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[Intervention Protocol]

Interventions implemented through sporting organisations for promoting healthy behaviour or improving health outcomes

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ABSTRACT

This is the protocol for a review and there is no abstract. The objectives are as follows:

Primary objective

- To determine the effectiveness of interventions implemented through sporting organisations to promote physical activity, healthy diet, reductions in alcohol consumption or tobacco use.

The primary objective focuses on four health behaviours among the most relevant for morbidity and mortality worldwide (WHO 2009).

Secondary objectives

- To determine the effectiveness of interventions in the setting of sporting organisations, or using a sporting organisation as a means of access to promote other healthy behaviours, health knowledge, or health outcomes.
- To determine whether effects are different based on the characteristics of the interventions including target population, geographical location, type of sports, type, duration, context and implementation of intervention, and timing of outcome measurement.
- To assess adverse events or unintended effects related to included interventions.

BACKGROUND

Description of the condition

Chronic diseases, such as cardiovascular diseases or malignancies, are responsible for about two-thirds of mortality worldwide, with the majority of deaths occurring in low- and middle-income countries, where deaths due to chronic diseases are expected to increase because of population growth, improved longevity and urbanisation (WHO 2014). In addition, chronic diseases are an important cause of poor health and disability, with diabetes and chronic obstructive pulmonary disease being among the ten leading causes of disability (Global Burden of Disease Study 2015). Besides, there is an important economic burden associated with chronic diseases, and related costs are expected to rise (Bloom 2011).

There is an important need to prevent, or at least delay, the development of chronic diseases, many of which are influenced by modifiable risk factors. These risk factors can be the target of health promotion interventions. Important behavioural risk factors associated with chronic diseases are physical inactivity, tobacco use, alcohol consumption, and unhealthy diet (WHO 2009). Physical inactivity is a major risk factor for cardiovascular disease and some cancers. It is estimated that almost one-third of the global population does not meet the minimum amount of recommended physical activity (Kohl 2012). Tobacco use is a well-established risk factor for lung diseases, and also a leading risk factor for death in high-income countries (WHO 2009). Although the prevalence of tobacco use has been decreasing in high-income countries, it is increasing in low- and middle-income countries. Consequently, the global burden of disease from tobacco use is likely to increase further (Lee 2014). Nearly 6% of all deaths worldwide are caused by alcohol consumption which varies widely across countries and population groups due to differences in culture or sociodemographic determinants (WHO 2015). Finally, unhealthy diets increase the risk of metabolic syndrome and associated health conditions, such as cardiovascular diseases or diabetes (Kastorini 2011). Often, individuals have more than one of these behavioural risk factors. For example, smokers are more likely to consume alcohol than non-smokers and physically inactive individuals often consume less fruits and vegetables than those who are active (Del Duca 2012; Koopmans 1997). Each additional risk factor may increase the risk of death, especially due to cardiovascular diseases (Khaw 2008). Conversely, a particular type of healthy behaviour may be associated with additional healthy behaviour of another type, and thus further favour good health. For example, physically active individuals are less likely to smoke or use illicit drugs (Pate 2000).

Description of the intervention

This systematic review will focus on interventions promoting one or several healthy behaviours, in particular, those addressing physical inactivity, unhealthy diet, tobacco use, or alcohol consumption.

Since the mid-1980s, the environment and societal context have become increasingly important in health-promoting activities (Dooris 2005). In 1986, the Ottawa Charter stated that “health is created and lived by people within the settings of their everyday life; where they learn, work, play and love”. This emphasised the importance of the so-called “settings approach” in health promotion (Geidne 2013; Nutbeam 1998). In this model, the focus is on a setting’s potential to promote health in everyday life. A healthy setting is seen as part of a dynamic system that belongs to, and is influenced by, other settings. In this review, we aim to evaluate interventions that are conducted in the setting of sporting organisations. These may be very diverse and range from very small units (such as sports clubs in a community) to larger organisations that span over many communities or countries, such as national or international sport associations. The review will comprise interventions in both professional and amateur sporting organisations with a non-profit or for-profit character. They have in common, the provision of opportunities for competition and sports practice, while some can also be considered social organisations, promoting social welfare and health (Donaldson 2012).

The intervention which is initiated by or occurs within a sporting organisation may consist of any programme, activity or policy that aims to promote healthy behaviour, or improve health outcomes. It may also use the image of a sporting organisation (or of one of its members) to convey a health message. Interventions may include the implementation of policies or initiatives to promote responsible consumption of alcohol during sports events. It may also consist of an intervention to increase the awareness of coaches on fair-play issues or educational sessions for promoting a healthy diet among members of a sporting organisation.

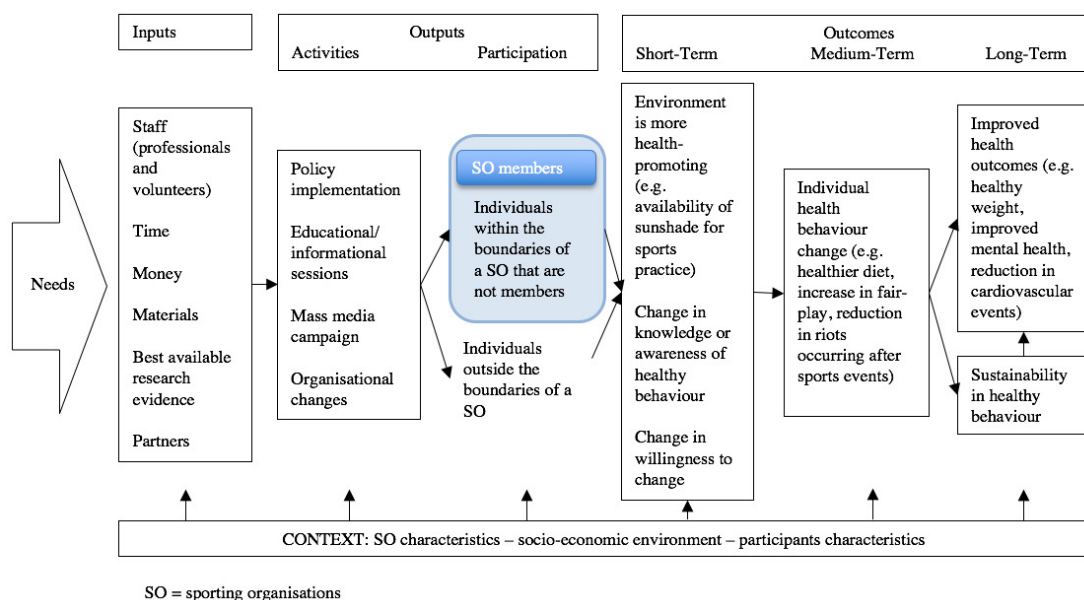
The included interventions target individuals that come in contact with sporting organisations in different ways, e.g. their active or passive members, but also their staff (e.g. coaches) or their supporters (Guagliano 2014; Kokko 2011; Wanner 2011). Further, the intervention may use the resources of the setting, in which case it is mainly used as a means to reach a specific target group. For example, this may be the case if the celebrity of a sports club or an individual athlete is used as a role model to promote healthy behaviour (Dvorak 2012; Irwin 2010). The intervention could further consist of delivering information during sports events to make people aware of a particular health issue or a healthy behaviour (Rosenberg 2014). Similarly, commercial companies make use of sports settings to reach consumers and successfully promote products such as food and beverages when they sponsor national or regional sporting organisations (Carter 2012). Furthermore, the included intervention may also target the setting itself, for example, a smoking ban in sports stadia.

How the intervention might work

Sporting organisations are a setting that interacts with other settings, such as residential communities and the natural environment. Interventions delivered in sporting organisations consequently influence health at different levels by affecting individuals, families or communities. They allow for interactions to occur between individuals, groups and settings (Figure 1). A socioecological approach of health promotion highlights the assets of an intervention within a sporting organisation. Healthy behaviour of individuals is influenced by intra- and interpersonal factors, as

well as systems (e.g. organisational settings, communities, environment, policies) which interact with each other (McLeroy 1988). In sporting organisations, there is infrastructure available to practice sports, and their primary aim is the promotion of a sports activity, which is itself a healthy behaviour. However, it should be noted that participation in sports has also been associated with unhealthy behaviour, such as a higher risk of hazardous alcohol consumption (Lisha 2010; O'Brien 2007; Wichström 2009). Further, sporting games are settings in which heavy drinking is common among people attending these events, for example, as supporters (Merlo 2011).

Figure 1. Logic model: interventions implemented through sporting organisations for promoting healthy behaviour



Besides providing these interactions on different levels, many sporting organisations allow access to a larger part of the population. In many countries, practicing sports within a sporting organisation has a long tradition, and is a popular leisure activity. A survey of the Fédération Internationale de Football Association (FIFA) from 2006 reported that 270 million people or 4% of the world's population was playing soccer under the umbrella of an association (Kunz 2007). In a population survey conducted in Australia, 27.2% of the participants were actively involved in organised sports (ABS 2012). Similar participation rates in sports clubs have been described among the English (22%) and Swiss population (25%) (Lamprecht 2014; Sport England 2014). These

numbers show that an estimated one in four individuals is actively involved in a sporting organisation. The number of individuals passively involved in sports is likely to be higher. The proportion of children that can be reached in the setting of a sporting organisation seems to be even higher. In Australia, 63% of children were found to participate in at least one organised sport (ABS 2009). Globally, sports organisations have a potential for health promotion, though this may not always be in a comprehensive way (Kokko 2009). Limited resources from an umbrella organisation can limit the development and the implementation of healthy policies. On the other hand, good support through health agen-

cies may promote their implementation (Dobbinson 2006; Kelly 2010a). Across ten European countries, the implementation of healthy policies in sports stadia was found to be relatively low. This was explained by the conflicting interests of sponsors and health promotion activities (Drygas 2013). Furthermore, while policies were found to frequently focus on anti-discrimination or fair-play, topics such as the promotion of healthy food or beverages seem to be underrepresented (Kelly 2010b).

Why it is important to do this review

In many countries, sporting organisations are considered a setting that is suitable to promote health and reduce the burden of chronic diseases in the population. Consequently, government agencies and other bodies are investing in sporting organisations, while assuming that this enhances health promotion and ultimately improves population health (Sport England 2015; VicHealth 2015). However, there is currently no clear evidence on the effects of interventions implemented within sporting organisations to promote healthy behaviour and improve health outcomes.

In 2008, two Cochrane systematic reviews assessed the then available evidence on the effects of interventions implemented through sporting organisations on participation in sports (Priest 2008a), and healthy behaviour change (Priest 2008b). In either review, no controlled studies could be identified despite comprehensive searches. By way of updating these reviews to explore if new evidence has emerged, we consulted with the original authors and agreed to cover the two related topics in the one review. This recognises that sporting organisations and individuals involved in health promotion activities may be interested in the potential for a health promotion role of sporting organisations as a setting as well as their ability to increase participation in sport and its associated activities.

Results of this review will be of particular interest to active members and decision-makers in sporting organisations. The review will explore the potential impact of interventions promoting health in their setting and may guide future investment. Its results will also be of interest to other individuals or organisations involved in health-promoting activities in alternative settings, such as health policy-makers or public health practitioners.

OBJECTIVES

Primary objective

- To determine the effectiveness of interventions implemented through sporting organisations to promote physical activity, healthy diet, reductions in alcohol consumption or tobacco use.

The primary objective focuses on four health behaviours among the most relevant for morbidity and mortality worldwide (WHO 2009).

Secondary objectives

- To determine the effectiveness of interventions in the setting of sporting organisations, or using a sporting organisation as a means of access to promote other healthy behaviours, health knowledge, or health outcomes.

- To determine whether effects are different based on the characteristics of the interventions including target population, geographical location, type of sports, type, duration, context and implementation of intervention, and timing of outcome measurement.

- To assess adverse events or unintended effects related to included interventions.

METHODS

Criteria for considering studies for this review

Types of studies

We will include:

- randomised controlled trials (RCTs), including cluster-RCTs;
- quasi-randomised trials;
- controlled before-and-after (CBA) studies; and
- interrupted time series (ITS) studies and repeated measures studies (RMS).

We will only include CBA, ITS and RMS studies if they fulfil the criteria of the Cochrane Effective Practice of Care (EPOC) Group: CBA studies must have at least two intervention sites and two control sites, ITS and RMS studies must have a defined point in time when the intervention has been started, and at least three data points before and three after it's start (EPOC 2013).

We will exclude historical controlled studies.

Types of participants

Studies are eligible for inclusion irrespective of participants' age, gender, socioeconomic status, ethnicity or nationality. For a study to be included, its participants must have been exposed to an intervention involving a sporting organisation, as either a setting, or a means of access to individuals. A study participant may have been an active or passive sports club member, coach, supporter, student, or any other individual.

Types of interventions

We will consider any intervention that is implemented within a sporting organisation or using a sporting organisation for access to a target population. Control interventions will be 'no intervention' or usual practice. Interventions may occur within a sporting organisation (e.g. implementation of a minimum age for participation in the Olympic Games) or outside the immediate boundaries of the setting (e.g. using the celebrity of a sports club or of an athlete to convey a health message) (Dvorak 2012; Irwin 2010). For the purpose of this review, we will define sporting organisations as "social entities involved in the sport industry that are goal-directed, with a consciously structured activity system and a relatively identifiable boundary" (Slack 1998). Sporting organisations may be local (e.g. local swimming club, gym), national (e.g. national football league), or international (e.g. International Association of Athletics Federations).

Eligible interventions include but are not limited to:

- mass media campaigns;
- information or educational sessions;
- management or organisational change strategies;
- policy changes, for example, targeting the sociocultural environment to encourage a specific group of people to participate;
- changes to traditional or existing programmes, for example, club or association-initiated rule modification programmes;
- provision of activities beyond traditional or existing programmes, for example, 'Come and Try' initiatives, skill improvement programmes, volunteer encouragement programmes; and
- interventions using role models defined as "an individual who is perceived as exemplary, or worthy of imitation or who inspires individuals or groups of people through personal contact and relationship" (Payne 2003).

If feasible, we will group the interventions according to the target population as follows:

- interventions targeting the population outside the boundaries of a sporting organisation (e.g. general population or a selected group);
- interventions targeting members of a sporting organisation; and interventions targeting individuals in the setting of a sporting organisation that are not (yet) taking part.

We will exclude studies in which the individual effect of sporting organisations cannot be separated from the effect of other intervention components (e.g. multi-component interventions), as well as studies implementing interventions across settings. Further, we will exclude studies with interventions:

- designed specifically for the treatment (or as therapy) for specific medical conditions (e.g. rehabilitation programmes);
- designed specifically to increase paid active or paid non-active participation;

- surrounding sports injury prevention; and aiming to reduce drug use related to sports (i.e. anti-doping interventions). Not excluded are policies or practices aiming to reduce alcohol consumption or tobacco use in the setting of sporting organisations.

Types of outcome measures

Primary outcomes

Primary outcomes will be measures of physical activity, diet, alcohol consumption, and tobacco use. We will consider any measures of physical activity, such as intensity or time spent, step counts, or the proportion of individuals meeting the minimum recommended amount of physical activity. These outcomes may be reported subjectively (e.g. self report in questionnaires, such as the International Physical Activity Questionnaire) or objectively (e.g. as quantified by an accelerometer or direct observation). For alcohol consumption, we will include any measure, e.g. the number of units of alcohol consumed or the frequency of drinking alcohol. For tobacco use, we will include any measures of reduction or cessation of tobacco use, e.g. proportion of participants smoke-free after a specified time period. For dietary outcomes, we will include measures of adherence to dietary advice (e.g. consumption of five servings of fruit and vegetables per day). We will exclude studies reporting mean dietary intake without any measure of adherence to dietary advice.

Secondary outcomes

Secondary outcomes will be:

- measures of other health behaviours, intention to change health behaviours, and health knowledge;
- measures of the following health outcomes: weight, Body Mass Index (BMI) or another body composition measure, blood pressure, blood cholesterol, quality of life;
- occurrence of adverse events or unintended effects related to the intervention (e.g. occurrence of intervention-related injuries).

If data are available for different measures of a specified outcome we will prioritise objective measures over subjective measures.

We will also extract information on factors relating to the implementation of an intervention (e.g. involvement of stakeholders, pilot-testing of interventions, completeness of implementation, interventions' reach and maintenance after the evaluation period has ended, any modification of initially planned interventions) as well as contextual factors (e.g. intervention conducted during Olympic Games).

Further we will extract the timing of outcome measurements. Outcomes will be grouped (if possible) in short-term (<6 months after intervention has been completed) and long-term outcomes (≥6 months after intervention has been completed).

Search methods for identification of studies

We will use the search strategy outlined in [Appendix 1](#) to identify published controlled studies that report both pre- and post-intervention data. We will not impose any language or time restrictions for the electronic database searches.

Electronic searches

We will search the following databases.

- Cochrane Central Register of Controlled Trials (CENTRAL).
- MEDLINE and MEDLINE In-Process and Other Non-Indexed Citations (1946 to present).
- EMBASE (1974 to present).
- PsycINFO (1806 to present).
- CINAHL (1981 to present).
- SPORTDiscus (1973 to present).
- Dissertation Abstracts (1997 to present).
- Sociological Abstracts (1952 to present).

The search strategy in [Appendix 1](#) has been developed for MEDLINE (Ovid) based on those of both previous Cochrane reviews ([Priest 2008a](#); [Priest 2008b](#)). We combined the intervention search terms for policy interventions and non-policy level health promotion interventions and complemented them with additional search terms for eligible interventions. We extended the list of search terms for sports and physical activity as well as for settings. Finally, we broadened the terms for study design. For the databases listed above, we will adapt the search strategy to their respective syntaxes. We will search electronic databases of relevance to health promotion and public health, with a simplified search strategy (sporting organisation*) of the following.

- BiblioMap, the EPPI (Evidence for Policy and Practice Information)-Centre database of health promotion research (<http://eppi.ioe.ac.uk/webdatabases/Intro.aspx?ID=7>).
- The Health Technology Assessment Database, accessible through the Cochrane Library (<http://onlinelibrary.wiley.com/cochranelibrary/search>).
- The Health Evidence Bulletins, Wales (<http://hebw.cf.ac.uk/>).
- The Effective Public Health Practice Project (<http://www.ehphp.ca/systematicreviews.html>).
- DECIPHER: Centre for the Development and Evaluation of Complex Interventions for Public Health Improvement (<http://decipher.uk.net/>).
- National Institute for Health and Clinical Excellence (<http://www.nice.org.uk/>).
- The Community Guide - Guide to Community Preventive Services - Systematic reviews and evidence-based recommendations (<http://www.thecommunityguide.org/index.html>).

- C2-SPECTR, the social, psychological, educational, and criminological trials register of the Campbell Collaboration (<http://www.campbellcollaboration.org/lib/?go=monograph>).
 - Leisure Information Network website (<http://lin.ca/>) using the National Recreation Database (Canada).
 - The World Health Organization (WHO) International Clinical Trials Registry (<http://apps.who.int/trialsearch/>).
 - The registry ClinicalTrials.gov (<https://clinicaltrials.gov/>)
-
- The WHO European Database on Nutrition, Obesity and Physical activity (NOPA) (<http://data.euro.who.int/nopa/>).

We will also conduct an Internet search in English using the Google search engine (<http://www.google.ch/>) and Google Scholar (<http://scholar.google.com/>). We will use the following keywords or combinations thereof to locate potentially eligible studies: sports club, sporting organisation, health promotion, intervention, policy. Given the decrease in relevance in results listed by both search engines, we will only consider the first 500 hits for each.

Searching other resources

We will contact individuals as well as national and international bodies involved in sports (e.g. International Olympic Committee, European Athletics Association, Swiss Federal Office of Sport) to identify unpublished or internal reports and conference proceedings. Further, we will check the reference lists of all included studies and relevant background literature, and contact authors of included studies to identify additional published and unpublished studies.

Data collection and analysis

Selection of studies

Two reviewers (AF, NP) will screen titles and abstracts of all search entries. We will retrieve full-texts for search entries for which we cannot make a judgement of eligibility based on title and abstract alone. One reviewer (AF) will retrieve the full-text of all potentially eligible studies, and two reviewers (AF, NP) will independently decide on their final eligibility against the inclusion criteria. If there is any disagreement or uncertainty, a third reviewer will be consulted (EvE). We will only include each study once, even if it has been reported in more than one publication. We will consider the largest or most recent data set and decide on a case-by-case basis. We will record the selection process in sufficient detail to complete a PRISMA flow diagram ([Moher 2009](#)), and 'Characteristics of excluded studies' table. We will not impose any language restrictions.

Data extraction and management

Two reviewers (AF, NP) will extract the data independently. A third reviewer (EvE) will resolve any discrepancies.

For the included studies, we will use a piloted and adapted version of the Cochrane Public Health data extraction template to extract data on:

- study characteristics: country, study design, funding source and contextual factors when available;
- sporting organisation characteristics: name, type of sport promoted, its geographic area of activity (local, national or international) and location;
- participant characteristics: age, gender, ethnicity, type of recruitment, relationship to the sporting organisation (active, passive or no member, supporter or relative of a member, other);
- intervention characteristics: name of the programme, content of the intervention, qualification and training of staff that deliver the intervention, mode of delivery (individual- or group-level, interactive or passive message delivery), setting of intervention delivery, duration and intensity of intervention, components used to promote participation (such as incentives);
- outcome definitions and time points of outcome measurement. We will group outcomes in short-term (< 6 months after intervention has been completed) and long-term outcomes (\geq 6 months after intervention has been completed);
- outcomes data;
- dropout/adherence rates;
- factors related to implementation of the intervention: involvement of stakeholders, pilot-testing of the intervention, modification of the primary intervention, intervention's reach, completeness of implementation of the intervention and its maintenance after the evaluation period has ended; and financial costs of the intervention.

Further, we will use the Equity checklist of the Campbell and Cochrane Equity Methods Group to evaluate if the included studies did address health equity issues (Ueffing 2012), such as conducting analyses by socioeconomic or sociocultural subgroups such as income, occupation or ethnicity.

Assessment of risk of bias in included studies

Two reviewers (AF, NP) will independently assess the quality of each included study. We will assess the risk of bias using the Cochrane Effective Practice and Organisation of Care (EPoC) 'Risk of bias' tool (EPoC 2015). According to this tool we will assess the following items for randomised controlled trials, non-randomised controlled trials and controlled before-after studies: sequence generation, allocation concealment, blinding of outcome assessment, completeness of outcome data, selective outcome reporting, baseline characteristics, baseline outcome measurements, protection against contamination, and other sources of bias. For interrupted time series studies we will assess independence of intervention, blinding, selective reporting, other bias, completeness

of outcome data, if the shape of effect was pre-specified and if intervention was unlikely to affect data collection. We will categorise them as being at low, unclear, or high risk of bias. Disagreements or uncertainties will be settled by consensus, and, where needed, through discussion with a third reviewer (EvE). We will summarise the 'Risk of bias' assessment in a 'Risk of bias' table and graph.

Measures of treatment effect

We will present effects for binary outcomes using risk ratios (RRs) with 95% confidence intervals (CIs). We will present effects for continuous outcomes as the difference in mean values with 95% CI. For continuous outcomes we will determine mean change from baseline data. The mean change will be determined by subtracting the final mean from the baseline mean. We will calculate the confidence interval of the mean change by using standard errors, confidence intervals, t values or P values that relate to the differences between means in two groups. If these measures are not available, we will use a correlation coefficient to impute a standard deviation (Higgins 2011). When continuous outcomes are measured with different scales, we will use the standardised mean difference (SMD) to measure the intervention effect.

Unit of analysis issues

We will collect data from studies that allocate individuals or groups to an experimental or control intervention. We will combine data from studies with a cluster design with other data only if the clustering has been accounted for. If it has not been accounted for in analyses, but the trial data are available from the authors, we will aim to re-analyse relevant data. For cluster-RCTs, we will adjust the results by using intra-class correlation coefficients.

Dealing with missing data

We will assess missing data and dropouts in the included studies. We will report numbers, characteristics and reasons for dropout. We will contact authors of included studies for further information, if needed.

Assessment of heterogeneity

We are expecting substantial heterogeneity in the results of the studies due to differences in types of study designs, interventions, outcomes, and patient characteristics (clinical heterogeneity). Only if primary outcomes are the same and the characteristics of the studies are sufficiently similar, will we undertake meta-analyses. For this purpose, we will evaluate the presence of heterogeneity by constructing forest plots and examining them for asymmetry. We will perform Chi² tests and use $P \leq 0.1$ as a threshold to reject the null hypothesis of homogeneity. We will calculate the I² statistic to quantify statistical heterogeneity, with $I^2 \geq 75\%$ indicating considerable heterogeneity. In this case (and according

to Higgins 2011), we will refrain from pooling outcome data but will present a narrative summary of the findings instead.

Assessment of reporting biases

We will investigate the presence of reporting bias by plotting a funnel plot and visually assess it for asymmetry and outliers. Thus, we will evaluate the presence of reporting bias or differences in the results between smaller and larger studies. We will employ Egger's test if there are sufficient studies that report standard errors for effect sizes (Egger 1997).

Data synthesis

The decision on whether to combine the studies quantitatively or describe them qualitatively will be made once we have extracted all relevant information from the included studies. We will examine the characteristics of the interventions and the comparability of the outcome measures. If the interventions or outcome measures are similar, we plan to synthesise the results in meta-analyses. If data allows we will conduct three different meta-analyses according to the study population (population outside the boundaries of a sporting organization, members of a sporting organization and individuals being in the setting of a sporting organization but not taking part in it). We will conduct meta-analyses only with data from RCTs and cluster-RCTs. If other types of studies are included, we will summarise their outcome data qualitatively. We will use Review Manager 5 for meta-analyses and employ the random-effects model with weighing by inverse variance (RevMan 2014). If we cannot pool outcome data we will employ narrative synthesis techniques (descriptive data synthesis) (Popay 2006). In this case we will summarise the studies by grouping them according to the type of intervention. We will base all data analyses on the intention-to-treat principle.

When discussing results, we will make a distinction between statistically and clinically significant results. For non-clinical outcomes (e.g. health behaviours), we will compare our results to findings in the literature to assess the significance of the changes compared to other studies.

GRADE and 'Summary of findings' table

We will use the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) approach to assess the overall quality of the available evidence for the main outcomes; results will be presented in a "Summary of findings" table (Guyatt 2013). Using GRADE, we will reflect the extent to which we have confidence that the estimates of effect are correct. Our confidence will be presented as either high, moderate, low or very low. Studies with a randomised design will start with a high level of confidence meanwhile non-randomised studies will start with a low level of confidence. We will then assess the level of confidence for each

outcome measure against eight criteria. We will consider five criteria for lowering the level of confidence: risk of bias, inconsistency, indirectness, imprecision and publication bias. Further, the level of confidence can be raised by three criteria: strong association between intervention and outcome, dose-response relationship and where all plausible confounders would have reduced the effect between intervention and outcome. We will use methods and recommendations described in Section 8.5 and Chapter 12 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011) using GRADEproGDT software (GRADEproGDT 2015). We will justify all decisions to down- or up-grade the quality of studies using footnotes, and we will make comments to aid the reader's understanding of the review where necessary.

We will present results in three "Summary of findings" tables according to the study population addressed by the intervention: population outside the boundaries of a sporting organization, members of a sporting organization and individuals being in the setting of a sporting organization but not taking part in it. Each "Summary of findings" table will present the following outcomes if available:

- Change in physical activity
- Change in diet
- Change in alcohol consumption
- Change in tobacco use
- Change in health outcomes (weight, BMI, blood pressure and blood cholesterol)
- Occurrence of intervention-related injuries or unintended effects.

In these tables we will present, for each primary or secondary outcome, the number of included studies and participants, the treatment effect estimate(s) and the assessment of the overall quality of the body of evidence for that outcome.

We will summarise process data narratively and use it to help interpret and explain any variation in the estimates for the effectiveness of an intervention.

Subgroup analysis and investigation of heterogeneity

To investigate possible sources of heterogeneity, we will conduct subgroup analyses in each of the three study population groups. If the available data allow it, we will examine subgroups defined by the following criteria:

- Type (intervention at population-level versus intervention at group- or individual-level) and duration of intervention.
- Type of sporting organisation (individual versus team sport, community-based organisation versus national or international sporting organisations).

- Population subgroups: age groups, gender, ethnicity, socioeconomic status (measured with education, income or occupation, or a combination of them), or geographical location of the intervention.
- Implementation and contextual factors.

Sensitivity analysis

In a sensitivity analysis, we will explore the impact of methodological study quality (risk of bias) on study findings. We will repeat any meta-analyses while excluding studies with high risk of bias. To explore whether the type of funding source has an effect on

estimates of intervention effectiveness, we will repeat them, excluding commercially funded studies.

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REFERENCES

Additional references

ABS 2009

Australian Bureau of Statistics. Children's Participation in Cultural and Leisure Activities, Australia, April 2009. <http://www.abs.gov.au/2009> (accessed 15 December 2015).

ABS 2012

Australian Bureau of Statistics. Sport and recreation: a statistical overview. Australia. <http://www.abs.gov.au/2012> (accessed 15 December 2015).

Bloom 2011

Bloom DE, Cafiero ET, Jané-Llopis E, Abrahams-Gessel S, Bloom LR, Fathima S, et al. World Economic Forum. The Global Economic Burden of Noncommunicable Diseases. http://www3.weforum.org/docs/WEF_Harvard_HE_GlobalEconomicBurdenNonCommunicableDiseases2011 (accessed 15 December 2015).

Carter 2012

Carter MA, Edwards R, Signal L, Hoek J. Availability and marketing of food and beverages to children through sports settings: a systematic review. *Public Health Nutrition* 2012; **15**(8):1373–9.

Del Duca 2012

Del Duca GF, Silva KS, Garcia LM, de Oliveira ES, Nahas MV. Clustering of unhealthy behaviors in a Brazilian population of industrial workers. *Preventive Medicine* 2012; **54**(3-4):254–8.

Dobbinson 2006

Dobbinson SJ, Hayman JA, Livingston PM. Prevalence of health promotion policies in sports clubs in Victoria, Australia. *Health Promotion International* 2006; **21**(2): 121–9.

Donaldson 2012

Donaldson A, Finch CF. Sport as a setting for promoting health. *British Journal of Sports Medicine* 2012; **46**(1):4–5.

Dooris 2005

Dooris M. Healthy settings: challenges to generating evidence of effectiveness. *Health Promotion International* 2005; **21**(1):55–65.

Drygas 2013

Drygas W, Ruszkowska J, Philpott M, Björkstöm O, Parker M, Ireland R, et al. Good practices and health policy analysis in European sports stadia: Results from the 'Healthy Stadia' project. *Health Promotion International* 2013; **28**(2):157–65.

Dvorak 2012

Dvorak J, Fuller CW, Junge A. Planning and implementing a nationwide football-based health-education programme. *British Journal of Sports Medicine* 2012; **46**(1):6–10.

Egger 1997

Egger M, Smith GD, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. *BMJ* 1997; **315**(7109):629–34.

EPOC 2013

Effective Practice and Organisation of Care Group (EPOC). Norwegian Knowledge Centre for the Health Services. What study designs should be included in an EPOC review and what should they be called?. <http://epoc.cochrane.org/epoc-specific-resources-review-authors2013> (accessed 15 December 2015).

EPOC 2015

Effective Practice Organisation of Care (EPOC). Norwegian Knowledge Centre for the Health Services. Suggested risk of bias criteria for EPOC reviews. <http://epoc.cochrane.org/epoc-specific-resources-review-authors2015> (accessed 15 December 2015).

Geidne 2013

Geidne S, Quennerstedt M, Eriksson C. The youth sports club as a health-promoting setting: an integrative review of research. *Scandinavian Journal of Public Health* 2013; **41**(3): 269–83.

Global Burden of Disease Study 2015

Global Burden of Disease Study 2013 Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2015;**386**:743-800.

GRADEproGDT 2015 [Computer program]

GRADEproGDT. GRADEpro Guideline Development Tool. Hamilton: McMaster University (developed by Evidence Prime, Inc.), 2015.

Guagliano 2014

Guagliano JM, Lonsdale C, Kolt GS, Rosenkranz RR. Increasing girls' physical activity during an organised youth sport basketball program: a randomised controlled trial protocol. *BMC Public Health* 2014;**14**(1):383.

Guyatt 2013

Guyatt GH, Thorlund K, Oxman AD, Walter SD, Patrick D, Furukawa TA, et al. GRADE guidelines: 13. Preparing summary of findings tables and evidence profiles-continuous outcomes. *Journal of Clinical Epidemiology* 2013;**66**(2): 173-83.

Higgins 2011

Higgins JPT, Green S (editors). The Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 [updated March 2011]. The Cochrane Collaboration, 2011. Available from www.cochrane-handbook.org.

Irwin 2010

Irwin CC, Irwin RL, Miller ME, Somes GW, Richey PA. Get Fit with the Grizzlies: a community-school-home initiative to fight childhood obesity. *The Journal of School Health* 2010;**80**(7):333-9.

Kastorini 2011

Kastorini CM, Milionis HJ, Esposito K, Giugliano D, Goudevenos JA, Panagiotakos DB. The effect of mediterranean diet on metabolic syndrome and its components: a meta-analysis of 50 studies and 534,906 individuals. *Journal of the American College of Cardiology* 2011;**57**(11):1299-313.

Kelly 2010a

Kelly BP, Baur L, Bauman A, King L. Examining opportunities for promotion of healthy eating at children's sports clubs. *Australian and New Zealand Journal of Public Health* 2010;**34**(6):583-8.

Kelly 2010b

Kelly B, Baur LA, Bauman AE, Smith BJ, Saleh S, King LA, et al. Health promotion in sport: An analysis of peak sporting organisations' health policies. *Journal of Science and Medicine in Sport* 2010;**13**(6):566-7.

Khaw 2008

Khaw KT, Wareham N, Bingham S, Welch A, Luben R, Day N. Combined impact of health behaviours and mortality in men and women: The EPIC-Norfolk prospective population study. *PLoS Medicine* 2008;**5**(1):e12.

Kohl 2012

Kohl HW 3rd, Craig CL, Lambert EV, Inoue S, Alkandari JR, Leetongin G, Lancet Physical Activity Series Working Group. The pandemic of physical inactivity: global action for public health. *Lancet* 2012;**380**:294-305.

Kokko 2009

Kokko S, Kannas L, Villberg J. Health promotion profile of youth sports clubs in Finland: Club officials' and coaches' perceptions. *Health Promotion International* 2009;**24**(1): 26-35.

Kokko 2011

Kokko S, Kannas L, Villberg J, Ormshaw M. Health promotion guidance activity of youth sports clubs. *Health Education* 2011;**111**(6):452-63.

Koopmans 1997

Koopmans JR, van Doornen LJ, Boomsma DI. Association between alcohol use and smoking in adolescent and young adult twins: a bivariate genetic analysis. *Alcoholism, Clinical and Experimental Research* 1997;**21**(3):537-46.

Kunz 2007

Kunz M. 265 million playing football. *FIFA Magazine* 2007, issue July:10-15.

Lamprecht 2014

Lamprecht M, Fischer A, Stamm HP. [Sport Schweiz 2014: Sportaktivitaet und Sportinteresse der Schweizer Bevoelkerung]. Magglingen: Bundesamt für Sport (BASPO) http://www.baspo.admin.ch/internet/baspo/de/home/aktuell/Sport_Schweiz_2014.html; Vol. 2014 (accessed 15 December 2015).

Lee 2014

Lee YC, Hashibe M. Tobacco, alcohol, and cancer in low and high income countries. *Annals of Global Health* 2014;**80**(5):378-83.

Lisha 2010

Lisha NE, Sussman S. Relationship of high school and college sports participation with alcohol, tobacco and illicit drug use: A review. *Addictive Behaviors* 2010;**35**(5): 399-407.

McLeroy 1988

McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Education Quarterly* 1988;**15**(4):351-77.

Merlo 2011

Merlo LJ, Ahmedani BK, Barondess DA, Bohnert KM, Gold MS. Alcohol consumption associated with collegiate American football pre-game festivities. *Drug and Alcohol Dependence* 2011;**116**(1-3):242-5.

Moher 2009

Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses. *PLoS Med* 2009;**6**(7):1-6.

Nutbeam 1998

Nutbeam D. Health promotion glossary. *Health Promotion International* 1998;**13**(4):349-64.

O'Brien 2007

O'Brien KS, Ali A, Cotter JD, O'Shea RP, Stannard S. Hazardous drinking in New Zealand sportspeople: Level of sporting participation and drinking motives. *Alcohol and Alcoholism* 2007;**42**(4):376–82.

Pate 2000

Pate RR, Trost SG, Levin S, Dowda M. Sports participation and health-related behaviors among US youth. *Archives of Pediatrics and Adolescent Medicine* 2000;**154**(9):904–11.

Payne 2003

Payne W, Reynolds M, Brown S, Fleming A. Sports role models and their impact on participation in physical activity: a literature review. https://www.clearinghouseforsport.gov.au/~/data/assets/pdf_file/0010/558685/Sports_role_models_and_their_impact_on_participation_in_physical_activity_a_literature_review.pdf 2003 (accessed 15 December 2015).

Popay 2006

Popay J, Roberts H, Sowden A, Petticrew M, Arai L, Rodgers M, et al. Guidance on the conduct of narrative synthesis in systematic reviews: a product from the ESRC Methods Programme. http://www.lancaster.ac.uk/shm/research/nss/research/dissemination/publications/NS_Synthesis_Guidance_v1.pdf 2006 (accessed 15 December 2015).

Priest 2008a

Priest N, Armstrong R, Doyle J, Waters E. Interventions implemented through sporting organisations for increasing participation in sport. *Cochrane Database of Systematic Reviews* 2008, Issue 3. [DOI: 10.1002/14651858.CD004812.pub3]

Priest 2008b

Priest N, Armstrong R, Doyle J, Waters E. Policy interventions implemented through sporting organisations for promoting healthy behaviour change. *Cochrane Database of Systematic Reviews* 2008, Issue 3. [DOI: 10.1002/14651858.CD004809.pub3]

RevMan 2014 [Computer program]

The Nordic Cochrane Centre, The Cochrane Collaboration. Review Manager (RevMan). Version 5.3. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2014.

Rosenberg 2014

Rosenberg M, Ferguson R. Maintaining relevance: an evaluation of health message sponsorship at Australian community sport and arts events. *BMC Public Health* 2014;**14**(1242):1–8.

Slack 1998

Slack T, Lüschen G. *Understanding Sport Organizations: The Application of Organization Theory*. 2nd Edition. Human Kinetics, 1998.

Sport England 2014

Sport England. The national picture. <http://www.sportengland.org/research/who-plays-sport/national-picture/> (accessed 15 December 2015).

Sport England 2015

Sport England. Club Matters: Supporting your sports club. <http://www.sportenglandclubmatters.com/> (accessed 15 December 2015).

Ueffing 2012

Ueffing E, Tugwell P, Welch V, Petticrew M, Kristjansson E, the Campbell and Cochrane Equity Methods Group. Equity Checklist for Systematic Review Authors. <http://equity.cochrane.org/sites/equity.cochrane.org/files/uploads/EquityChecklist2012.pdf> (accessed June 2015).

VicHealth 2015

VicHealth. Everyone Wins - Community Sporting Clubs. <https://www.vichealth.vic.gov.au/media-and-resources/publications/everyone-wins-clubs> (accessed 15 December 2015).

Wanner 2011

Wanner M, Martin-Diener E, Bauer GF, Stamm H, Martin BW, Allez Hop, a nationwide programme for the promotion of physical activity in Switzerland: what is the evidence for a population impact after one decade of implementation?. *British Journal of Sports Medicine* 2011;**45**(15):1202–7.

WHO 2009

World Health Organization. Global health risks: mortality and burden of disease attributable to selected major risks. http://www.who.int/healthinfo/global_burden_disease/global_health_risks/en/ 2009 (accessed 15 December 2015).

WHO 2014

World Health Organization. Global Health Estimates 2014 Summary Tables: Deaths by cause, age and sex, by WHO Region, 2000-2012. http://www.who.int/healthinfo/global_burden_disease/en/ 2014 (accessed 15 December 2015).

WHO 2015

World Health Organization. Alcohol Fact sheet. <http://www.who.int/mediacentre/factsheets/fs349/en/> (accessed January 2015). [<http://www.who.int/mediacentre/factsheets/fs349/en/>]

Wichstrøm 2009

Wichstrøm T, Wichstrøm L. Does sports participation during adolescence prevent later alcohol, tobacco and cannabis use?. *Addiction* 2009;**104**(1):138–49.

* Indicates the major publication for the study

APPENDICES

Appendix I. Medline search strategy

Database(s): Ovid MEDLINE(R) 1946 to November Week 3 2015, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations December 02, 2015, Ovid MEDLINE(R) Daily Update November 18, 2015

Search Strategy:

#	Search	Results
1	exp health promotion/	60767
2	primary prevention/	15442
3	preventive medicine/	11012
4	public health/	65475
5	health education/	54667
6	exp policy/	132942
7	social control, formal/	11490
8	government regulation/	18970
9	social control, informal/	3628
10	social environment/	39126
11	Legislation/	1669
12	exp Legislation as Topic/	145015
13	Environment/	50642
14	Environment Design/	4355
15	(legislat\$ or polic\$ or regulat\$).tw.	1616093
16	white paper?.tw.	1338
17	((modus operandi or statute or understanding\$ or law\$ or directive\$ or ruling\$ or rule\$ or plan\$ or protocol\$ or guiding principle\$ or course of action or guideline\$ or procedure\$) adj5 (smoking or anti-smoking or tobacco or anti-tobacco or alcohol\$ or sun or shade or skin cancer\$ or eat\$ or nutrition\$ or obesity or inclusion\$ or social\$ or emotional or anti-discrimination or anti-harassment or anti-vilification or disability or	48017

(Continued)

	safety)).tw	
18	(prevent\$ or manag\$ or promot\$ or program\$ or project\$ or educat\$ or campaign\$ or intervent\$ or strateg\$ or train\$).tw	4375821
19	(public health or health educ\$ or (health* adj behavio\$)).tw	190470
20	prevention control.fs.	1111682
21	or/1-20	06376656
22	exp recreation/	159207
23	leisure activities/	6973
24	exercise/	73992
25	physical exertion/	54172
26	(soccer or football or basketball or swim\$ or cycling or bicycl\$ or jogg\$ or athlet\$ or running or lacrosse or baseball or rugby or tennis or volleyball or hockey or yoga or sports class\$ or gymnas\$).tw	185310
27	(physical adj5 (fit\$ or train\$ or activ\$ or endur\$)).tw.	89231
28	(exercise\$ or game\$ or sports\$ or leisure\$ or recreation\$).tw	304620
29	((lifestyle or life-style) adj5 activ\$).tw.	3892
30	((lifestyle or life-style) adj5 physical\$).tw.	3264
31	or/22-30	595980
32	fitness centers/	367
33	public facilities/	981
34	bathing beaches/	920
35	swimming pools/	1601
36	community networks/	5976
37	Social Participation/	917
38	(gym? or gymnasi\$ or club\$ or swimming pool\$).tw.	16943

(Continued)

39	wellness cent\$.tw.	166
40	(sport\$ adj2 (body or bodies or organi\$ or federation\$)).tw.	937
41	((sport\$ or physical\$ or exercise\$ or game\$ or leisure\$ or recreation\$ or fitness) adj1 (event\$ or setting\$ or sector\$ or venue\$ or site\$ or centre\$ or center\$ or facility or facilities or association\$)).tw	4227
42	olympic\$.tw.	2847
43	(FIFA or IOC or IAAF or NFL or NBA).tw.	2366
44	or/32-43	36085
45	21 and 31 and 44	8289
46	Randomized Controlled Trial.pt.	418423
47	Pragmatic Clinical Trial.pt.	236
48	exp Randomized Controlled Trials as Topic/	106151
49	Randomized Controlled Trial/	418423
50	Randomization/	87193
51	Random Allocation/	87193
52	Double-Blind Method/	136478
53	Single-Blind Method/	21725
54	Placebos/	34178
55	(random\$ or sham or placebo\$).ti,ab,hw,kw.	1128668
56	((singl\$ or doubl\$ or trebl\$ or tripl\$) adj25 (blind\$ or mask\$)).ti,ab	147826
57	((singl\$ or doubl\$ or trebl\$ or tripl\$) adj (blind\$ or mask\$)).hw,kw	157414
58	(clin\$ adj25 trial\$).tw.	314208
59	Controlled Clinical Trial/	92318
60	exp clinical trials as topic/	304871

(Continued)

61	time series.ti,ab,kw.	18897
62	((“before and after” or “before after”) adj2 (stud\$ or trial\$ or design\$)).ti,ab,kw	8493
63	Controlled Before-After Studies/	81
64	Interrupted Time Series Analysis/	103
65	(pre test or pretest or post test or posttest).ti,ab,kw.	18626
66	Evaluation studies/	215110
67	pilot projects/	92395
68	(control\$ adj6 (study or trial or group? or design\$)).tw.	712917
69	or/46-68	2194637
70	exp animals/ not humans.sh.	4158255
71	69 not 70	1886003
72	45 and 71	1594

Concept of search strategy:

Set 21 : Intervention terms (sets 1 - 20)

Set 31 : Sports and exercise terms (sets 22-30)

Set 44: Settings (organised sports) (sets 32 - 43)

Set 71 : Study type terms (sets 46-70)

CONTRIBUTIONS OF AUTHORS

- Draft the protocol: All authors
- Study selection: AF, NP
- Extract data from studies: AF, NP, LW
- Enter data into RevMan: AF
- Carry out the analysis: AF, EvE
- Interpret the analysis: All authors
- Draft the final review: All authors
- Disagreement resolution: EvE, SK
- Update the review: AF, EvE

DECLARATIONS OF INTEREST

- Aline Flatz - no conflicts of interest
- Nadine Pfeifer - no conflicts of interest
- Thomas Radtke - no conflicts of interest
- Susi Kriemler - no conflicts of interest
- Irma Klerings - no conflicts of interest
- Erik von Elm - no conflicts of interest
- Luke Wolfenden - Is the author of trials likely to be included in this review

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