the level of athletes. Additionally, 60% (totally) agreed that they could be open about their mental health problems within their team/sport. Hereby, 41% (totally) agreed that more attention is needed for mental health/guidance in their team/sport (figure 1). Furthermore, 51% reported not knowing whom to approach within TeamNL/NOC*NSF to discuss their mental health problems.

DISCUSSION

The objective of our study was to address mental health symptoms among Dutch elite athletes and their coaches. The most prevalent mental health symptoms among athletes were psychological distress and alcohol misuse, with prevalence rates of 73% and 52%, respectively. Among coaches, the prevalence reached 41% for psychological distress and 53% for alcohol misuse. Recent adverse life events showed a significant association with anxiety, depression, sleep disturbance, alcohol misuse and disordered eating in elite athletes. Additionally, recent severe injuries showed a significant association with distress and sleep disturbance in elite athletes. Among coaches, no significant associations were found between potential contributing factors and mental health symptoms. Among elite athletes, 60% (totally) agreed that they could openly address their mental health issues within their team/sport while 53% still (totally) agreed that more attention is needed for mental health/guidance in their team/sport. As for the coaches, 60% (totally) agreed that they could openly discuss their mental health issues within their team/sport. Furthermore, 41% (totally) agreed that more attention is needed for mental health/guidance in their team/sport.

Prevalence rates in elite athletes

Compared with the research project conducted two cycles ago, our study shows different prevalence rates of mental health symptoms among elite athletes.[5 6] The prevalence of mental health symptoms in 2017 reached 32% for distress, 45% for anxiety/depression and 6% for alcohol

misuse,[5 6] while in our study, the prevalence reached 73% for distress, 14% for anxiety, 17% for depression and 52% for alcohol misuse. Notably, different screening instruments were used to measure symptoms of anxiety and depression in these studies. However, in both studies, alcohol misuse was assessed with the same screening questionnaire, namely the three-item AUDIT-C questionnaire.[22] A potential influential factor contributing to alcohol misuse might be the existence of underlying psychological symptoms, for example, depression and anxiety.[29] Prior research studies suggest that alcohol consumption can offer temporary mood improvement and relief from stress.[29] Notably, we observed relatively high prevalence rates for psychological distress in athletes, which is possibly due to the various stressors elite athletes are exposed to during their career, such as intense physical activity, injury, performance pressures, selection challenges and concerns related to retirement or transitioning out of sport.[30] Our findings regarding anxiety, depression, sleep disturbance and alcohol misuse are in line with the findings of a recent study among Canadian elite university-level student athletes that used the SMHAT-1 as screening instrument.[31] In comparison with another study that used the SMHAT-1 among US athletes, we found higher prevalence rates for mental health symptoms among Dutch elite athletes, for instance, 17% vs 5% for depression.[32] These varied results are likely to be explained due to the potential variance in population characteristics.

Gender differences in prevalence rates in elite athletes

In our group of elite athletes, we conducted post hoc analyses to explore the prevalence of mental health symptoms separately for female and male elite athletes (not possible among coaches due to limited sample size). Among female elite athletes, the prevalence of mental health symptoms reached 83% for distress, 18% for anxiety, 23% for depression, 31% for sleep disturbance, 47% for alcohol misuse, 0% for drug misuse and 22% for disordered eating. Furthermore, male elite athletes reported 62% for symptoms of distress, 9% for anxiety, 11% for depression, 18% for sleep disturbance, 57% for alcohol misuse, 4% for drug misuse and 9% for disordered eating. Female elite athletes reported significantly higher prevalence rates for symptoms of distress (p=0.005) and disordered eating (p=0.049) than the male elite athletes in our study.

Prevalence rates in coaches

Two recent studies among coaches showed different prevalence rates for distress (10.3% and 19%), alcohol misuse (48.1% and 19%) and depression/anxiety (43.6% and 39%).[7 8] In our study, the prevalence of mental health symptoms among coaches reached 41% for distress, 53% for alcohol misuse and 5% for depression/anxiety. It should be noted that there were differences in the usage of screening questionnaires or the implementation of different cut-off scores among these studies.

The increasing prevalence rate for distress is potentially due to the wide array of stressors that elite-level coaches have to encounter because of the critical role they have in athlete's achievements, potentially leading to adverse effects on their mental well-being.[7 33] The limited number of studies as well as these mixed results emphasise that research on mental health of elite coaches is still in the early stages, highlighting the need for further research in this area.

Contributing factors and mental health symptoms in recent published data

In our study, we found that recent severe injuries had an association with distress and sleep disturbance in elite athletes. Also, recent adverse life events had an association with anxiety, depression, sleep disturbance, alcohol misuse and disordered eating in elite athletes. Our findings are in line with the existing literature, which demonstrates the potential intersection of injury, recent life events and mental health symptoms in elite athletes.[1 2] This is a confirmation that the occurrence of any adverse life event in elite athletes and coaches should trigger further screening for the presence of mental health disorders.

Views and needs towards mental health resources and support

While the number of studies exploring mental health symptoms and related treatment seeking among elite athletes across various countries has increased, this is the first study exploring the view and needs of Dutch elite athletes and their coaches regarding mental health resources and support.[34 35] In our study, 38% among Dutch elite athletes and 51% among coaches reported not knowing whom to approach within TeamNL/ NOC*NSF to discuss their mental health symptoms while 53% among Dutch elite athletes, and 41% among coaches (totally) agreed with the need for more mental health/guidance in their team/sport. This is potentially due to the fact that mental health-seeking in general is known to be still low among elite athletes due to various barriers, such as stigma, low mental health literacy, negative experiences with mental health seeking in the past and busy schedules.[35 36]

Limitations

It is important to note that the mental health symptoms in our study were self-reported and therefore, mental health disorders clinically diagnosed by a medical professional were not under study. This approach may introduce subjectivity into the results and potentially lead to either an underestimation or overestimation of the problem's extent. Recall bias may also have an effect on the results due to self-reported assessment. Our study contained anonymous recruitment and validated scales to enhance objectivity of the participants regarding their own mental health, as mental health symptoms often considered taboo in elite-level sports, which could also result in an underestimation of mental health symptoms.[37] In our study, we were unable to conduct non-response analysis due to the recruitment process which involved blinding to ensure privacy and confidentiality. Hereby, selection bias may have been introduced, potentially impacting the external validity of our results, as it is possible that the Dutch elite athletes and coaches with a specific interest in mental health support were more likely to participate.

Moreover, our study did not include a reference group or comparison group from a non-athlete population. Hereby, the possibility to observe potential differences with the general population where limited. Lastly, the cross-sectional design of this study prohibits assessment of any causal relationships between the dependent and independent variables under this study. Another limitation of our study is the lower-than-expected response rate which may influence the generalisability of our results.

Recommendations for practice

Our findings indicate that mental health symptoms are prevalent among Dutch elite athletes and coaches, emphasising the need for continued attention and awareness. Standard care by sport medicine physicians and/ or other mental health professionals that includes tackling and/or surveillance of mental health symptoms is necessary. The IOC SMHAT-1 should be used by sports medicine physicians and other licensed/registered health professionals during the precompetition period (ie, ideally a few weeks after the start of sport training) and when any significant event for an athlete occurs (eg, major injury/illness, unexplained performance concern, end of competitive cycle, suspected harassment/abuse, adverse life event and transitioning out of sport) to support athletes who are at risk for developing mental health symptoms while also enhancing their psychological resilience.[9] Hereby, mental health symptoms could be detected early and treatment (if needed) could be provided which can improve quality of life, performance and prevent development of mental health disorders in athletes and coaches.[9] The IOC Sport Mental Health Recognition Tool 1 can be used by athlete's coaches, family members and other essential supports of the athlete to observe mental health symptoms in athletes, which can warrant help-seeking and subsequent assessment, education, and/or treatment if red flags would be identified.[9] Educating athletes and coaches about the consequences of alcohol misuse should be prioritised.[38 39] Because of the rising prevalence rates of alcohol misuse, such education can contribute to improving coping behaviours, as research revealed a bidirectional association between alcohol misuse and mental health symptoms such as sleep disturbance and anxiety.[38 39] In addition, we noted a decrease in prevalence rates of symptoms of anxiety and depression, emphasising the necessity to maintain the focus and monitoring efforts that contributed to this decline. Therefore, increasing knowledge about prevalent mental health symptoms is crucial, as it can enhance mental health literacy. This is a

global challenge among both the general population and elite athletes and their coaches.[40] More attention should be directed towards mental health guidance within organisations like TeamNL/NOC*NSF. This way, athletes and coaches will know where and whom to approach to address their mental health problems so that subsequent support can be facilitated for both athletes and coaches. Moreover, this approach will allow for more insight on perspectives and needs of athletes and coaches.

Recommendations for future research

In future research, it is advisable to consider a longitudinal design involving a non-athlete population as well. This would involve implementing repeated use of the SMHAT-1 over an entire sports season or implementing the Oslo Sports Trauma Research Centre Questionnaire on Health Problems (OSTRC-H) to monitor mental health symptoms comprehensively.[1 41] The OSTRC-H questionnaire serves as a tool for the longitudinal assessment and monitoring of health problems in athletic populations.[1 41] In our study, no associations were found between potential contributing factors and mental health symptoms, indicating the need for further assessment in future research to explore the possibility of other potential triggering factors associated with mental health symptoms among coaches. Future research should also focus on understanding how psychological, social, cultural and triggering factors relate to the development of mental health symptoms and mental health disorders. A research project should be implemented where mental health symptoms and mental health disorders will be evaluated, as the occurrence of any adverse life event can precipitate the onset of mental health disorders. Furthermore, researchers should focus on testing interventions in different subpopulations in elite sports, as different contributing factors (eg, severe injuries, adverse life events), and different population characteristics within elite sports may need different support/guidance. Regarding the ongoing stigma that mental health symptoms may be perceived as a weakness, therefore, creating a barrier for treatment-seeking, effective anti-stigma intervention programmes should be developed and implemented in elite sports.[42–44] This is an important step to overcome this barrier and for creating a destigmatising environment for athletes and coaches whereas mental health will be a necessity and form of self-care in elite sports.

CONCLUSION

The substantial prevalence rates of mental health symptoms among Dutch elite athletes (from 73% for psychological distress to 52% for alcohol misuse) and coaches (from 41% for psychological distress to 53% for alcohol misuse) highlight the importance of addressing this issue. Recent adverse life events in elite athletes showed a significant association with anxiety, depression, sleep disturbance, alcohol misuse and disordered eating. Additionally, recent severe injuries in elite athletes

showed a significant association with distress and sleep disturbance.

Consequently, there is a need for thorough and sustainable attention regarding mental health support among Dutch elite athletes and coaches within their sport. The majority of the Dutch elite athletes and coaches feel like they can be open about their mental health problems within their team/sport but also reported a need for more attention to mental health/guidance in their team/sport. The IOC SMHAT-1 can be used to detect mental health symptoms as early as possible so that subsequent treatment and support can be provided and the development of mental health disorders prevented.

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