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Depressive symptoms and the general health of retired professional footballers compared with the general population in the UK: a case–control study

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ABSTRACT

Objectives To determine the prevalence of depressive symptoms and general health of male ex-professional footballers compared with general population controls.

Methods 572 retired professional footballers and 500 general population controls in the UK were assessed by postal questionnaire. Anxiety and depressive symptoms were assessed using the Hospital Anxiety and Depression Scale and a threshold score of ≥11 was used to indicate probable caseness. General health was ascertained using the Short Form-12 Health Survey Questionnaire quality of life (QoL) tool; self-reported comorbidities, analgesic usage and body pain; and Index of Multiple Deprivation based on postcode data. Mood was assessed using the Positive and Negative Affect Scale and sleep using the Medical Outcome Survey. Linear regression analysis was used to determine adjusted relative risk with 95% CI and adjusted for age, body mass index, comorbidities, body pain and medication usage.

Results The prevalence of depressive symptoms in retired professional footballers was 5.66% compared with 5.76% in the general population and anxiety prevalence was also comparable (12.01% vs 10.29%; all p>0.05). However, footballers had lower physical and mental component scores compared with controls (p<0.01). They also reported significantly more sleep problems, more negative mood profiles and more widespread body pain (adjusted relative risk (aRR) 1.88, 95% CI 1.15 to 3.09). They also reported greater pain medication usage compared with controls (aRR 1.54, 95% CI 1.26 to 1.89). However, compared with controls, they were 26% (95% CI 15% to 37%) less likely to report comorbidities, especially heart attacks (aRR 57%, 95% CI 27% to 74%) and diabetes (aRR 61%, 95% CI 37% to 76%).

Conclusions The prevalence of depressive symptoms and anxiety symptoms and probable caseness in ex-professional footballers is comparable with general population controls. However, ex-footballers reported lower health-related QoL, more widespread body pain and higher analgesic usage. Conversely, lower reporting of diabetes and heart attacks indicates potential long-term physical health benefits of professional football.

INTRODUCTION

Football is the world's most popular sport with over 300 million active players worldwide and

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Strengths and limitations of this study

► Largest study of depressive symptoms and general health in ex-professional footballers and controls in the UK.
► Case-control study design with control male participants recruited from a community-based population sample representative of the UK general population.
► Outcomes were self-reported by participants using postal questionnaires.
► Lack of current or previous physical activity levels assessed.
► Higher response rate in the ex-footballers compared with the control participants.

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110 000 athletes registered at a professional level.[1] There has been considerable interest in whether the mental health of athletes is often compromised, especially by anxiety and depression.[2] Retired professional footballers may experience unique psychological stress factors primarily due to the nature and the intensity of the sport, where severe or recurrent injuries are common.[3] Also, the pressures of competition, training and maintaining high-performance levels are hallmarks of a successful professional career.[4] The intensity of mental and physical demands may increase their susceptibility to certain mental health problems and risk-taking behaviour.

Despite individual high-profile cases of depression in professional footballers in the UK (eg, Gary Speed, Paul Gascoigne and Clarke Carlisle), there is a lack of robust epidemiological studies on mental health issues in professional footballers. Studies on European former professional footballers from countries such as the Netherlands have reported anxiety and depression prevalence figures ranging from 25% to 43%.[5] However, none of these studies included a non-athlete or general population comparison group. A

recent systematic review suggests that despite a seemingly higher risk of anxiety and depression in athletes in a range of elite sports, the figures are broadly comparable with the general population. The review further concluded that the evidence base is restricted by a paucity of high-quality study designs, particularly in professional footballers.[6] Turner *et al*[7] also found that anxiety and depression featured in 37% of former players with knee pain and knee osteoarthritis. A subsequent phenomenological study[8] suggested that these may be common sequelae of significant sport injuries that caused frustration and associated participation restrictions and limitations to work, social and leisure activities. However, studies focused on mental health and quality of life (QoL) of athletes are limited by study design, lack of power and small sample sizes, and comparison across sporting populations.[2 9–12] Therefore, there is a need for studies that are focused on an individual sport, such as professional football and its full-time players; are adequately powered for depression outcomes; include an age-adjusted control population; and investigate comorbidities and auxiliary measures of mental health and QoL indicators, such as sleep patterns, mood profiles and pain distribution, including use of pain medication.

Therefore, based on previous research and the gaps in the evidence base, the objectives of the present study were (1) to determine the prevalence of anxiety and depressive symptoms and probable caseness for each in retired professional footballers compared with general population controls; (2) to determine the general health in retired professional footballers compared with general population controls; and (3) to determine the risk and protective factors associated with professional football.

METHODS

A cross-sectional design was used, involving a series of postal questionnaire surveys to ex-footballers and to a sample of men in the general population (aged 40 years and over) to gain information on symptoms of anxiety and depression, mood and sleep, as well as well as simple demographics, occupational history, general health (comorbidities) and current medications. The exclusion criteria at baseline were known terminal illness, severe psychiatric illness or dementia, or any other condition or circumstance considered by their general practice to make them unsuitable to receive the questionnaire.

Patient and public involvement

The study was supported by a patient advisory group that provided input to the programme of research. Patients and ex-professional footballers partnered with us for the design of the study, the informational material to support the intervention and the burden of the questionnaire from the patient's perspective. At the end of the study, the patient advisory group commented on the findings and contributed to the dissemination plan, and this included input on poster and oral presentations at local, national and international conferences.

Participants

The recruitment of the source sample of ex-footballers and general population controls has been detailed in a previous publication examining the risk of knee pain and osteoarthritis in the footballers versus the controls.[13] Ex-footballers were recruited via the Professional Footballers' Association and former players' associations (N=21 professional clubs). Inclusion criteria for ex-footballers were men aged over 40 years who had played professionally (in the top four tiers of the English Football League). The comparison group was recruited from the Knee Pain and Related Health in the Community Study, involving recruitment via 12 general practitioner (GP)/ family medicine practices in the UK Midlands region. All men on these UK National Health Service GP registers aged 40 years and older who were not terminally ill were able to give written informed consent and had no other reason judged by the GPs to exclude them from the study were sent the questionnaire. Individuals who indicated interest in further research conducted by the University of Nottingham were subsequently contacted with a follow-up questionnaire focused on mental health and QoL.

Questionnaire survey

The postal questionnaire was developed based on previously published questionnaires and using extensively validated tools in the retired footballers and the control population. Through public and patient involvement, pilot versions of the questionnaire were evaluated to identify any problems with content, language and layout. The questionnaires were similarly constructed to capture detailed information about all participants (including football career history for retired footballers), anthropometric details (age and body mass index (BMI)), medical history and current medication usage.

Age and BMI

Participants self-reported their date of birth and height and weight in the returned questionnaires. BMI was calculated as the weight divided by the square of height (kg/m^2).

Symptoms of anxiety and depression

Anxiety and depressive symptoms were determined using the Hospital Anxiety and Depression Scale (HADS), which is composed of 14 items, equally divided between the two mood states (anxiety and depression). Each item has a 4-point rating scale. Responders are asked to indicate their feelings based on the previous 1 week, with recommended cut-off points indicating whether the responder is (1) within the normal range (scores of 0–7), (2) mild–moderate caseness (scores of 8–10) and (3) severe caseness (scores of 11–21). Although cut-offs of >8 have been used in some studies to indicate anxiety or depression,[14] this threshold is considered too low and lacking

in sensitivity for use in a general population sample,[15] so a cut-off of ≥11 was used to identify definite anxiety and definite depression. This cut-off has been defined using psychiatric ratings of anxiety and depression disorders.[16] While the gold standard for a clinical diagnosis of generalised anxiety disorder or major depressive disorder is a detailed evaluation of symptom criteria using the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5), research has shown that it compares consistently with HADS data both for sensitivity and specificity.[17] As the HADS is also simple, easy to administer and relatively short compared with the DSM-5,[18] we chose to include it as part of the postal questionnaires mailed to over 40 000 participants in this study.

QoL measures, MCS and PCS

QoL was assessed using the Medical Outcome Study Short Form-36 Health Survey Questionnaire (SF-36) in the ex-footballers, which was converted into SF-12, and the Medical Outcome Study Short Form-12 Health Survey Questionnaire (SF-12) in the general population controls. The difference in SF versions used was due to logistical factors: the SF-12 was a survey embedded within a questionnaire posted to the general population controls whose focus was on knee osteoarthritis outcomes and not mental health per se. As a result of these page restrictions, we used the shortened version, SF-12, for the controls compared with the second follow-up questionnaire posted to the ex-footballers, which contained the SF-36. In order to aid comparison, the SF-36 outcomes were transformed into SF-12 outcomes as detailed by Jenkinson and colleagues.[19] Each SF response was used to calculate scores in each of the eight domains: physical functioning, role physical, bodily pain, general health perception, vitality, social functioning, role emotional and mental health. These figures were then standardised using z-score transformations using means and SDs previously described.[19] Using the z-scores for each scale, the aggregate score for two summary scales, the Mental Health Component Score (MCS) and the Physical Health Component Score (PCS), were calculated. Finally, the scores were standardised to a T-score, where the mean was set to 50 and the SD was set to 10. For the SF-12, scoring was conducted according to previously published data.[20 21] Item weights for response categories from an American population-based study, which was found comparable with other population studies in nine other countries, including the UK, was used to standardise responses.[19] There is considerable evidence suggesting that the PCS and MCS from the SF-12 show similar levels of precision to the summary scores derived from the longer SF-36 version. Even though summary scores are not exactly identical, the level of difference between the two is small and is not subjectively or clinically meaningful.[22]

Medical Outcome Survey (MOS) Sleep Scale

The sleep scale from MOS is a 12-item measure that is generic and not disease specific, and measures six dimensions of sleep: sleep disturbance, snoring, shortness of breath with headache, sleep adequacy, somnolence and quantity of sleep.[23] The tool has demonstrated excellent reliability and validity for assessing sleep in community samples.[24 25] A sleep problems index (SLP-9) can be calculated using nine items from the MOS Sleep Scale indicating quality of sleep on a 0–100 scale. The higher the score, the lower the quality of sleep. The quantity of sleep is recorded as the average hours of sleep per night over the previous 4-week period and was dichotomised as optimal sleep (if this was 7–8 hours) or non-optimal (if this was less than 7 hours or greater than 8 hours) as per MOS sleep scoring criteria.

Positive and Negative Affect Scale (PANAS)

PANAS is a self-report questionnaire comprising two 10-item scales, which describe different feelings and emotions measuring both positive and negative affects.[26] The questionnaire asked responders to consider their feelings at the time of completing the questionnaire. The normal population reference guide for the mean positive affect score was 29.7 (+7.9) and that for the mean negative affect score was 14.8 (+5.4). PANAS has demonstrated high reliability and construct validity, is brief and ideal for use in self-reported questionnaires and has been used extensively alongside measures of anxiety and depression such as HADS.[27 28]

### Indices of Multiple Deprivation

The Index of Multiple Deprivation is an official measure of the relative deprivation in England.[29] It ranks all areas in England from 1 (most deprived) to 32 844 (least deprived area) and is based on weights given to key domains such as income, employment, education and housing. It uses postcodes to determine an overall measure of deprivation. This information was then presented in quintiles with percentage of footballers and controls within the lowest and highest quintiles.

Comorbidities

Individual comorbidities were self-reported according to a brief specific checklist enquiry (fibromyalgia, diabetes, heart attacks, hypertension and cancer), with data dichotomised into individuals with or without these conditions. An open-text question was also included to capture information on any other diagnosed medical conditions not on the checklist.[30]

Widespread body pain

Widespread body pain was self-reported using a body pain mannequin.[31] It was scored using the American College of Rheumatology criteria for widespread body pain, whose definition is pain in each of the four quadrants of the body including the spinal or axial column. Reported pain in any part of the body was dichotomous (present/absent) and the total number of regions with pain was a simple count of the shaded regions of the manikin.
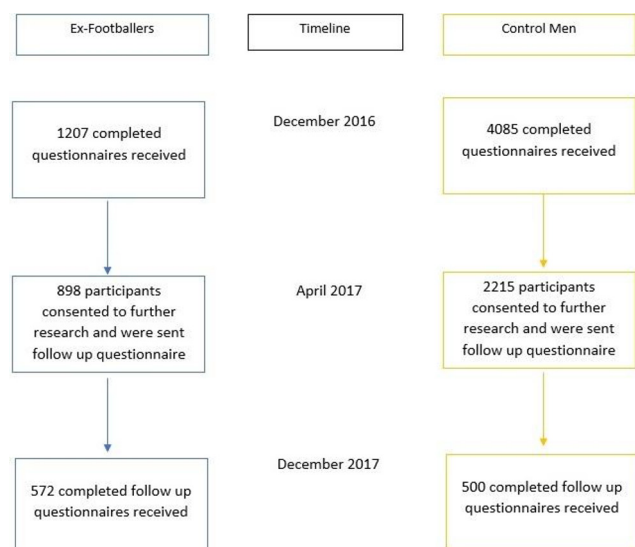
Figure 1 Selection of ex-footballer and general population controls.

Pain-relieving medication

Self-reported analgesic medication (both prescribed and over the counter) was recorded and grouped as all pain-relieving medication, and subgrouped as non-steroidal anti-inflammatory drugs (NSAIDs), opioids, other over-the-counter (OTC) and prescribed analgesics, and other medications with pain-modifying properties (eg, citalopram and amitriptyline).

Statistical analyses

A power calculation was conducted based on a 12.6% prevalence of depressive symptoms in a non-clinical sample of community-derived adults using the HADS[15] and an OR of 2 after adjustment for other known factors in ex-footballers. The sample size required to detect this OR, with 90% power and a 0.05% significance level, was 336 participants per group.

Categorical variables were reported as frequencies and percentages, and continuous variables were reported as means and SDs. To determine whether distributions of the variables were statistically significant between ex-footballers and controls, a t-test (continuous variables) or a χ^2 test (categorical variables) was used. For the SF-12 outcomes, specifically the PCS and MCS between footballers and controls, we used the rank-sum command in Stata, which compared two independent samples using the Mann-Whitney two-sample statistic. Statistical significance was defined as p<0.05. We had very few missing data at random (eg, where BMI was not reported by a participant). Imputation or modelling was therefore not undertaken for the occasional missing values. Details on missing data have previously been published.[13]

All analyses were conducted using Stata IC V.14 on Windows 7 Operating System, and power calculations were undertaken using OpenEpi V.3.

RESULTS

Of the 898 questionnaires sent to the retired professional footballers, 572 responses were received (63.7% response). Of 2215 questionnaires sent to general population controls, 500 questionnaires were received (22.6% response) (figure 1).

The mean age of the ex-footballers was significantly younger than that of the controls (60 vs 64 years), but the mean BMIs were comparable (table 1).

The prevalence of probable depression was similar in the footballers and controls (5.7% vs 5.8%), but the prevalence of probable anxiety was slightly higher in the footballers (12.0% vs 10.3%), though this was not statistically significant. Although footballers and controls shared a similar positive mood profile, footballers were significantly more likely to experience negative moods compared with the controls and to have greater problems with sleep quality

Table 1 Characteristics of footballer and control populations			
	Footballers, n=572	**Controls, n=500**	**P value**
Age (years), mean (SD)	60.11 (10.77)	64.26 (9.37)	<0.001
BMI (kg/m^2), mean (SD)	27.13 (3.40)	27.29 (4.48)	0.51
HADS Anxiety Score ≥11, n (%)	70 (12.01)	50 (10.29)	0.34
HADS Depression Score >11, n (%)	33 (5.66)	28 (5.76)	0.94
SF Physical Component Score, mean (SD)	45.33 (10.32)	77.60 (8.35)	<0.001
SF Mental Component Score, mean (SD)	48.09 (7.47)	71.87 (6.64)	<0.001
Optimal sleep (7–8 hours per night), n (%)	369 (64.51)	275 (56.70)	0.01
Sleep Problem Index (SIP) in highest tertile, n (%)	186 (33.04)	131 (26.90)	0.03
Positive mood, mean (SD)	34.75 (8.05)	34.97 (6.86)	0.63
Negative mood, mean (SD)	16.5 (6.72)	14.22 (4.95)	<0.001
Indices of Multiple Deprivation in the lowest and highest quintile, n (%)	17 (3.51)	84 (17.28)	<0.001
	205 (42.27)	199 (40.95)	0.18

BMI, body mass index; HADS, Hospital Anxiety and Depression Scale; SF, Short Form.

Table 2 Comparison of self-reported comorbidities, pain and medication in the ex-footballers compared with the general population controls

	Footballers, n=572	Controls, n=500	P value	Adjusted relative risk (95% CI) (for age and BMI)
Comorbidities* n (%)	178 (30.58)	260 (52.31)	<0.001	0.74 (0.63 to 0.85)†
Comorbidities (by Charlson Comorbidity Index weighting, mean (SD)), n(%)‡	0.44 (0.80)	0.75 (0.98)	<0.001	0.71 (0.6–0.85)†
Diabetes, n (%)	22 (3.77)	57 (11.47)	<0.001	0.39 (0.24 to 0.63)†
Cancer, n (%)	40 (6.86)	50 (8.58)	0.07	0.88 (0.59 to 1.30)
Heart attacks, n (%)	18 (3.08)	47 (9.46)	<0.001	0.43 (0.26 to 0.73)†
Hypertension, n (%)	134 (22.98)	169 (34.00)	<0.001	0.79 (0.65 to 0.96)†
Fibromyalgia, n (%)	3 (0.51)	1 (0.20)	0.39	3.08 (0.31 to 31.02)
Any body pain, n (%)	454 (78.14)	330 (71.90)	0.02	1.09 (1.00 to 1.17)§
ACR criteria widespread body pain (no knee pain), n (%)	48 (8.40)	23 (4.60)	0.01	1.88 (1.15 to 3.09)§
Total regions with pain, mean (SD)	3.13 (3.29)	3.44 (3.05)	0.14	0.91 (0.79 to 1.05)
Back pain, n (%)	176 (30.18)	146 (29.38)	0.57	1.00 (0.76 to 1.32)
Knee pain, n (%)	337 (57.80)	193 (38.83)	<0.001	1.47 (1.29 to 1.69)§
Pain medication use, n (%)	240 (41.17)	165 (33.20)	0.007	1.54 (1.26 to 1.89)§
Opioids, n (%)	23 (4.03)	32 (6.40)	0.07	0.64 (0.37 to 1.10)
NSAIDS, n (%)	49 (8.58)	21 (4.20)	0.004	1.94 (1.19 to 3.20)§
OTC analgesics, n (%)	137 (23.99)	70 (14.00)	<0.001	1.86 (1.44 to 2.43)§
Other medications, n (%)¶	18 (3.15)	31 (6.20)	0.01	0.50 (0.28–0.94)†

*Diabetes, hypertension, myocardial infarction, cancer and fibromyalgia.
†Protective factors.
‡Includes myocardial infarction, hypertension, diabetes and cancer.
§Risk factors.
¶Other medications with pain-relieving effects.
ACR, American College of Rheumatology; NSAID, non-steroidal anti-inflammatory drug; OTC, over-the-counter.

(p<0.05). When using the sleep problem Sleep Problem Index, more footballers reported problems with sleep quality (p<0.05) and poor sleep patterns, which included restlessness, shortness of breath and drowsiness. They were also more likely to have lower scores in terms of both their PCS and MCS, as indicated by the SF-12 QoL measure.

With respect to social deprivation, fewer footballers (3.51%) were living in areas marked as the most deprived compared with the control population (17.28%, p<0.001).

Risk factors associated with professional football following adjustment for age and BMI are presented in table 2. Ex-footballers overall were less likely to present with any comorbidity (diabetes, hypertension, myocardial infarction, cancer and fibromyalgia), especially diabetes (adjusted relative risk (aRR) 61%, 95% CI, 37% to 76%), heart attacks (aRR 57%, 95% CI 27% to 74%) and hypertension (aRR 21%, 95% CI 4% to 35%). However, footballers reported more widespread body pain using the American College of Rheumatology (ACR) criteria (aRR 88%, 95% CI 15% to 30.9%). Footballers also consumed more NSAIDs (8.6% vs 4.2%) and OTC analgesics (24% vs 14%) but not opioids (4% vs 6.4%) compared with the controls.

DISCUSSION

This is the first study to report the prevalence of symptoms of depression and anxiety and the general health and QoL of retired professional footballers compared with a control population. The main findings are (1) the prevalence of probable depression and anxiety in the ex-footballers is comparable to men in the general population; (2) ex-footballers have a lower QoL as indicated by the SF-12 PCS and MCS; (3) they are more likely to present with widespread body pain and use pain medication particularly OTC analgesics and NSAIDs; and (4) they are less likely to present with comorbidities, in particular diabetes, heart attacks and hypertension.

The study reported a prevalence of probable depression (6%) and anxiety (12%) in ex-footballers, which is lower than the 25%–43% as reported by Gouttebarge et al.[5] This discrepancy could result from smaller sample sizes (range of 70–149 ex-players), sample selection and status of footballers (current professional footballers from five different European countries) and the assessment tool used to determine depression and anxiety (12-item general health questionnaire (GHQ-12)) in that study. In a further study[32] specifically investigating ex-footballers, a

39% prevalence of both anxiety and depression using the GHQ-12 was estimated. A number of self-report assessment tools have been used in epidemiological research to detect depression and anxiety.[32–34] While the GHQ-12 has demonstrated excellent validity in detecting depression in the general population,[35] the HADS has demonstrated better sensitivity and specificity in detecting depression. Indeed, the choice of assessment tool should be balanced with feasibility of approach, cost effectiveness, as well as the administration and scoring times involved.[32] Additionally, none of the previous studies in ex-footballers presented results for an adequately matched comparison group of non-professional footballers. The results of this study accord with a comparative meta-analysis in high-performance athletes and non-athletes showing similar levels of depression across the groups.[4] Elite athletes are sometimes supported with psychological training as part of their sport programme and may have developed mental toughness and resilience in order to cope with stress, anxiety and even depression.[36–39] There is a noted stigma about reporting mental health symptoms in both ex-footballer and general population samples, which may result in choosing to suppress, ignore and not seek further help when needed.[6 35 40] Furthermore, when compared with another general population study, the prevalence of depression (7%–9%) and anxiety (8%–14%) in general population men aged 40–65 years is comparable to the controls in this study, suggesting that this East Midlands control population is representative of the British general population and is a valid control group.[41]

In terms of QoL, the ex-footballers had significantly lower scores in both physical and mental components compared with controls. It has been postulated that this negative effect on QoL is a consequence of reporting more specific joint pain (eg, knee pain) and more overall body pain.[13 42] Although both the ex-footballers and the control population indicated pain in one region on a body pain manikin (78% vs 72%), after adjustment for age and BMI, ex-footballers are 88% more likely to present with widespread body pain when using the more stringent ACR criteria compared with the control group. Widespread pain can have significant, deleterious effects on physical and mental health and well-being,[43] including implications on sleep disturbance and mood. Longitudinal cohort studies have shown that insomnia and sleep disturbances significantly increase the risk of chronic pain in pain-free individuals at baseline, while pain is not a strong predictor of insomnia.[44] As a result of the cross-sectional nature of this study, we cannot ascertain causation between pain and sleep. However, the results in ex-footballers show that while sleep duration may be marginally better (64.5 vs 56.7% for 7–8 hours of sleep), the quality of sleep was more disturbed in terms of restlessness, feeling tense or drowsy compared with controls. The effect on mood is also notable with ex-footballers more likely to present with negative feelings and emotions such as distress, irritability, fear and nervousness compared with controls. The association of emotional distress and

pain-related fear on patients with chronic pain has been established in previous population-based studies.[45–48] Widespread body pain is a key feature of fibromyalgia, but the cross-sectional nature of this study does not allow investigation of temporal trends.[47] A further indication of higher pain levels in ex-footballers is the significantly higher use of analgesics (41%) compared with controls (33%) and, in particular, NSAIDs (8.58% vs 4.20%) and OTC analgesics (24% vs 14%). The use of analgesics presumably reflects compromised musculoskeletal health, whereas in terms of systemic general health, the footballers reported significantly less diabetes, cancer, heart attacks and hypertension compared with controls. These results accord with previous studies of elite male athletes and ex-footballers with lower risk of ischaemic heart disease and diabetes, but an elevated risk of musculoskeletal conditions, particularly lower limb osteoarthritis.[13 49] Interestingly, ex-footballers reported significantly lower use of drugs such as citalopram, diazepam and temazepam, which are used primarily in the treatment of depression and anxiety, respectively. Although the study was not powered for medication outcomes, the use of medication in the footballer cohort was primarily for pain relief rather than for relief for mental health problems. In fact, ex-footballers may have developed a certain resilience and mental toughness due to being elite athletes, which may be a protective factor for long-term mental ill-health.[4 37 49 50]

There are several caveats to this study. First, this was a postal questionnaire study focused on pain and osteoarthritis in ex-footballers[13] and a community sample,[32] and so may be subject to response bias (those with pain are more likely to respond). However, this would not explain the between group differences. Second, the response rate was higher in the ex-footballer cohort than the controls (63.7% vs 22.6%), and the low response rate in controls questions the representativeness of the sample. Third, the comorbidities and medications were self-reported, and due to logistical reasons relating to questionnaire length, data on established associated risk factors for depression and anxiety, such as smoking status, alcohol consumption, educational, marital and economic status,[51–54] were not available. Also, although the study did not find any differences between ex-footballers and controls in terms of mental health, it would have been interesting to examine mental toughness, resilience, optimism and general pain coping mechanisms between the two populations. Future epidemiological research on this topic should explore these relationships in more detail. Also, our use of the self-completed HADS alone is a limitation as this measure included only the symptoms of depression or anxiety as opposed to producing a definitive clinical diagnosis. Although we used the upper suggested cut-off of the HADS as a surrogate for probable depression and anxiety, the prevalence data for this dichotomous cut-off should be interpreted with this important caveat in mind. Furthermore, this study did not specifically measure two aspects of QoL: physical health via current physical activity

levels and social relations via personal relationships or available social support. These data would have given us insight into current physical fitness levels, physical limitations as a consequence of musculoskeletal conditions and whether there was adequate psychosocial support in an individual's life. These form some of the core tenets of a healthy QoL[53] and may have offered robust data on previously reported anecdotal effects of bankruptcy, divorce or trauma, particularly in the ex-footballers.[55] Finally, we did not examine the effects of repetitive heading of footballs and risk of head injury and concussion in professional footballers, and the possible long-term health impact that this could have on neurocognition and mental health. A future study is planned to address this issue.

In summary, this is the largest study on symptoms of anxiety and depression and QoL in ex-professional footballers and the first to include an age-adjusted general population comparison sample. The results show that ex-footballers are just as likely to have anxiety and depression symptoms as controls, but they have lower QoL in terms of both physical and mental composite scores. However, despite reporting more widespread body pain and use of analgesics, they are less likely to report cardiovascular disease or diabetes. The results suggest that healthcare providers, club management and football organisations should be focused on improving musculoskeletal pain management strategies in ex-footballers. Further study on the potential benefits of professional sport on pain coping and resilience mechanisms, which may be protective factors for long-term psychological consequences such as depression and anxiety would benefit the large numbers of ex-professional footballers both nationally and internationally. It would also be valuable to explore the effects of neurocognitive functioning on mental health in ex-footballers and to capture the granularity around type, severity and frequencies of injuries such as concussion and the subsequent long-term health impact.

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