What Benefits Does Team Sport Hold for the Workplace? A Systematic Review

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Abstract

Physical inactivity is proven risk factor for non-communicable disease and all cost-mortality. Worldwide public health policy recommends community settings such as the workplace to promote physical activity. Despite the growing prevalence of workplace team sports, studies have not synthesized their benefits within the workplace.

A systematic review was carried out to identify articles related to workplace team sports including intervention, observational and qualitative studies. Eighteen studies met the inclusion criteria.

The findings suggest team sport holds benefits not only for individual health but also for group cohesion and performance and organisational benefits such as increased work performance. However, it is unclear how sport is most associated with these benefits as most studies included poorly described samples and unclear sporting activities.

Our review highlights the need to explore and empirically understand the benefits of workplace team sport for individual, group and organisational health outcomes. Research must provide detail regarding their respective samples, the sports profile and utilise objective measures (e.g., sickness absence register data, accelerometer data).

Keywords: absence, exercise, physical activity, work performance, well-being, workplace sports

Introduction

Despite the well-documented health benefits associated with being active, many adults in developed countries do not meet the recommended guidelines for physical activity (WHO, 2010). For example, within the UK, recent figures suggest that 33% of men and 37% of women fall below the recommended minimum weekly physical activity guidelines of 150 minutes per week (HSCIC, 2015; DoH, 2011). With strong evidence linking physical inactivity as a risk factor for coronary heart disease, poor mental health, hypertension, type 2 diabetes, obesity and all-cost mortality (DoH, 2011, Hamilton, Healy, Dunstan, Zderic & Owen, 2012), public health policy worldwide has recommended various community settings such as workplaces to encourage employees to participate in regular physical activity (Malik, Blake & Suggs, 2014; Lee, Shiroma, Lobelo, Puska, Blair & Katzmarzyk, 2012).

Encouraging employees to take part in physical activity can have benefits for both the organisation and the individual, as employee ill-health has been associated with sickness absence (ONS, 2014; Black & Frost, 2011; DoWP, 2014). In the UK, a total of 131 million work days were lost due to ill-health in 2014 (ONS, 2014), costing the UK economy £100 billion (DoWP, 2014). There is much evidence to suggest that employees who are physically active both outside of work (Malik, Blake & Suggs, 2014) and during working hours (Brown, Barton, Pretty & Gladwell, 2014) are more likely to have fewer sickness absence days (Amlani & Munir, 2014) and reduced presenteesim at work (Widera, Chang & Chen, 2010). Furthermore, physically active employees are also less likely to report feelings of stress or burnout (Mosadeghrad, Ferlie & Rosenberg, 2011) and more likely to report job-security (Lâszló et al., 2010), enriched workplace performance (Puig-Ribera et al., 2015) and higher job satisfaction (Thøgersen-Ntoumani & Fox, 2005).

Physical activity interventions in the workplace have been shown to benefit employee health and performance, and reduce costs of sickness absence and sickness presenteesim for organisations (Hamilton et al., 2012; Malik, Blake & Suggs, 2014; Black & Frost, 2011; DoWP, 2014; Brown et al., 2014; Amlani & Munir, 2014; Puig-Ribera et al., 2015; Thøgersen-Ntoumani & Fox, 2005; Waddell & Burton, 2006; Pronk & Kotte, 2009; Rongen, Robroek, Van Lenthe & Burdof, 2013). A review clarifying the relationship between physical activity and sickness absence by Amlani and Munir

(2014) found that interventions involving weekly resistance/endurance training have a positive effect in reducing sickness absence (although the studies were considered to have a medium risk of bias). Additionally, a review exploring the influence of workplace interventions on physical activity participation by Malik, Blake and Suggs (2014) found that interventions with 'actual' physical activity promote physical activity behaviours and team-based exercise classes have a greater impact on behaviour than individual counselling sessions. Similarly, a meta-analysis examining the impact of worksite physical activity interventions by Conn et al. (2009) found physical activity programs to have a positive impact on exercise behaviour, lipid profiles, work attendance and job stress. Although these reviews provide good insight into physical activity, they do not explore sport and more specifically team sport within the workplace.

Recent studies reflect the growing popularity of workplace team sports. These include, , but are not limited to; traditional team sports (e.g., soccer, netball, volleyball, rugby), individual team sports (e.g., cycling, running, walking, swimming), indoor team sports (e.g., table tennis, badminton), non-traditional team sports (e.g., activity challenges, climbing, canoeing) where individuals strive for competitive (e.g., winning) or non-competitive outcomes (e.g., skill-development, task-completion) ; (Eichberg, 2009; Carter, Bishop, Middleton & Evans, 2014). Further, in the case of this review team walking and activity challenges were considered as team sports given their inherent competitive nature (e.g., step goals, external rewards), the social interaction present during participation and the organisational processes that underpin these activities (e.g., organising walks, reliance on others to participate).

One explanation for this focus on team sports as opposed to engaging in individual physical activity or exercise programmes is the additional benefits for the employees and for the organisation (Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b). These include improved team commitment and cohesion, enhanced communication and an overall stronger workplace culture as well as enriched employee health and workplace performance (Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b). As evidence from workplace team sports studies are still in their infancy, the purpose of this systematic review is to synthesise the evidence on the benefits of team sports for individual (e.g., fitness and health), group (e.g., teamwork relations) and organisational health (e.g.,

sickness absence). This review therefore includes evidence from observational studies and qualitative studies in order to provide a comprehensive understanding of workplace team sports and their benefits.

Literature Search Strategy and Assessment

Search Strategy

A literature search restricted to research articles published from 2000 to April 2015 was undertaken to identify relevant research related to workplace team sports. To identify the relevant articles, a computerised search was conducted using the following databases; EBSCO, PsycARTICLES, Medline/PubMed, SPORTDiscus, EMBASE, Web of Science and CENTRAL (Cochrane Central Register of Controlled Trials).

The following search terms were used in a series of combinations (work OR workplace OR work site OR organisation OR organization OR corporate OR business OR enterprise OR employee OR worker) AND (group OR team) AND (sport OR physical activity OR exercise OR physical exercise OR fitness OR health promotion) AND (intervention* OR trial*) OR programme OR program OR randomized controlled OR longitudinal OR prospective OR cross-sectional OR survey OR questionnaire OR qualitative OR interview* OR focus group*) AND (benefit OR health OR quality of life OR well-being OR weight OR obesity OR body mass OR diabetes OR blood pressure OR cardiovascular OR cardiorespiratory OR sickness absence OR sick leave OR sick days OR stress OR presenteesim OR satisfaction OR productivity OR performance OR team work OR communication OR team cohesion OR team trust). Additionally, (*) was used to create wildcard searches (e.g., absence, absenteeism) on database searches, and the literature search was expanded by exploring the reference lists of the studies included in the review.

Inclusion and Exclusion Criteria

From the literature on workplace team sports (e.g., Joubert et al., 2011) we have defined ‘team sports’ as ‘*employees participating in any type of workplace physical activity where interaction takes place between employees in a team or group format to reach a competitive or non-competitive*

shared common goal or outcome (e.g., winning, skill-development, task completion)' . Therefore, any physical activity meeting this criterion, with either a competitive (e.g., winning) or non-competitive (e.g., skill-development, task completion) outcome, was classified as a team sport. Examples include, though are not limited too; soccer, netball, volleyball, rugby, cycling, walking, swimming, table tennis, activity challenges, climbing and canoeing. Using this definition, the following inclusion criteria were developed and studies were selected if they: (i) met the definition of 'team sports'; (ii) used team sport as a study variable; (iii) concerned at least one of the following outcomes for the employee (e.g., cardiovascular or cardiorespiratory changes, stress, well-being, quality of life, BMI/weight changes; job satisfaction), for the group (e.g., team commitment; communication; cohesion; trust) and for the organisation (e.g., sickness absence; presenteesim; work performance); and (iv) were conducted with employees in a workplace setting. Only studies published in English were included.

Data Extraction and Quality Assessment

Data extraction. The initial database search returned a total of 56,767 results, which was reduced to a total of 50 articles after duplicates were removed (*n=24,218*) and articles were excluded based on title and abstract (*n=32,555*). Of the 50 relevant articles, 12 abstracts were considered appropriate for further review. Additional manual searches of reference lists yielded a further six studies that were retrieved and evaluated against the inclusion criteria. Of the 56 relevant articles, 38 did not meet the inclusion criteria resulting in a final sample of 18 articles. The research process and search strategy is summarised in Figure 1.

The final sample of selected studies was reviewed by the lead author who extracted the data. Extracted information included; (i) location, year and research design; (ii) research objectives addressed; (iii) demographics of participants/organisation; (iv) type of team sports participated in; (v) methods of data collection and outcome measures; (vi) methods of analysis; and (vii) results/findings of the studies. This information is presented in Tables 1 to 4.

Quality assessment. Each study was categorised by study type as well as examined independently for quality by all authors. First, the studies were categorised into the following study types: randomised controlled trials (RCT's); non-randomised interventions (those with no control or

comparison group); cross-sectional studies and qualitative studies. Second, studies were assessed in terms of quality by examining the sample, study design, methods, assessments and outcomes (or findings for qualitative studies).

Quality assessment of the methodologies used in each study was achieved by using their respective guiding methodological frameworks. RCT's, intervention studies without control groups, prospective cohort studies and cross-sectional studies were assessed in accordance with Cochrane Collaboration guidelines and appraised using the Effective Public Health Practise Project Tool (EPHPPT) (Armijo-Olivo et al., 2012). The EPHPPT, evaluates each studies (1) design; (2) selection bias; (3) blinding; (4) cofounders; (5) data collection methods; and (6) withdrawals/dropouts. Each domain is rated strong (3 points), moderate (2 points) and weak (1 point). Domain scores are averaged and a study quality score of weak (1.00-1.50), moderate (1.51-2.50) or strong (2.51-3.0) is provided (Armijo-Olivo et al., 2012). For qualitative studies, quality was assessed following best practice guidelines by Sparks and Smith (2014) and Garside (2014). Previous research has shown this approach to be a reliable way to assess the quality of qualitative research (Williams, Smith & Papathomas, 2014; Carroll & Booth, 2014).

Findings

A total of 18 studies met the inclusion criteria. Four were categorised as RCT's, three were non-randomised intervention studies with no control group, two were cross-sectional studies and nine were qualitative exploratory studies.

Evidence from Randomised Controlled Trials

Four of the studies were classified as RCT's (Barene et al., 2013, 2014a, 2014b; Roessler & Bredah, 2006). All measured individual outcomes but only one reported group outcomes (Roessler & Bredah, 2006) and organisational outcomes (Barene et al., 2014b). Whilst four published papers were identified, three of the studies (Barene et al., 2013, 2014a, 2014b) report separate findings from the same RCT. Details of these studies are presented in Table 1.

Characteristics of studies: The study participants were drawn from a variety of industries, and sample sizes ranged from 30 to 118 participants. All of the studies reported a largely female sample (>70%) with an average participant age of 44.5 years.

Type of interventions: Three of the papers (Barene et al., 2013, 2014a, 2014b) were part of the same 40-week intervention within a Norwegian hospital concerning out-of-work (lunch/post-work) soccer. The studies report findings at the 12-week point (Barene et al., 2013) and post intervention (Barene et al., 2014a, 2014b). The group were supervised up to week 12 and then group-lead sessions commenced. These studies (Barene et al., 2013, 2014a, 2014b) also reported findings from a Zumba group but this activity falls outside the definition of team sport and therefore the results are not included here. Another intervention (Roessler & Bredah, 2006) was undertaken over a six-week period, and focused on participation in team-based physical activities.

Evidence of individual outcomes: At the 12-week mark of the soccer intervention, Barene et al. (2013) found significant improvements in VO^2 peak, average exercise heart rate, blood plasma levels and bone mineral content and significantly reduced total body fat mass and percentage. In the same intervention after 40 weeks, Barene et al. (2014a) found further improvements in VO^2 Max and blood plasma levels and significant reductions in total body fat mass/percentage and lower limb mass/percentage. Moreover, Barene et al. (2014b) found significantly decreased neck-shoulder muscle pain and no significant changes in lower back pain or perceived exertion. Furthermore, these studies (Barene et al., 2013, 2014a, 2014b) found facilities close to an employee's workplace improved participation. Finally, Roessler and Bredah (2006) found a range of team-sport activities improved cardiorespiratory fitness, health behaviours and well-being.

Evidence of organisational outcomes: Barene et al. (2014b) measured work-ability; however no significant changes were observed in the soccer group either at the 12- or 40-week point of the intervention.

Quality assessment: All four studies used objective measures of health, such as measures of cardio-respiratory fitness (Roessler & Bredah, 2006) and VO^2 Max (Barene et al., 2013, 2014a, 2014b). With regard to selection bias, all studies were considered as strong, as all participants were randomly selected from the respective target population. In terms of attrition three studies were

classified as strong with 76% participation (Barene et al., 2013, 2014a, 2014b) and one study (Roessler & Bredah, 2006) as weak (i.e., no attrition data reported). In addition, all studies described their blinding process for randomisation. Of these studies, three (Barene et al., 2013, 2014a, 2014b) were rated as strong in blinding participants to the intervention; the remaining intervention was deemed as having moderate quality for blinding as although the process was independently randomised, either the researcher or participant was aware of whether they were in the intervention or control group. In terms of confounders, three studies (Barene et al., 2013, 2014a, 2014b) were strong, controlling for >80% of confounders, while one study (Roessler & Bredah, 2006) was rated as moderate due to matching participants on sex, age and physical activity.

Evidence from Non-Randomised Intervention Studies (No Control Group)

Three studies were identified as non-randomised intervention studies with no control groups (Thøgersen-Ntoumani et al., 2014; Soroush et al., 2013; Scherrer et al., 2013). Two measured individual outcomes (Thøgersen-Ntoumani et al., 2014; Soroush et al., 2013) whereas the other (Scherrer et al., 2013) measured individual and group outcomes. Details of these studies can be found in table 2.

Characteristics of study: Two studies were undertaken within educational establishments (Thøgersen-Ntoumani et al., 2014; Soroush et al., 2013) and in the other; the workplace was not defined (Scherrer et al., 2013). The sample sizes ranged from 56 to 2118 with a good gender balance and an average age of 41 years being reported.

Type of interventions: One study (Thøgersen-Ntoumani et al., 2014) concerned supervisor-led team walking over a 16-week period. This was classified as a team sport due to the majority of the walks being team lead and the organisational processes that underpin the participation in this activity (i.e., contacting peers, arranging walks, participating as a group). A further study (Soroush et al., 2013) was a self-selected team based walking program which lasted 6-months with a 12-week follow up period. Participants within teams were aiming to achieve 10000 steps per day and the team with the most steps over the intervention period was awarded a prize thereby making the intervention competitive between peers. The final intervention (Scherrer et al., 2013) also involved a competitive

walking intervention and the participants kept pre, mid and post intervention diaries on a range of topics.

Evidence of individual outcomes: Thøgersen-Ntoumani et al. (2014) found an increase in perceptions of health, subjective vitality and a decrease in fatigue at work. These changes were sustained four months after the end of the intervention. No changes were identified for enthusiasm, nervousness and relaxation at work. Soroush et al. (2013) found that team walking significantly decreased blood pressure and improved estimated cardio-respiratory fitness, therefore positively impacting upon individual cardiovascular fitness. In the final study, Scherrer et al. (2010) reported employees perceiving increases in physical activity participation, health and well-being.

Evidence of group outcomes: Only one study reported group outcomes (Scherrer et al., 2010) whereby employees reported improved social interactions in the workplace.

Evidence of organisational outcomes: Thøgersen-Ntoumani et al. (2014) found significant increases in work performance during the intervention period among participants involved in team walking.

Quality assessment. Two studies were considered to be of moderate quality (Thøgersen-Ntoumani et al., 2014; Soroush et al., 2013). These two studies reported baseline and follow up data and used objective measures and questionnaires to assess outcomes. The study by Scherrer et al. (2010) did not use objective measures but did report participation rate.

Evidence from Cross Sectional Studies

Two studies were classified as cross-sectional (Davey et al., 2009; Hartenian, 2003). Both studies used self-report data collected via a questionnaire. One study (Davey et al., 2009) reports individual and group outcomes and the other reports group outcomes only (Hartenian, 2003). None measured organisational outcomes. Further details of these studies are presented in table 3.

Characteristics of studies. The sample sizes ranged from 59 to 123, with limited detailed demographic data being reported. One study (Davey et al., 2009) reported a high percentage of female participants (>75%), while the other (Hartenian, 2003) provided no individual (i.e., age, gender, dependents) or organisational (i.e., industries, job role) demographics.

Evidence of individual outcomes. Davey et al. (2009) found motivation to participate in the 'step it up' program was for fitness and health benefits associated with physical activity. In addition, participants were motivated by intrinsic enjoyment.

Evidence of group outcomes. One study, (Davey et al., 2009) found a positive association between the competitive nature of the 'step it up' programme and social interaction and work-related teamwork and support within the organisation. Hartenian (2003) found no correlations between participation in workplace team sports and workplace team skills.

Quality appraisal. All of the studies used self-report data from validated measures and all briefly described their respective samples and were deemed to have low levels of selection bias. Furthermore, all of the studies were judged to have a moderate rate of survey returns, and with regard to confounders, all studies were rated as strong, as all potential confounders were controlled for.

Evidence from Qualitative Studies

Nine studies (Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b; Verdonk, Seesing & Rijk, 2010; Pichot, Pierre & Burlot, 2009) were qualitative in nature using semi-structured individual interviews and/or focus groups. Seven studies (Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b) report different findings from a large research programme conducted across financial institutions in South Africa. In summary, this research programme used a range of qualitative methods to identify participant experiences of participating in team-based sports and their associated benefits. The remaining two qualitative papers (Verdonk, Seesing & Rijk, 2010; Pichot, Pierre & Burlot, 2009) assessed individual and group benefits of participating in team sports.

Characteristics of the studies. The sample sizes ranged from 13 to 63 employees, and all represented white-collar roles in the financial or corporate industries. The participants' ages ranged from 20-45 years.

Perceptions / experiences of individual benefits. In interviews with employees, Joubert et al. (2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b) found participants reported experiencing improvements in their health and well-being as a result of taking part in workplace team sports. The specific types of health benefits were not defined. The studies, further found participants reported

reduced stress and tension as a result of participation in inter-office soccer, volleyball, netball and cricket.

In support, Verdonk, Seesing and Rijk (2010) and Pichot, Pierre and Burlot (2009) also found participants reported improved health and well-being as a result of taking part in team sports. Moreover, these researchers found the competitive nature of workplace team sport to increase feelings of personal competence and achievement (Verdonk, Seesing & Rijk, 2010; Pichot, Pierre & Burlot, 2009).

Perceptions / experiences of group benefits. Of the nine studies, only one did not report perceptions of group benefits (Verdonk, Seesing & Rijk, 2010). Overall, the studies by Joubert and colleagues found participants reported workplace team sport helped to remove hierarchical barriers within the workforce which resulted in improved team work and values, team trust, communication and knowledge of peers and level of approachability between peers. Furthermore, participants felt that team sports were a positive influence on awareness of diversity in the workplace. Pichot et al. (2009) also found employees who participated in team sports reported improved workplace communication, knowledge of peers, group cohesion and the removal of hierarchical barriers.

Perceptions / experiences of organisational benefits. The studies by Joubert et al. (2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b) found employees had a positive attitude towards their organisation and reported feeling valued by the organisation. They also found participants reported being more motivated to perform at work. Pichot et al. (2009) also found in their study that participants felt highly stimulated and motivated to perform at work.

Quality appraisal. With regard to the trustworthiness (i.e., validity), six of the studies (Joubert et al., 2010a, 2011, 2013, 2014b; Verdonk, Seesing & Rijk, 2010; Pichot, Pierre & Burlot, 2009) described their respective methods of data collection, the role of the researcher and analysis to a strong degree. However, one study described this process to a moderate degree (Joubert & De Beer, 2012) and two studies (Joubert et al., 2014a, 2010b) provided a weak level of information regarding their respective methods and data collection/analysis. Though describing their homogenous sample to an acceptable degree, it should be acknowledged that the studies from the South African research

project (i.e., Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b) did not describe whether each sample was unique or a level participant overlap existed.

Discussion

The aim of this article was to review the literature on workplace team sports and to synthesise the evidence on the benefits of team sports for individual (e.g., fitness and health), group (e.g., teamwork relations) and organisational health (e.g., sickness absence). Overall, evidence suggests workplace team sport is effective in improving individual, group and organisational health outcomes.

Evidence from RCT studies suggest that participation in workplace team sports can lead to significant improvements in an individual's cardio-respiratory fitness, health outcomes, health behaviours and well-being (Barene et al., 2013, 2014a, 2014b), which research has suggested impacts upon organisational health (Conn et al., 2009). None of the RCT studies that were reviewed assessed organisational benefits. Evidence from non-RCT interventions (no control group) found that participation in team sports led to an increase in subjective perceptions of health, subjective vitality and decreased fatigue at work. There was also evidence to suggest that team walking significantly decreased blood pressure and improved estimated cardio-respiratory fitness in physical activity, health and well-being (Thøgersen-Ntoumani et al., 2014; Soroush et al., 2013; Scherrer et al., 2010). Only Scherrer and colleagues (2010) measured group outcomes whereby employees reported improved social interactions in the workplace. Another study (Thøgersen-Ntoumani et al., 2014) included an organisational outcome and found significant improvements in work performance during the intervention period among participants involved in team walking.

Overall, these intervention studies (RCT and non-RCT) suggest that team sport interventions can be beneficial for both individual health and group outcomes. However, as three of these studies were non-RCT interventions, therefore limited in their ability to exert cause and effect, and three studies were from the same RCT intervention (e.g., Barene et al., 2013, 2014a, 2014b), albeit with a low risk of bias, further research is required to provide additional scientific evidence on the effectiveness of team sports for both employees and the organisation. Moreover, the results reported

in this review were based on samples with a high percentage of female participants (>70%) and therefore a wider spread of gender is also required in future studies.

Two studies reporting cross sectional data were based on identifying outcomes and participation in workplace team sports. Both of these studies were not designed as research intervention studies. Davey and colleagues (2009) identified motivating factors for taking part; these were solely for individual health benefits and intrinsic enjoyment. In contrast, Hartenian (2003) found no relationship between participating in team sports and any health outcomes. Despite these studies being limited in the cause and effect they can exert, and shortcomings of their methodology (e.g., limited participant information), they do however identify positive relationships worthy of further investigation. For example, future research should seek to empirically examine the impact workplace team sport holds on group outcomes such as social interactions, support and teamwork.

Evidence from qualitative exploratory studies (Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b; Pichot, Pierre & Burlot, 2009; Verdonk, Seesing & Rijk, 2010) found participation in workplace soccer, netball, cricket and volleyball led to perceptions of improvements in physical and psychological health, positive feelings towards the organisation and improved team work, team values, communication and knowledge of peers. Though some studies (Joubert et al., 2010a, 2011, 2013, 2014b; Verdonk, Seesing & Rijk, 2010; Pichot, Pierre & Burlot, 2009) contained the qualities of high standard qualitative research (i.e., trustworthiness, reflexivity and credibility), three studies (Joubert et al., 2010b, 2012, 2014a) presented limited detail regarding the methodological approach, role of the researcher, sample and participants' voice within the results. Moreover, data (e.g., narrative) was often reported quantitatively, rather than through a participant's rich account of their experience of workplace team sports. However, when presented, this data (Joubert et al., 2010a, 2011, 2013, 2014b) was contextually rich in nature, though in all cases the studies homogenous sample (e.g., corporations and financial institutions in RSA) should be considered when generalising findings. Future research should provide clarity by exploring similar questions across a heterogeneous sample in order to provide reflexive and trustworthy information relevant to exploring workplace team sport and informing a standardised measure and experimental research.

The benefits of workplace team sport. The evidence reviewed suggests participation in workplace team sport leads to improvements in individual, group and organisational outcomes. For example, a number of studies report previously well established (e.g., Malik et al., 2014) health outcomes such as improvements in cardio-respiratory fitness and well-being (Barene et al., 2013, 2014a, 2014b; Roessler & Bredah, 2006). Moreover, benefits for group and organisational outcomes include job performance, team trust, team performance and lower sickness absence (Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b; Verdonk, Seesing & Rijk, 2010; Pichot, Pierre & Burlot, 2009; Barene et al., 2013, 2014a, 2014b; Roessler & Bredah, 2006). Similar findings were found in reviews by Amlani and Munir (2014), Faragher et al. (2005), and Voit et al. (2001), who report that physical activity levels and improved individual health outcomes are associated with lower sickness absence and higher job satisfaction and job performance. In our review, studies did not objectively measure sickness absence and many studies did not use validated scales to assess group outcomes or organisational outcomes such as work performance, team performance and job satisfaction. Future studies should use objective measures of sickness absence such as organisational data and validated scales for assessing group outcomes so that the contribution that workplace team sports makes to these factors can be better understood; particularly when using longitudinal study designs or implementing RCTs.

Type of workplace team sport. A small number of team sports were identified across the studies implemented either by the researchers (i.e., intervention studies) or by the organisation (i.e., in the cross-sectional and qualitative studies). The most frequently used team sport was team walking followed by football and running. These were introduced on an either competitive or non-competitive basis and although the competitive traditional team sports (e.g., soccer, running) clearly met our definition of team sports (see above) as they had a clear common shared goal (i.e., winning), the exact nature of the shared goals for non-competitive sports were not always presented clearly. Furthermore, few studies outlined the duration of the workplace initiative, frequency and length of play and the level the team sport was implemented (e.g., novice, intensity). These shortcomings need to be addressed and reported clearly in future studies.

Consistent with previous research (e.g., Brown et al., 2014; Pretty, Peacock, Sellens &

Griffin, 2005), team sports delivered within a natural environment such as team walking (Thøgersen-Ntoumani et al., 2014) were found to be effective in improving psychological well-being. Also consistent with previous research (e.g., Poland, Krupa & McCall, 2009; Williams & Snow, 2012), activities that are provided close to an employee's organisation act as an enabler to participation and long-term adherence (Barene et al., 2013, 2014a, 2014b). Future research should consider these factors during the design of intervention studies and the implementation of health promotion programmes.

Strengths and limitations of the review. A major strength of our review is the broad inclusion and exclusion criteria used, therefore comprehensively synthesising literature and categorising studies into intervention (e.g., RCT/ non-RCT), observational and qualitative designs. However, the interventions were categorised into groups based on our understanding of their intervention and their content and therefore open to interpretation. Another key strength of our review is the direct examination of team sports against the outcomes of interest. We did not include multicomponent health promotion studies where team sports may have been one component as it would make it difficult to draw conclusions about the direct effects of workplace team sports on individual group and organisational outcomes. However, when generalising our findings the weight placed upon the three studies (Barene et al., 2013, 2014a, 2014b) from same RCT and results of the large South African research project (Joubert et al., 2010a, 2010b, 2011, 2012, 2013, 2014a, 2014b) must be considered as potential risk of bias. Despite the methodological shortcomings of the studies reviewed and a limited evidence base, our findings add to literature, and suggest that; the available evidence provides good support that team sports are effective in improving individual health and moderate support (due to measurement issues) that team sports may be effective in improving a number of group and organisational outcomes.

Conclusion

To our knowledge, this is the first review to comprehensively synthesise and discuss the effectiveness of workplace team sport across individual, organisational and group health outcomes. A

limited evidence base of intervention and non-intervention studies reveal that a range of team sports are effective in influencing individual, group and organisational outcomes. However, although studies were of a high quality design, they need to include details of team sports and include objective measures of sickness absence and validated scales of work and group outcomes. Moreover, standardised ways of defining and reporting on workplace team sports must be adopted so that studies can be compared more easily and include core measures of group and organisational outcomes. Our review adds to the literature base and suggests workplace team sport as an alternative to leisure time physical activity to improve physiological (e.g., VO^2 peak, exercise heart rate, body composition) and psychological (e.g., mental well-being) health outcomes. Improvements in individual health outcomes can impact societal challenges and reduce the risk of non-communicable disease and all-cost morality. Further, workplace team sports should be considered by organisations due to the organisational benefits, such as reduced sickness costs and increased work performance and team cohesion among those participating.

Contributions and Conflicts of Interest

AB searched for and extracted the studies data, and all authors appraised the studies for quality and contributed toward the writing of this review. There are no conflicts of interest. This activity was conducted under the auspices of the National Centre for Sport and Exercise Medicine (NCSEM) England, a collaboration between several universities, NHS trusts and sporting and public bodies. The views expressed are those of the authors and not necessarily those of NCSEM England or the partners involved.

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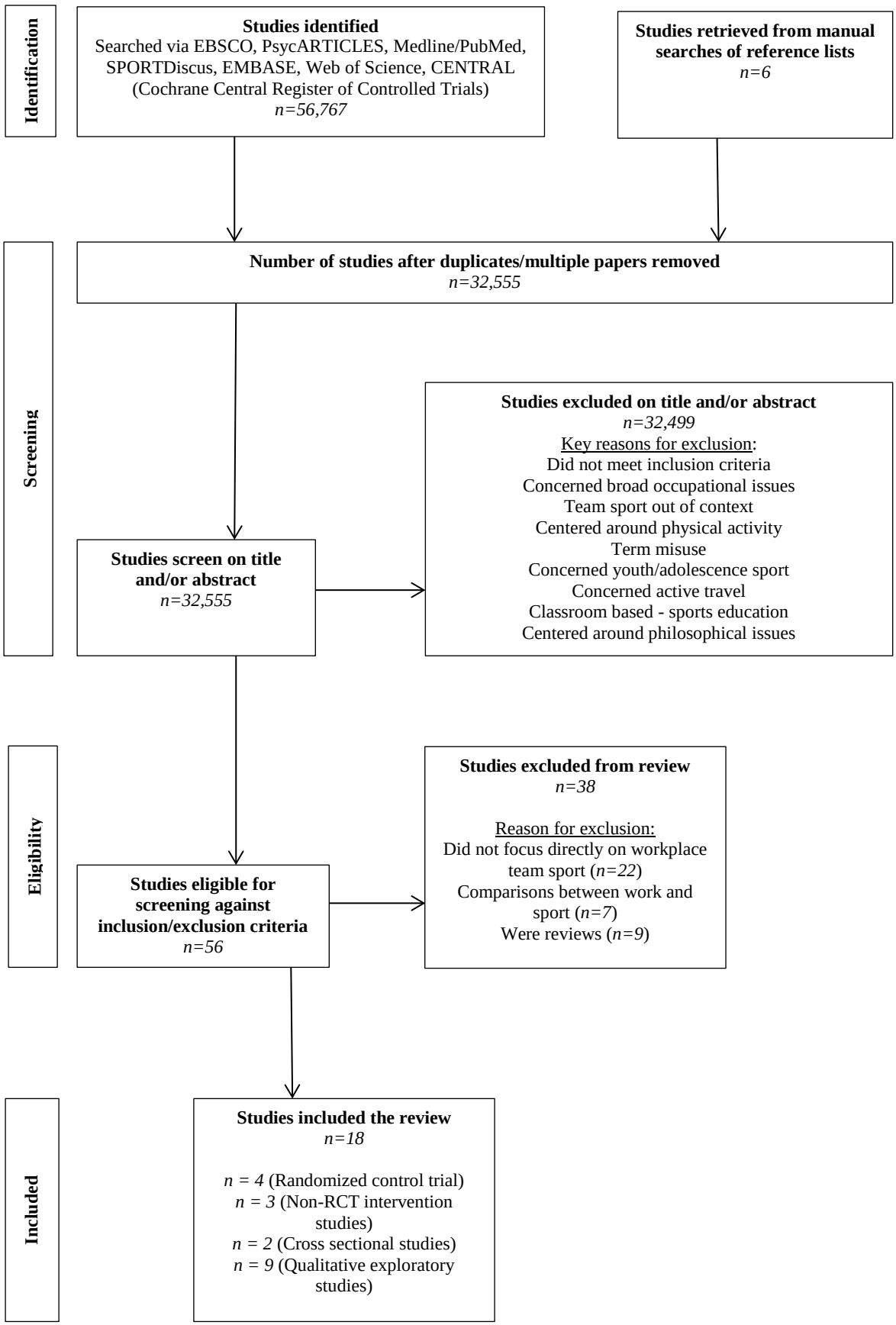

Figure 1. Flowchart showing identification and selection of publications

Table 1. Randomized control trials and interventions.

Study and Quality Appraisal	Location and Design	Intervention Description	Workplace Setting	Participant Demographics	Outcome Measures	Method of Analysis	Results
Barene et al.[2013, 2014a, 2014b] (Strong)	Norway; Intervention vs. control group (40-week)	Indoor soccer (indoor) intramural standard, lasting 1 hour twice a week, outside of working hours.	Hospital	118 (107 females/11 males), age: 45.3, average weight: 70.6kg, BMI: 25.3, Physical fitness not discussed, largely nurses, assistants, physiotherapists, occupational therapists and managers.	Objective measures of blood pressure, cardiorespiratory fitness, blood sampling, heart rate, body fat, self-report measures on perceived exertion and participation.	Repeated measures ANOVCA	Individual outcomes: Significant improvements demonstrated in intervention group compared to control group in cardiorespiratory fitness, heart rate, blood plasma levels, lower limb mass, total body fat and lower limb fat percentage and neck-shoulder muscle pain. Other findings:

							Facilities close to worksite enabled participation.
Roessler & Bredah [2006] (Moderate)	Denmark, Intervention vs. control	Non-competitive physical activity and competitive inter-employee mixed sport (played for 6-weeks for 1 hour sessions during working hours)	Factory	30 employees (24 women), Intervention group mean age 43, control group mean age 39. Job roles or further demographics not provided	Cardiorespiratory fitness (objective measure) Qualitative interviews to explore impact of intervention on work relations	T-tests; narrative analysis	Individual outcomes: An improvement in cardiorespiratory fitness and in positive attitude to physical activity and a reduction in pain observed in the intervention group compared to control group. Participation in team sports further improved the above outcomes compared to non-team-based

			physical activity.
			Qualitative interviews with participants found perceptions of closer working relation in the workplace as a result of team sports.

Key: *BMI*= body mass index

Table 2. Non-RCT intervention studies (no control group).

Study and Quality Appraisal	Location and Design	Intervention Description	Workplace Setting	Participant Demographics	Outcome Measures	Method of Analysis	Results
Thøgersen-Ntoumani et al.[2014] (Moderate)	UK, RCT (immediate treatment vs. delayed treatment) – 16-week intervention.	Three workplace walking groups, non-competitive, (1st ten weeks group led, 2 self-lead, 2nd six weeks all self-lead)	University	75 (92% female) employees, mean age 47.68, who were physically inactive (i.e., under 150mins exercise pw) non-academic employees in desk based roles (e.g., support staff).	Self-report (questionnaire) health, vitality, work performance.	Multilevel modelling	Individual outcomes: Increased perceptions of health, subjective vitality, and decreases in fatigue at work. Changes were sustained four months after the end of the intervention. No changes were identified for enthusiasm, nervousness and relaxation at work. No group benefits reported. Organisational outcomes: Improved self-report work performance.

Soroush et al.[2013] (Moderate)	Sweden and USA, pre and post intervention comparison	Team based walking intervention, with step distance competition (over 10000 pd)	Two universities	2118 employees (80% female); mean age 42.4, and 355 graduate-students selected for fitness testing.	Pedometer, anthropometric measures (e.g., height, weight), resting BP, cardiorespiratory fitness, physical activity questionnaire	Repeated measures ANOVA	Individual outcomes: Steps/day averaged 12,256 (SD=3,180) during first month and gradually decreased to month 6**.** Significant improvements were observed in blood pressure and cardiorespiratory fitness. Group and organisational outcomes not assessed
Scherrer et al.[2010] (Weak)	Australia, Pre, mid and post intervention diary study only	Global Corporate Challenge workplace walking competition to achieve 10000 daily steps, competition for greatest number of steps achieved	One company (not described)	56 participants. No demographic data provided	Self-report diary study	Content analysis	Individual health: employees perceived an increase in physical activity, health and well-being. Group benefits: employees reported improved social interactions in the workplace. Organisational outcomes: not assessed

Key: BMI= body mass index, BP = Blood pressure

Table 3. Cross sectional studies.

Study and Quality Appraisal	Location and Design	Study Description	Workplace Setting	Participant Demographics	Data Collection Measures	Method of Analysis	Results
Davey et al.[2009] (Moderate)	New Zealand, Cross sectional	Evaluation of Step It Up Challenge (SIUC)	University	123 employees who participated in the 2007 SIUC, 75% female, large percentage under 45 years of age	Online Survey (motivation to participate, importance of SIUC, physical activity levels)	Factor, cluster and multiple regression analysis	Group outcomes: Team support, teamwork, social gains and competition improved Individual outcomes: fitness, health, well-being, enjoyment, maintenance, participation improved Organisational outcomes not measured
Hartenian [2003] (Moderate)	Unknown, Cross Sectional	Exploring team members acquisition of team knowledge, skills and abilities	One company (not described)	59 took part, no further demographics provided	Questionnaire - communication, conflict resolution, goal setting, team skills, planning, training, experience and participation in team sports	Multiple regression	Group outcomes: No correlation was found between playing team sports and the possession of team skills. Individual and organisational outcomes not measured

Table 4. Qualitative studies.

Study and Quality Appraisal	Location and Design	Study Description	Workplace Setting	Participant Demographics	Data Collection Methods	Method of Analysis	Results
Joubert et al.[2010a, 2011, 2013, 2014b] (strong) Joubert et al.[2012] (moderate) Joubert et al.[2010b, 2014a] (weak)	South Africa, Qualitative exploratory design	Exploring employee's experiences of workplace team sport. Designing an organisational team sport measure	Financial Corporation	72 employees. 11 to 49 males, 23 females from 9 financial corporations Largely Afrikaans speaking, broad range of job roles and departments.	Semi-structured focus groups and individual interviews	Content/ Thematic analysis/Factor analysis	Individual outcomes: health improved. Group outcomes: Improved; peer knowledge, communication, relationships, trust, respect, goal sharing/striving, commitment, supporting others, shared knowledge. Hierarchical barriers removed Organisational outcomes: Improved; service, feeling of value, work performance Other findings: Successful Implementation; top-tier management involvement, funding important

Verdonk, Seesing & Rijk [2010] (strong)	Netherlands, Qualitative exploratory design	Exploring health beliefs and workplace physical activities	Business from a range of sectors. No specifics given	13 male, mean age 39.	Semi-structured individual interviews	Thematic analysis	Individual outcomes: Allows high achievement, displays of competence, and a chance to compete. Enjoyment, while improving health and well-being Other findings: two main themes: ideal man is a winner & not a whiner
Pichot, Pierre & Burlot [2009] (strong)	France, Qualitative exploratory design (individual interviews and ethnography)	How are management practices in companies effected through sport	Manufacturing and financial corporations	14 'decision makers' - HR directors, executives, CEO's. No further demographics given	Individual interviews and ethnography	Thematic analysis	Group outcomes: Improved; communication, relationships, peer knowledge, cohesion. Hierarchical barriers removed. Individual outcomes: Stress relief, motivation improved Organisational outcomes: stimulation at work and performance Other findings: Watching sport a positive - sharing a good time, improves relationships, sense of belonging