



Cardiovascular pre-participation screening does not distress professional football players

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Abstract

Background: It has been debated whether cardiovascular screening of athletes creates negative psychological reactions in those being screened. Neither the athletes' level of distress towards, nor their opinion about screening has actually been examined. Therefore, the aim of this study was to assess the level of distress among Norwegian elite male football players and their experiences of screening.

Methods: After screening, players completed a 10-item scale assessing their experience on a Likert scale. Their level of distress was measured with the intrusion sub-scale of Impact of Event Scale (IES) (7 items) on a six-point scale (grade 0–5). A sum score of ≥ 19 indicates a clinical stress problem. Twenty-five out of 28 teams, 441 of 591 players (75%, mean age 26 [18–39] years) consented to participate.

Results: Sixty-four percent felt more confident when playing football and 88% were satisfied having completed the screening. The majority (77%) felt a need for the screening and 84% would strongly recommend it to others. Sixteen percent were afraid that the screening result might have consequences for their own health, and 13% were afraid of losing their license to play football. Less than 3% experienced distress (IES ≥ 19).

Conclusions: The majority of the players were satisfied having completed the screening, felt more confident and would recommend it to other players. Only a marginal proportion of the players were distressed by the screening, but were at least as likely to recommend it.

Keywords

Pre-participation screening, psychological distress, sudden cardiac death, athletes, sports

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Introduction

Cardiovascular pre-participation screening (PPS) of athletes is a helpful tool to prevent sudden death in sports. Screening procedures are also applied as part of a general health examination of athletes.¹ At present, 12 European countries have implemented PPS at elite sport level.²

Tested in one country, PPS has proven highly effective in reducing sudden cardiac deaths in sports.³ Both the utility of PPS, however, and the content, have been highly disputed. Negative aspects of screening, such as too many false positive findings, few true positive findings, poor cost-benefit ratio and the possibility that PPS might create negative psychological reactions, have been highlighted.⁴

It is noteworthy that the USA and Europe have chosen different screening protocols. Both include

family history, a report of one's own physiological response to exercise and a medical examination including a blood pressure measurement. While Europe also investigates resting electrocardiogram (ECG) in the recommended screening (5;6),^{5,6} the USA does not.⁷

Large sports institutions such as the Union of the European Football Association (UEFA), Fédération

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International de Football Association (FIFA) and the International Olympic Committee (IOC) have supported PPS.^{1,8,9}

This study questions whether PPS creates negative psychological reactions in those being screened. No documentation supports nor invalidates the notion that PPS stresses athletes. Referral to other directly commensurable research examining responses to PPS is therefore not possible. It has been argued, though, that a diagnosis of a potentially dangerous condition detected during PPS may be associated with psychological implications as well as the potential for loss of professional lucrative contracts.^{10,11} The need for rapid evaluation of athletes who fail the initial screening process has been emphasized and a possible role for psychological support and counselling has been suggested.^{10,11}

To evaluate possible psychological distress due to PPS, it may be useful to consider psychological distress associated with other screening procedures. While the aim of PPS is to support the athletes in being healthy and to exclude underlying heart disease, the aim of screening for specific diseases is to detect illness at an early stage.

Apart from the dissimilarities between these two types of screening, psychological side-effects following screening for breast and ovarian cancer, for example, have been documented.¹² Women who received false-positive results conducted more frequent breast self-examinations and had higher, but apparently not pathologically elevated, levels of distress and anxiety. They also thought more about breast cancer than those who had received normal results.¹³ After mammography screening for breast cancer for 10 years, about 10% of women experience significant psychological distress for many months because of false-positive findings.¹⁴ Women without cancer experienced moderate and transient levels of distress. Nevertheless, the great majority would recommend screening to others.¹⁵ The results from genetic testing for hereditary cancer underscore the importance of time; changes in distress observed shortly after test-result disclosure frequently differed from the pattern of distress subsequently seen.¹⁶ No studies evaluate if better information or follow-up can relieve distress related to screening.

The aims of this study were to investigate the degree of stress in elite football players undergoing PPS and to explore their opinion about PPS.

Methods

In response to the UEFA requirement of cardiovascular PPS⁸ of all male elite football players in 2008, screening was conducted in the two Norwegian male professional leagues. The screening comprised 28 of 30 eligible teams ($n = 591$ players) and was conducted at La Manga,

Spain, during a winter tournament. Two teams chose not to participate in the study and performed their own screening. The cardiac screening protocol, conducted according to UEFA's requirement and in accordance with the common European protocol,⁵ consisted of medical examination, family and case history on a pre-specified questionnaire, measuring blood pressure, resting ECG, and, additionally, echocardiography.⁸

This sub-study surveyed the athletes' reactions to this screening programme. Consent to participate was given by 25 of 28 teams and 441 of 591 players (75%, mean age 26 (18–39) years).

The survey was conducted between two and three months after the screening was finished, but before the final written results were sent to those players who had some kind of positive result and required follow-up (30 of 591, 5%).

The questionnaires were sent to the medical supervisor of each team, who distributed them to the players. Later, one reminder was sent to the medical supervisors who were also contacted by phone.

To avoid bias in the players' responses to the questionnaire, the choice of design prioritized anonymity. The players were thus identifiable by their team only, not individually. Hence, it was not possible to obtain individual data from non-attending players and teams. It was conveyed by the team supervisors, however, that non-attendance was mainly caused by time strain.

The self-developed 10-item questionnaire focused on both negative and positive aspects of screening (Table 1), and contained questions about satisfaction with screening, the need for screening and feelings of confidence when playing afterwards. There were also questions pertaining to the fear of disclosure of disease at the screening and anxiety about loss of income due to the risk of losing one's license to play. Cardiac disease in the family and previous anxiety for heart disease were asked for, in addition to if and how screening would influence peoples' attitude to practise sports. Players were also asked whether or not they would recommend screening to other players. Responses were scored on a standard five-point Likert scale from 1 (not at all) to 5 (very much).

Added to the questionnaire was the intrusion subscale of the Impact of Event Scale (IES) (Table 1), which is commonly applied to measure the level of psychological distress after an event.^{17,18} The seven-item intrusion subscale has six response alternatives: from 0 = 'never' to 5 = 'a high degree'. Horowitz suggested that a IES total score above 19 indicates a clinically significant level of distress.¹⁹ Wolfarth found that IES cut-off of 19 to be an appropriate level in identifying International Classification of Diseases (ICD-10) cases.²⁰ Neal defined an IES score of 20–34 as case level.²¹ In this study, an IES intrusion subscale sum score ≥ 19 was defined as clinically significant.

Statistics

The statistical software SPSS version 17 was used to conduct the analysis. The data presented below refer mainly to the proportion of players who scored 4 or 5 on the 5-point scale (e.g. much- or very much more confident). Mann-Whitney U test and Student's *t*-test were conducted and the level of significance was set to $p < 0.05$.

Ethics

The study was approved by the Norwegian Regional Ethical Committee.

Results

According to the IES intrusion subscale, the degree of distress was generally low among the players; the mean score was 2.8 with a median of 1 ($SD = \pm 4.8$, range 0–30). A small group (2.8%) experienced distress to a degree of clinical significance (IES sum score ≥ 19) due to the screening. This group would more often recommend the screening to others, 100% vs. 83% ($z = -2.76$, $p \leq 0.006$). Although not significant, they were somewhat more likely to worry about heart disease, 33% vs. 5% ($p = 0.086$), were more affected by heart disease in their families, 33% vs. 12% (ns) and seemed happier that they underwent the screening, 92% vs. 88% (ns).

The main findings of the players' responses to PPS are shown in Figure 1. There were 64% who felt more confident by playing football, whereas only 1% felt slightly less confident after the screening. The majority (88%) were happy that they had undergone the screening and 84% would strongly recommend it to others. Sixteen percent were afraid that the examination might have consequences for their own health and 13% were afraid of losing their license to play. Finally, 13% reported premature (under 55 years) cardiac disease in first degree relatives.

Discussion

This study is the first to investigate athletes' degree of stress due to screening and their experiences of screening.

The first main result was that very few of the players were distressed by the screening. Their distress is likely to be related to a family history of cardiac disease and fear of having cardiac disease themselves, although this should be interpreted with caution as statistical power was too low to show statistical significance. It is noteworthy that the distressed players were more likely to recommend other players to undergo screening, indicating that the screening results was considered more important than the procedural stress.

In general, the psychological distress caused by screening was low among the players, and thus psychological side-effects from PPS do not seem to be an issue requiring lengthy debate. There may, however, be a few vulnerable individuals who require particular consideration.

When examining the psychological effects of screening for diseases, the reactions to breast cancer screening are most often studied. The number of players experiencing distress after PPS seems lower compared with results from screening programmes for breast cancer. Even though breast cancer screening samples are female and the current study involves males, the age of those attending breast cancer screening is more comparable to the players than those screened for, for example, prostatic cancer. Additionally, those seeking breast cancer screening are self-selected and might have a higher level of pre-test anxiety for the disease. Indeed, most of the players expect to be healthy, although fear of a serious cardiac disease and its consequences should not be underestimated. However, the findings from cancer screening are not necessarily generalizable to PPS.

The second main result was that the great majority of the players were clearly positive towards screening. After PPS, the players were more confident when playing and recognized a need for the screening. They were pleased with the information and would recommend it to others.

This study is the first to show that the players unequivocally, across the different questions, approved screening. These findings should be included in discussions about PPS. Previously, authorities and doctors, but not players, have expressed opinions about screening.^{5,11,22}

A substantial number were afraid of the possibility of losing their license to play and thus of a loss of income. This finding may explain some players avoiding screening and needs to be given further consideration.

Methodological considerations

The survey was conducted at one time point only. Shortly following the individual screening, the players got preliminary oral information about the results of the individual screening. Another month after the screening survey, 30 players got a letter with various cardiac findings that needed follow-up. This survey did not capture these players' responses to this situation. It is unlikely, however, that a follow-up-assessment would alter the main findings as these were both unambiguous and consistent.

Nor did the study depict the number of pre-screened players, being more likely to be healthy than players screened for the first time. Though, this is the first large PPS in Norway. Number of pre-screened athletes in this study is likely marginal.

Due to preserving the anonymity of the players, it was not possible to cross-check results from the survey with the cardiac screening findings. Further studies,

Table 1. Questionnaire

(The questionnaire is answered by ticking the one alternative you found most correct)

1) Your age: _____ (years)

2) Are you satisfied with the information regarding the heart investigation?

- Very much
- Much
- Moderately
- Not so much
- Not at all

3) Has the heart investigation altered your feeling of safety while playing football?

- I feel much safer
- I feel a little safer
- No change
- I feel a little more unsafe
- I feel much more unsafe

4) Did you fear that the investigation would reveal that you had a heart disease?

- Very much
- Much
- Moderately
- Not so much
- Not at all

5) To score your degree of fear, how much were you afraid of: (answer all questions)

Scale:

1 = Very much

2 = Much

3 = Moderately

4 = Not so much

5 = Not at all

Danger for my own life/health—

Loss of income—

Consequences for my family—

Loss of licence to play football—

6) Has anybody in your closest family had heart disease at a young age (<55years)?

- Yes
- No
- Uncertain

7) Have you previously been worried about heart disease?

- Very much
- Much
- Moderately
- Not so much
- Not at all

8) Are you happy that you underwent the heart investigation?

- Very much
- Much
- Moderately
- Not so much
- Not at all

9) As an elite athlete, do you feel a need of undergoing a heart investigation?

- Yes
- No
- No opinion on this

10) Would you recommend other football players to undergo heart investigation?

- Very much
- Much
- Moderately
- Not so much
- Not at all

(continued)

Table 1. Continued

11) How do you think a heart investigation affect people's attitude towards self-practice of sports?

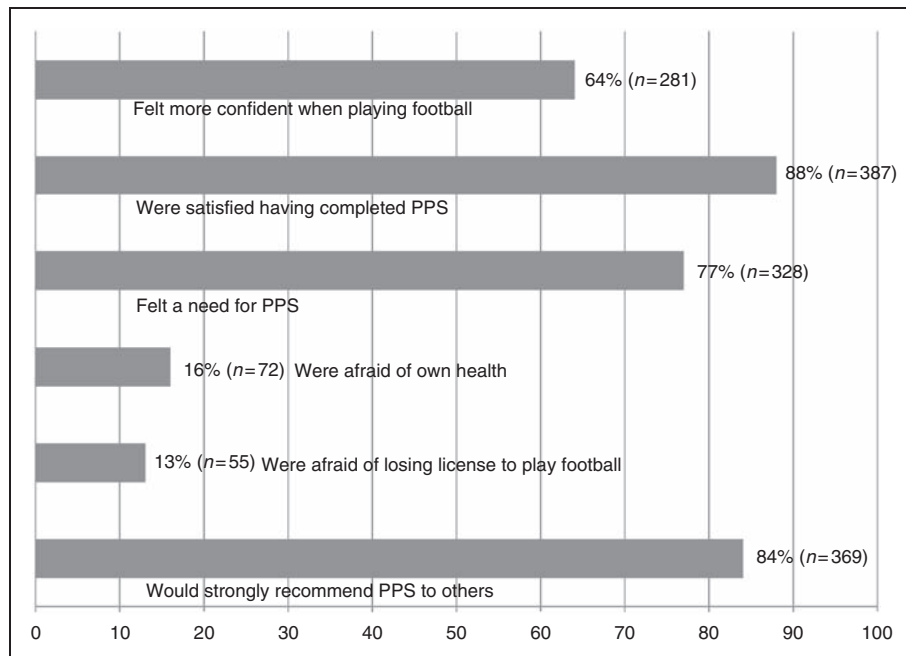
- Very much more positive to practicing sports
 A little more positive to practicing sports
 No affection
 A little less positive to practicing sports
 Much less positive to practicing sport

IES (Impact of Event Scale)

Below you find some sentences which are used by persons who have experienced strain. These sentences describe how they feel after undergoing an event which has had an impact on them. Read each sentence and tick the number 0 to 5 corresponding to how you remember feeling in the period after the heart investigation.

Very Much Quite much Medium Some what A little Never
5 4 3 2 1 0

- 1) I have had periods with strong emotions regarding the heart investigation
- 2) Things I have heard or seen suddenly remind me of the heart investigation
- 3) I have started thinking of the heart investigation when I have not wanted so
- 4) Images of the heart investigation have suddenly appeared in my mind
- 5) Any reminder regarding the heart investigation has evoked feelings in me
- 6) I have had sleeping problems due to thoughts and images from the heart investigation
- 7) I have had bad dreams about the heart investigation

**Figure 1.** Players' evaluations of PPS.

however, may choose a different design to resolve research questions that demand replies from known player identity.

With retrospective surveys, recall bias may be a weakness, but this was not considered a major problem in this study.

Strengths of the study imply a large number of participants enrolled. Focus was on the group of athletes which are most often studied in screening investigations, elite football players, but the sample was limited to professional males. The material was nationwide and unselected. The non-response rate, for both teams and players, was low. The acceptance of screening could be limited of doping, however, and of the player being a starter or a substitute, the latter probably more likely to accept the terms of the team manager.

The questionnaire was self-developed since this was the first study of its kind. The IES, though, is a frequently used and well validated form to detect distress.²⁰ For practical reasons and to preserve adherence rates, only a limited number of items were included in the self-developed questionnaire. They were assessed by a Likert scale, a common method of assessment.

Our study comprised of Norwegian male football players and relates to the surroundings, the information procedures and the safety conditions in this screening. It can only be speculated whether the findings may be generalized to other athletes screened in various circumstances, although we believe findings may be fairly similar providing screening is conducted in a structured manner and within safe frames as experienced by the athletes.

Conclusion

The majority of the players were satisfied having completed the screening, felt more confident and would recommend it to other players. Only a marginal proportion of the players were distressed by the screening, but were at least as likely to recommend it.

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Conflict of interests

None.

References

- Ljungqvist A, Jenoure PJ, Engebretsen L, Alonso JM, Bahr R, Clough AF, et al. The International Olympic Committee (IOC) consensus statement on periodic health evaluation of elite athletes. *Clin J Sport Med* 2009; 19(5): 347–365.
- Corrado D, Basso C, Schiavon M, Pelliccia A and Thiene G. Pre-participation screening of young competitive athletes for prevention of sudden cardiac death. *J Am Coll Cardiol* 2008; 52(24): 1981–1989.
- Corrado D, Basso C, Pavei A, Michieli P, Schiavon M and Thiene G. Trends in sudden cardiovascular death in young competitive athletes after implementation of a pre-participation screening program. *JAMA* 2006; 296: 1593–1601.
- Papadakis M and Sharma S. Electrocardiographic screening in athletes: the time is now for universal screening. *Br J Sports Med* 2009; 43(9): 663–668.
- Corrado D, Pelliccia A, Bjornstad HH, Vanhees L, Biffi A, Borjesson M, et al. Cardiovascular pre-participation screening of young competitive athletes for prevention of sudden death: proposal for a common European protocol. Consensus Statement of the Study Group of Sport Cardiology of the Working Group of Cardiac Rehabilitation and Exercise Physiology and the Working Group of Myocardial and Pericardial Diseases of the European Society of Cardiology. *Eur Heart J* 2005; 26(5): 516–524.
- Bille K, Figueiras D, Schamasch P, Kappenberger L, Brenner JJ, Meijboom FJ, et al. Sudden cardiac death in athletes: the Lausanne Recommendations 1. *Eur J Cardiovasc Prev Rehabil* 2006; 13(6): 859–875.
- Maron BJ, Thompson PD, Ackerman MJ, Balady G, Berger S, Cohen D, et al. Recommendations and considerations related to preparticipation screening for cardiovascular abnormalities in competitive athletes: 2007 update: a scientific statement from the American Heart Association Council on Nutrition, Physical Activity, and Metabolism: endorsed by the American College of Cardiology Foundation. *Circulation* 2007; 115(12): 1643–1455.
- UEFA CLUB LICENSING SYSTEM CLARIFICATION MEMO No. 11. *Section: Sporting Criteria; Criterion: S.03 - Medical Care of Players; Subject: Required Minimum Content of Medical Examination* (2006).
- Dvorak J. A lion never dies: pro memoria of Marc-Vivien Foe. *Br J Sports Med* 2009; 43(9): 628.
- Chandra N, Papadakis M and Sharma S. Preparticipation screening of young competitive athletes for cardiovascular disorders. *Phys Sportsmed* 2010; 38(1): 54–63.
- Papadakis M, Chandra N and Sharma S. Controversies relating to pre-participation cardiovascular screening in young athletes: time for a realistic solution? *Br J Sports Med* 2011; 45(3): 165–166.
- Petticrew MP, Sowden AJ, Lister-Sharp D and Wright K. False-negative results in screening programmes: systematic review of impact and implications. *Health Technol Assess* 2000; 4(5): 1–120.
- Brewer NT, Salz T and Lillie SE. Systematic review: the long-term effects of false-positive mammograms. *Ann Intern Med* 2007; 146(7): 502–510.
- Olsen O and Gotzsche PC. Screening for breast cancer with mammography. *Cochrane Database Syst Rev* 2001; (4): CD001877.
- Ekeberg O, Skjauff H and Karesen R. Screening for breast cancer is associated with a low degree of psychological distress. *Breast* 2001; 10(1): 20–24.

16. Hamilton JG, Lobel M and Moyer A. Emotional distress following genetic testing for hereditary breast and ovarian cancer: a meta-analytic review. *Health Psychol* 2009; 28(4): 510–518.
17. Horowitz M, Wilner N and Alvarez W. Impact of Event Scale: a measure of subjective stress. *Psychosom Med* 1979; 41(3): 209–218.
18. Eid J, Thayer JF and Johnsen BH. Measuring post-traumatic stress: a psychometric evaluation of symptom – and coping questionnaires based on a Norwegian sample. *Scand J Psychol* 1999; 40(2): 101–108.
19. Horowitz M. Impact of Event scale (IES). In: Rush AJ, First MB and Blacker D (eds) *Handbook of psychiatric measures*, 2nd edn. Washington DC: American Psychiatric Association, 2008, p.553.
20. Wohlfarth TD, van den Brink BW, Winkel FW and ter Smitten M. Screening for posttraumatic stress disorder: an evaluation of two self-report scales among crime victims. *Psychol Assess* 2003; 15(1): 101–109.
21. Neal LA, Busuttill W, Rollins J, Herepath R, Strike P and Turnbull G. Convergent validity of measures of post-traumatic stress disorder in a mixed military and civilian population. *J Trauma Stress* 1994; 7(3): 447–455.
22. Rules concerning the medical protection of athletic activity (Gazzetta Ufficiale della Repubblica Italiana). Decree of the Italian Ministry of Health, (1982).