

THE MENTAL HEALTH OF AUSTRALIAN ELITE ATHLETES

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Abstract

Objectives

Currently, little is known about the prevalence of mental disorders in athletes. This study aims to investigate Australian elite athletes' symptoms of general psychological distress and common mental disorders.

Design

A cross-sectional survey design was employed to assess self-reported symptom prevalence.

Methods

A total of 224 elite athletes (118 female, 106 male) from national sporting organisations in Australia were administered a self-report internet-based survey comprising measures of demographic status and mental health symptoms.

Results

Overall, 46.4% of athletes were experiencing symptoms of at least one of the mental health problems assessed. Percentages meeting criteria for mental disorders were similar to previous epidemiological studies of both international athlete and community samples: depression (27.2%), eating disorder (22.8%), general psychological distress (16.5%), social anxiety (14.7%), generalised anxiety disorder (7.1%), and panic disorder (4.5%). Injured athletes had higher levels of both symptoms of depression ($t = 3.23, p = .001$) and generalised anxiety disorder ($t = 2.26, p = .025$).

Conclusions

The level of symptoms of mental health problems reported by elite athletes appears similar to that observed in the community. However, caution must be exercised in interpreting the findings, as possible demographic differences between athletes and comparison population datasets may exist. Furthermore, self-selection of respondents in the present study may have reduced the representativeness of the sample and the validity of the comparisons. Athletes, particularly those

currently injured, should be well-supported to seek help for mental disorders through access to mental health professionals.

Keywords

Athletes; Mental Disorders; Prevalence.

Introduction

The prevalence of mental disorders is greatest among younger people, with one-quarter of 16-34 year-olds meeting clinical criteria for one or more disorders.¹ These disorders include depression (characterised by low mood), generalised anxiety disorder (persistent worrying), social anxiety disorder (fear of social situations), panic disorder (presence and fear of panic attacks), and eating disorder (dysfunctional eating behaviours). However, despite most elite athletes falling within the younger age categories, and the potential for sport-related factors to influence vulnerability to mental health problems, little is known about the prevalence of symptoms of mental disorders within this group.² The limited data available suggests that elite athletes may experience mental disorders such as depression, at a broadly similar rate to the general community. For example, a study of US college athletes ($n = 257$) found that 19.2% of male and 25.6% of female athletes surveyed reported elevated symptoms of depression.³ Community-based studies have yielded similar prevalence levels of 29.2% in a community sample of young people (18-25 years),⁴ and 38.5% (male = 33.2%, female = 41.3%) in a college student sample (95% aged 18-25).⁵ Moreover, research on French elite athletes found a 6-month prevalence rate of 6.0% (male = 5.2%, female = 7.5%) for generalised anxiety disorder (GAD) in athletes.⁶

Given their inherently high levels of physical activity and the putative link between exercise and positive mental health,⁷ it is possible that athletes have lower rates of certain mental disorders such as depression than general community members. However, currently there is insufficient evidence to support this hypothesis,⁸ and the prevalence of mental disorders remains under debate.⁹ Conversely, it is plausible that a number of factors specific to elite athletes could increase their susceptibility to certain mental disorders. These include relocating for sport (especially for younger elite athletes),¹⁰ exposure to sport-related stress,¹¹ and injury. Injuries in particular have been found to be associated with depression in athletes.¹²⁻¹⁴ There is also evidence suggesting that athletes may have a higher prevalence rate for eating disorders compared to age and sex matched non-athletes,¹⁵ and that those involved in aesthetic (e.g., gymnastics) and weight-dependent sports (boxing, wrestling) may be more at risk for these disorders than other sport types.^{15, 16} Studies have indicated that elite athletes may also

be at a heightened risk for suicide, citing possible risk factors such as injury, pressure to win, substance abuse, and a comparatively early retirement from their professional career.¹⁷ Whilst one recent study has documented the 6-month prevalence of anxiety disorders at 8.6% and depression at 3.6% for French elite athletes from a variety of sports,⁶ further investigation of the prevalence of common mental disorders in elite athletes is required to enable a clearer understanding on the mental health needs of this group.

Therefore, the aim of this study was to investigate symptom levels of common mental disorders (depression, GAD, social anxiety disorder, panic disorder, eating disorder) and general psychological distress in an elite Australian athlete population. As symptom levels vary by gender, males and females were also examined separately. An additional aim was to examine injury and relocating for sport, two of the proposed risk factors listed above, as predictors for each disorder. Based on previous research it was expected that injured athletes would be more likely to experience depressive symptoms. All other investigations were exploratory.

Methods

Respondents were 224 elite athletes from the Australian Institute of Sport (AIS) and Australian sporting organisations funded by the Australian Sports Commission, who completed a self-report Internet-based survey comprising questions about a range of demographic variables and mental health symptoms. The survey took approximately 20-30 minutes to complete and was the first stage of a two-phase project involving a subsequent randomised controlled trial (see ¹⁸ for details). All online data collection was conducted using LimeSurvey (www.limesurvey.org), an open-source online survey application housed on a secure server at the Australian National University. Inclusion criteria were being aged 18 years or older and being an elite athlete, as defined by participants' level of competition (Olympic or Paralympic, professional, or state-, national-, or international-level athletes). An implicit inclusion criterion was that the respondents should be Internet and computer literate. Ethics approval for the study was granted by both the Australian Institute of Sport (AIS) ethics committee (20090808) and The Australian National University Human Research Ethics Committee (ANU HREC 2009/373).

Respondents were recruited through various means from November 2009 to February 2011. The primary methods were through recruitment emails distributed by the Director of the AIS to athletes aged 18 or older ($n = 407$) during March 2010 (recruitment wave 1) and by direct recruitment through elite sporting clubs (see ¹⁸ for further detail). In addition, one organisation arranged to send a text message to their athletes' mobile phones (January 2010) to indicate that they had been sent an email. All respondents were provided with a link to an anonymous online survey comprising the measures which they completed. The link to the survey took respondents to a web page where they were provided with information about the study (including that participation was voluntary) and where they were invited to provide consent by selecting a link "*Yes, I would like to participate*".

Of the 407 athletes aged 18 or more years and enrolled at the AIS at the time of recruitment, 104 elite athletes responded to the invitation to participate in the survey (25.1% response rate from this sample). A further 124 athletes from other sports organisations completed the survey. Four respondents were excluded from the sample ($n = 228$): two indicated they were aged under 18 years, and two indicated that they were regional or recreational athletes. Therefore, the current study presents data collected from the remaining 224 elite athletes.

Demographic and characteristics data collected included age, relationship status, current injury status, whether the athlete had relocated for sport, highest level of education and whether the athlete was currently studying. Table 1 presents a description of the measures used, demonstrating adequate alpha levels, sensitivity and specificity for identifying cases of mental disorders for each measure. Full references for all measures and psychometric data are included in Supplementary Table 1.

Insert Table 1 about here

Responses (K-10 scores) from the athletes were compared with that of available data from young people in the general community from the 2011-12 Australian Health Survey.¹⁹ The Australian Health Survey collected health information from stratified multistage area sample of private households from the Australian population during 2011-2012. Age-standardised estimates from the sample of young people aged 18 to 34 years from the 2011-12 Australian Health Survey (total $N = 20,500$) were used for comparison with the present study using z tests. Chi-square and t-tests were used to compare male and female respondents. In addition, linear regression was used to determine if injury (injured/non-injured) and relocating for sport (no relocation, relocated ≤ 12 months, relocated > 12 months) were predictors of symptoms of mental disorders, whilst controlling for age and gender.

Results

Table 2 presents the sample characteristics. Almost two-thirds (61.2%) of athletes were aged 18-25 years and only a small percentage (6.7%) were aged 35 years or older. Two-thirds (63.4%) of athletes were never married, 19.2% were de facto, 15.6% of athletes were married, and 1.8% were separated, widowed, or divorced. Overall, 40.2% of athletes did not have a postsecondary/tertiary education, 30.8% had a Bachelor's degree, 18.8% had an 'other certificate' or 'other' qualification, 4.0% had a higher degree, another 4.0% had an associate/undergraduate diploma, and 2.0% had a trade/apprenticeship.

Insert Table 2 about here

Table 3 presents mean symptom levels, the percentages of those meeting the criteria (caseness) for each of the mental disorders, and prior help-seeking behaviour. Just under half of respondents met criteria for at least one mental health problem, and over half had sought help from a mental health

professional for personal or emotional problems. Almost half of respondents had sought help from a psychologist with many fewer consulting general practitioners (GPs). General psychological distress (K-10) scores for the present study were similar to the Australian Health Survey estimates except for females aged 18-24 years who had higher scores in the present study sample of elite athletes ($z = 2.50$, $p = .018$).

Linear regression models demonstrated that injured athletes had significantly higher symptoms of depression ($t = 3.23$, $p = .001$) and generalised anxiety ($t = 2.26$, $p = .025$) than non-injured athletes. Injury and relocation were not significantly associated with meeting criteria for any other disorder.

Insert Table 3 about here

Discussion

The present study has demonstrated that just under half of respondents in this elite athlete sample met caseness for at least one mental health problem. Approximately one in five athletes in this group were experiencing significant levels of depressive symptoms and one in four reported probable clinically significant levels of eating disorder symptoms.

Specifically, 46.4% of athletes in the present study sample (males = 38.7%, females = 53.4%) were likely cases for at least one of the mental health problems measured (general psychological distress, depression, generalised anxiety, social anxiety, panic disorder, or eating disorder). The only comparable study, in French elite athletes,⁶ found a prevalence level of 16.9% (males = 15.1%, females = 20.2%) for current (< 6 months) *diagnosis* of any of the following: anxiety disorders (including panic attacks, agoraphobia, obsessive-compulsive disorder, GAD, and social phobia), depression, eating disorders (anorexia nervosa, bulimia, and eating disorders not otherwise specified), suicidal thoughts and attempts, psychosis, or substance abuse and dependence (including nutritional supplements, tobacco, cannabis, alcohol, doping agents, psychoactive substances). However, this may

reflect the disparity in the range of mental health problems measured, as well as the different measurement methods employed (epidemiological scales vs. diagnostic interviews) between the two studies. In particular, diagnostic tests generally result in lower prevalence levels due to higher expected specificity. The authors of the French study,⁶ additionally argued that they found lower than expected rates of psychopathology due to lower diagnostic rates among physicians (who assessed 38% of the athletes) compared to psychologists. Accounting for the measurement differences, the prevalence of common mental disorders in the present research and the French study,⁶ appear to be broadly comparable to rates found in the Australian general community for young people aged 16-24 years (males = 22.8%, females = 30.1%) and 25-34 years (males = 22.8%, females = 26.9%) for prevalence of any anxiety, affective or substance use disorder using the World Health Organization's Composite International Diagnostic Interview (version 3.0)¹. Whilst the present study provides an indication of prevalence, accurate comparison is problematic due to a potential lack of sample representativeness as well as the disparity between included disorders and measurement type.

Overall approximately one-quarter (males = 23.6%, female = 30.5%) of the athletes scored above the caseness cutoff score for *depression* indicating a possible depressive disorder. This level is similar to that reported by previous studies using the same criterion in college athletes (males = 19.2%, females = 25.6%),³ and general college students of a similar age (males = 33.2%, female = 41.3%).⁵ It is also important to note that in the present study, almost one-quarter of athletes were experiencing a current injury. Injury is considered to be a factor implicated in depression in athletes,¹² and indeed predicted depression symptoms in the present study sample with injured athletes having higher depression scores than non-injured athletes. Despite the proposed negative consequences of moving away from home,¹⁰ relocating for sport did not predict the level of depressive symptoms in the present study sample, an encouraging finding given that over 40% of athletes in the present sample had relocated for their sport. Nevertheless, given the serious negative consequences of depressive illness,²⁰ the high reported depression rates found in the current study, if representative, point to a significant burden of depression symptoms that need to be addressed in young athletes. The findings also point to the need to provide appropriate psychological care for athletes experiencing injury.

Approximately one-tenth of males and one-third of females met caseness for an *eating disorder* in the present study. This level of caseness for females is very similar to that found in a predominantly female (89.2%) UK university sample ($N = 327$),²¹ which reported 24.2% caseness using the same SCOFF cut point of two or more items endorsed. By contrast, a US study,²² reported lower rates of caseness using a more conservative cut-off (≥ 3 SCOFF items) in a sample of 677 female undergraduate (13.5%) and graduate (9.3%) university students. However, data from the present study showed that caseness drops to a comparable 14.4% for female athletes when using this cut-point. The level of caseness for the elite female athletes in the present study appears to be comparable to studies conducted in university samples of females of a similar age, a finding which contrasts with a previous study which reported a higher rate of eating disorder among athletes than non-athletes²³. Very few studies have examined the measurement of eating disorder in males using the SCOFF scale, making comparison with the community difficult. Limited data from a study in Pakistan found a rate of 17.2% in male medical students aged 18-25 years based on the present cut-off.²⁴ Normative data from a large representative community sample using the SCOFF is required.

Elevated symptoms of *social anxiety* were common (caseness = 14.7%) among athletes participating in the present study. This level is not dissimilar to that found in the general community, with levels of social anxiety caseness using the Mini-SPIN reported as up to 30% in a broader population sample of both male and female young university students.²⁵ Whilst of concern, the overall level of social anxiety observed in the present sample of athletes is not unusual for young people of this age group. However, elite athletes are likely to have some level of exposure to the public either during competition, press conferences, or community engagement. Indeed, due to their role, young athletes report a heightened sense of social and public evaluation.²⁶ These demands may be highly challenging for an athlete experiencing social anxiety. Consequently, it is important to address social anxiety in athletes to improve symptoms and functioning, including the athlete's capacity to perform their sporting-related roles effectively.

Caseness for *generalised anxiety disorder* for athletes was recorded at 7.1% (males = 3.8%, females = 10.2%), which is comparable to the level found in the French elite athlete study (6.0%; males = 5.2%,

females = 7.5%).⁶ In addition, injury predicted symptoms of generalised anxiety disorder in the present sample. There is little previous research documenting this effect, the majority of studies in the area having examined trait rather than state anxiety as a predictor of injury with inconsistent findings (e.g.,^{27,28}). The present study results for generalised anxiety again emphasises the need to provide psychological care to injured athletes. One in 20 athletes met criteria for *panic disorder* (4.5%) and this level was broadly similar to that found in the French study using diagnosis (1.2%) and the rate of 12-month panic disorder experienced in Australian community members aged 18-65 years (2.6%).¹ In addition, one in ten athletes reported experiencing at least one panic attack or limited symptom panic attack in the past week, a finding of clear relevance to those working with athletes as well as to the athletes themselves.

Psychological distress scores from this survey were compared with those reported in the 2011-12 Australian Health Survey,¹⁹ for those aged 18 to 24, and 25 to 34 years. The level of distress among athletes was very similar to that of their Australian peers in the general community for each distress category except females aged 18-25 years, who appeared to experience higher distress than their peers. This raises the possibility that young female athletes may be at a heightened risk for psychological distress. However, further research with a larger sample is required to investigate this effect.

The level of lifetime professional help-seeking (57.1%) for any psychological problem recorded in the present study appears to be similar to a previous study of Australian university students,²⁷ which found a comparable rate of formal help-seeking (51.0%) using a similar measure. However, the latter proportion was noted by the authors as being unexpectedly high and perhaps due to a bias relating to a preponderance of psychology student participants.²⁹ Likewise, with respect to the present study, it is important to note that previous research suggests that elite athletes may be highly accustomed to consulting with a sport psychologist for sport-related issues,²⁶ which may include issues such as problems with performance, rather than mental health problems such as depression or anxiety. Indeed, a substantial proportion of athletes listed “psychologist” (37.1%) as a professional they had visited; substantially fewer reported a visiting a psychiatrist (4.5%). Thus, it is possible that some athletes

were reporting on experience with a psychologist for sport-related issues rather than consulting for mental health care. Our previous research has indicated that elite athletes consider a close relationship with a mental health professional a facilitator of help-seeking.²⁶ Therefore, it is vital that athletes have access to a mental health professional to treat personal or emotional problems in addition to sport-focused psychological assistance.

There are several limitations to this study. First, the response rate among the AIS athletes was low and the findings might not therefore be representative of all Australian elite athletes. However, the rate is not dissimilar from other widely distributed mental health surveys in this age-group in Australia (e.g.,³⁰). Second, it is possible that athletes with past experience of mental health problems or current injury may have been more likely to participate, leading to a biased sample. Third, there was a lack of age- and gender-matched comparable community data for the measures employed, making it difficult to compare the prevalence of symptoms with those in the general community of young people. Additionally, the validity of the findings may be compromised by potential differences between the comparison data and the present study sample on certain characteristics (e.g., age, sex, ethnicity). Thus, these comparisons are preliminary and caution must be exercised in interpreting the findings. Finally, the measures used in the present study were self-reported symptoms and represent indications of a likely or probable mental disorder. Further research using clinician ratings may provide a different assessment of the prevalence of mental health problems in elite athletes.

Conclusion

To the authors' knowledge, this is the first Australian study to systematically investigate mental disorders in young elite athletes. Just under half of participating athletes met caseness for at least one of the mental health conditions measured. Both depression and anxiety appeared prevalent, although at comparable levels to young people in the general population. However, caution must be exercised when interpreting the findings given the potential bias introduced by the self-selection of participants as well as possible differences on demographic characteristics between comparative samples. Encouraging levels of reported help-seeking for psychological problems were found. Help-seeking from professional sources should be facilitated, particularly for injured athletes.

Practical Implications

- As in the general community, importance should be placed on improving the mental health of elite athletes.
- Athlete mental health needs to be well-supported and they should have access to mental health professionals.
- Providing mental health care for injured athletes should be a high priority.

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Table 1. Mental health symptoms and help-seeking behaviour measures.

Construct	Measure	No. of items	Example items	Rating scale	Scoring (range)	Cut-off score		Reported Alpha
General psychological distress	Kessler 10 scale (K-10)	10	During the last four weeks, how often did you feel: “So nervous that nothing could calm you down” “So sad that nothing could cheer you up”	5-point Likert-type Range: 1 (none of the time) to 5 (all of the time).	Sum (10-50) Higher scores = higher symptom levels	≥ 22	N/A	0.90-0.93
Depressive symptoms	Center for Epidemiologic Studies Depression Scale (CES-D)	20	During the past week how often did the following apply to you: “I enjoyed life” (reverse-scored) I felt everything I did was an effort”	4-point Likert-type Range: 0 (rarely or none of the time [< 1 day] to 3 (most or all of the time) [5-7 days])	Sum (0-60) Higher scores = higher symptom levels	≥ 16	Sensitivity = 87%; Specificity = 77%	0.85-0.90
Anxiety symptoms	Generalised Anxiety Disorder 7 scale (GAD-7)	7	How often during the past 2 weeks have you felt bothered by: “Feeling nervous, anxious or on edge” “Becoming easily annoyed or irritable”	4-point Likert-type Range: 0 (not at all) to 3 (nearly every day)	Sum (0-21) Higher scores = higher symptom levels	≥ 11	Sensitivity = 82%; Specificity = 85%	0.89-0.92
Social anxiety symptoms	Social phobia Inventory (SPIN)	17	How much have the following bothered you during the past week: “I am bothered by blushing in front of people” and “Parties and social events scare me”.	5-point Likert-type Range: 0 (not at all) to 4 (extremely)	Sum (0-68) Higher scores = higher symptom levels	≥ 19	Sensitivity = 73%; Specificity = 84%	0.82-0.95
Panic disorder symptoms	Panic Disorder Severity Scale (PDSS-SR)	7	“How many panic and limited symptom attacks did you have during the past week?” “During the past week, how much did the above symptoms altogether (panic and limited symptom attacks, worry about attacks, and fear of situations and activities because of attacks),	5-point Likert type Range: 0 (no panic or limited symptom episodes) to 4 (extreme: full panic attacks occurred more than once a day, more days than not).	Sum (0-28) Higher scores = higher symptom levels	≥ 8	Sensitivity = 83%; Specificity = 64%	0.92

			interfere with your <u>ability to work or carry out your responsibilities at home?</u>	Range: 0 (No interference with work or home responsibilities) to 4 (Extreme, incapacitating impairment, such that I was essentially unable to manage any work or home responsibilities).				
Eating disorder symptoms	SCOFF questionnaire (SCOFF)	5	“Have you recently lost more than 6.3 kilograms in a three month period?” “Do you believe yourself to be fat even when others say you are too thin?”	Dichotomous scale, Range: 0 (no) and 1 (yes)	Sum (0-5)	≥ 2	Sensitivity = 85%; Specificity = 90%	0.44-0.57
Prior help-seeking behaviour	Prior counselling measure of the General Help-Seeking Questionnaire (GHSQ).	4	Have you ever seen a mental health professional (e.g., school counsellor, counsellor, psychologist, psychiatrist, mental health nurse) to get help for your personal or emotional problems?	Varied: dichotomous to 5-point Likert-type rating scales.	Items on the prior counselling measure should be treated individually.	--	N/A	--

Note: References are provided in Supplementary File 1; N/A = Not applicable.

Table 2. Respondents' demographic data.

Characteristic, <i>n</i> (%)	Male (<i>n</i> = 106)	Female (<i>n</i> = 118)	Total (<i>n</i> = 224)
Age in years, mean (<i>SD</i>) *	26.08 (6.76)	23.86 (5.02)	24.91 (6.00)
Country of birth			
Australia	97 (91.5)	112 (94.9)	209 (93.3)
United Kingdom	7 (6.6)	1 (0.8)	8 (3.6)
Other	2 (1.9)	5 (4.2)	7 (3.1)
Speak a language other than English at home, <i>n</i> (%)	9 (8.5)	7 (5.9)	16 (7.1)
Current injury or modified training program due to injury	22 (20.8)	32 (27.1)	54 (24.1)
Injury occurred in the last 4 weeks (<i>n</i> = 54)	6 (27.3)	10 (31.3)	16 (29.6)
Relocated for their sport	44 (41.5)	51 (43.5)	95 (42.4)
Relocated more than 12 months ago (<i>n</i> = 95)	27 (61.4)	33 (64.7)	60 (63.2)
AIS athlete *	37 (34.9)	65 (55.1)	102 (45.5)
Full-time salary from sport **	52 (49.1)	4 (3.4)	56 (25.0)
Level of competition **			
Olympic	8 (7.5)	18 (15.3)	26 (11.6)
Paralympic	3 (2.8)	5 (4.2)	8 (3.6)
International	35 (33.0)	70 (59.3)	105 (46.9)
National state	25 (23.6)	12 (10.2)	37 (16.5)
Age group international	14 (13.2)	6 (5.1)	20 (8.9)
Age group national state	6 (5.7)	6 (5.1)	12 (5.4)
Professional	15 (14.2)	1 (0.8)	16 (7.1)
Sport type **			
Cricket	44 (41.5)	21 (17.8)	65 (29.0)
Football (soccer)	17 (16.0)	15 (12.7)	32 (14.3)
Hockey	0 (0)	12 (10.2)	12 (5.4)
Netball	0 (0)	10 (8.5)	10 (4.5)
Rowing	6 (5.7)	6 (5.1)	12 (5.4)
Sailing	9 (8.5)	4 (3.4)	13 (5.8)
Water Polo	0 (0)	14 (11.9)	14 (6.3)
Softball	0 (0)	8 (6.8)	8 (3.6)
Other †	30 (28.3)	28 (23.7)	58 (25.9)

Note: Exact *p* values for chi-square were used when values when the expected frequencies were less than 5 in more than 20% of cells.; Results marked * indicate a significant difference between male and female respondents, **p* < .05 ***p* < .001; † = Respondent numbers for 'other' sports (*n* = 58) are as follows: athletics/track and field = 8, cycling (track and road) = 7, skiing (alpine and aerial) = 5, volleyball = 5, golf = 4, powerlifting = 4, archery = 3, beach volleyball = 3, canoe slalom = 3, gymnastics = 3, swimming = 3, triathlon = 3, basketball = 2, kayak = 2, orienteering = 2, skeleton = 1. Figures represent *n* (%) except where otherwise indicated.

Table 3. Symptoms of mental health disorders and reported help-seeking behaviour.

	Male (n = 106)	Female (n = 118)	Total (n = 224)
<i>Symptom measure (potential range)</i>			
K-10 (10-50), M (SD) *	14.63 (6.11)	16.67 (5.70)	15.71 (5.97)
CES-D (0-60) , M (SD)	10.33 (9.47)	12.64 (9.06)	11.55 (9.31)
GAD-7 (0-21), M (SD) *	3.32 (3.86)	4.78 (3.84)	4.09 (3.91)
SPIN (0-68), M (SD)	9.46 (8.40)	9.97 (8.61)	9.72 (8.49)
PDSS-SR (0-28), M (SD)	0.67 (2.92)	1.02 (2.60)	0.86 (2.75)
SCOFF (0-5), M (SD) **	0.43 (0.88)	1.07 (1.25)	0.77 (1.14)
<i>Caseness cut-off (percentage meeting cut-off score)</i>			
K-10 score \geq 22 (%)	13 (12.3)	24 (20.3)	37 (16.5)
CES-D score \geq 16 (%)	25 (23.6)	36 (30.5)	61 (27.2)
GAD-7 score \geq 11 (%)	4 (3.8)	12 (10.2)	16 (7.1)
SPIN score \geq 19 (%)	15 (14.2)	18 (15.3)	33 (14.7)
PDSS-SR score \geq 19 (%)	3 (2.8)	7 (5.9)	10 (4.5)
SCOFF score \geq 2 (%) **	13 (12.3)	38 (32.2)	51 (22.8)
Met caseness for any mental health problem, n (%) *	41 (38.7)	63 (53.4)	104 (46.4)
Number that have ever seen a mental health professional to get help for personal or emotional problems? (GHSQ) n (%)			
Any source **	44 (41.5)	84 (71.2)	128 (57.1)
Psychologist **	35 (33.0)	74 (62.7)	109 (48.7)
Doctor/GP *	7 (6.6)	26 (22.0)	33 (14.7)
Psychiatrist	6 (5.7)	7 (5.9)	13 (5.8)
Counsellor/School counsellor/Other (not specified)	22 (20.8)	37 (31.4)	59 (26.3)
Proportion experiencing high or very high psychological distress (K-10), K-10 score \geq 22			
	Male (n = 95)	Female (n = 113)	<i>Australian population estimates (2011- 12) ¹⁹</i>
<i>Males aged 18-24 (%)</i>	14.3	--	10.6
<i>Males aged 25-34 (%)</i>	8.7	--	8.2
<i>Females aged 18-24 (%) *</i>	--	25.7	13.0
<i>Females aged 25-34 (%)</i>	--	10.3	13.6

Note: Exact *p* values for chi-square were used when values when the expected frequencies were less than 5 in more than 20% of cells; Results marked * indicate a significant difference between male and female respondents, or between present sample and population estimates, **p* < .05 ***p* < .001.

Supplementary Table 1. Mental health symptoms and help-seeking behaviour measures.

Construct	Measure	No. of items	Example items	Rating scale	Scoring (range)	Cut-off score	Sensitivity/ Specificity at cut-off	Reported Alpha	Previous research
General psychological distress	Kessler 10 scale (K-10) ¹	10	During the last four weeks, how often did you feel: “So nervous that nothing could calm you down” “So sad that nothing could cheer you up”	5-point Likert-type Range: 1 (none of the time) to 5 (all of the time).	Sum (10-50) Higher scores = higher symptom levels	≥ 22 2	N/A	0.90-0.93 1, 3, 4	Young adults ^{5, 6}
Depressive symptoms	Center for Epidemiologic Studies Depression Scale (CES-D) ⁷	20	During the past week how often did the following apply to you: “I enjoyed life” (reverse-scored) I felt everything I did was an effort”	4-point Likert-type Range: 0 (rarely or none of the time [< 1 day] to 3 (most or all of the time) [5-7 days])	Sum (0-60) Higher scores = higher symptom levels	≥ 16 7, 8	Sensitivity = 87%; Specificity = 77% ⁹	0.85-0.90 7, 8, 10	Young adults ⁸ ; Athletes ¹¹
Anxiety symptoms	Generalised Anxiety Disorder 7 scale (GAD-7) ¹²	7	How often during the past 2 weeks have you felt bothered by: “Feeling nervous, anxious or on edge” “Becoming easily annoyed or irritable”	4-point Likert-type Range: 0 (not at all) to 3 (nearly every day)	Sum (0-21) Higher scores = higher symptom levels	≥ 11	Sensitivity = 82%; Specificity = 85% ¹²	0.89-0.92 12, 13	Adults ¹⁴
Social anxiety symptoms	Social phobia Inventory (SPIN) ¹⁵	17	How much have the following bothered you during the past week:	5-point Likert-type	Sum (0-68)	≥ 19	Sensitivity = 73%;	0.82-0.95 15, 16	Adults ¹⁴

			“I am bothered by blushing in front of people” and “Parties and social events scare me”.	Range: 0 (not at all) to 4 (extremely)	Higher scores = higher symptom levels		Specificity = 84% ¹⁵	
Panic disorder symptoms	Panic Disorder Severity Scale (PDSS-SR) ¹⁷	7	“How many panic and limited symptom attacks did you have during the past week?” “During the past week, how much did the above symptoms altogether (panic and limited symptom attacks, worry about attacks, and fear of situations and activities because of attacks), interfere with your <u>ability to work or carry out your responsibilities at home?</u> ”	5-point Likert type Range: 0 (no panic or limited symptom episodes) to 4 (extreme: full panic attacks occurred more than once a day, more days than not). Range: 0 (No interference with work or home responsibilities) to 4 (Extreme, incapacitating impairment, such that I was essentially unable to manage any work or home responsibilities).	Sum (0-28)	≥ 8	Sensitivity = 83%; Specificity = 64% ¹⁸	Adults ¹⁹
Eating disorder symptoms	SCOFF questionnaire ²⁰	5	“Have you recently lost more than 6.3 kilograms in a three month period?” “Do you believe yourself to be fat even when others say you are too thin?”	Dichotomous scale, Range: 0 (no) and 1 (yes)	Sum (0-5)	≥ 2	Sensitivity = 85%; Specificity = 90% ²¹	Adults ²⁵⁻²⁷
Prior help-seeking behaviour	Prior counselling measure of the General Help-Seeking Questionnaire (GHSQ) ²⁸	4	Have you ever seen a mental health professional (e.g., school counsellor, counsellor, psychologist, psychiatrist, mental health nurse) to get help for your personal or emotional problems?	Varied: dichotomous to 5-point Likert-type rating scales.	Items on the prior counselling measure should be treated individually ²⁹	--	N/A	Adolescents/Young adults ²⁸

Supplementary Table 1 References

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