Appendix

Appendix 1: Research Poster

University of the West of England, BRISTOL

Birmingham Women's and Children's NHS Foundation Trust

PARTICIPANTS NEEDED

FOR

Decision making experiences on withdrawing a child and young person's treatment.

Looking for health professionals to **explore** and **understand** the experiences in **decision-making** in terms of: professionals' understanding of their role in withdrawing treatment for a child; factors that influence professionals in deciding whether to withdraw a child from treatment and how decision-making is managed amongst staff.

The study will involve being **interviewed** (approximately 30 minutes) via **face-to-face**, **skype** or **telephone**.

If you are interested and for more information, please contact:

University of the West of England
BRISTOL

Birmingham Women's and Children's NHS Foundation Trust

Decision-making experiences on withdrawing a child and young person's treatment: From the perspective of professionals working in healthcare.

Participant Information Sheet

A research conducted by University of the West of England (UWE) in collaboration with Birmingham Women's and Children NHS Foundation Trust

Name and Contact Details and status of the Principal Investigator: Shanara Abdin, Trainee Health Psychologist (Doctoral Level student) email:

Name of the other Investigators

Invitation

We would like to invite you to take part in a research study.

Before you decide if you would like to participate, take time to read the following information carefully, and if you wish discuss it with others, such as your family, friends or colleagues.

Please ask a member of the research team whose contact details can be found at the end of this information sheet if there is anything that is not clear, or if you would like more information before you make your decision.

What is the purpose of the study?

The aim of this study is to explore and understand the experiences of health professionals in decision-making in terms of: professionals' understanding of their role in withdrawing treatment for a child; factors that influence professionals in deciding whether to withdraw a child from treatment and how decision-making is managed amongst staff.

What will happen to me if I take part?

If you agree to take part, you will be invited to participate in an interview with one of the research team. This will be held in a convenient location for you. The interview will last around 45 minutes depending on how much you have to say. The interview will be audio-recorded on a digital voice recorder.

Do I have to take part?

No. It is up to you to decide whether or not you wish to take part. If you do decide to participate, you will be asked to sign and date a consent form. You would still be free to withdraw from the study at any time without giving a reason.

Will my taking part in this study be kept confidential?

Yes. A code will be attached to all the data you provide to maintain confidentiality.

Your personal data (name and contact details) will only be used if the researchers need to contact you to arrange study visits or collect data by phone. Analysis of your data will be undertaken using coded data.

The data we collect will be stored in a secure document store (paper records) or electronically on a secure encrypted mobile device, password protected computer server or secure cloud storage device.

What are the possible benefits of taking part?

There are no material benefits to taking part in this study. However, the findings will be fed back to the team to inform future service provision. You will not be disadvantaged by participating in this study.

What will happen to the results of the study?

The results of this study may be published in scientific journals and/or presented at conferences. If the results of the study are published, your identity will remain confidential.

A lay summary of the results of the study will be available for participants when the study has been completed and the researchers will ask if you would like to receive a copy.

Who is funding the research?

No funding has been received for this research.

Who is organising this study and acting as data controller for the study?

This study has been organised by the University of the West of England in collaboration with Birmingham Children's Hospital.

What will happen to the data provided and how will my taking part in this project be kept confidential?

Your data will be collected, stored and used in accordance with the General Data Protection Regulation and Data Protection Act 2018 and secured against unauthorised access.

The information you provide as part of the study is the research study data. Data will be stored up to 10 years after the study as per the UWE Research Data policy.

Any research study data from which you can be identified such as your name or audio recording is known as personal data. Personal data will be stored confidentially for 5 years after the study has finished or as long as it is necessary to verify and defend when required, the process and outcomes of research. Personal data will only be accessible to the research team and will not be shared to anyone without your consent. Personal data collected from you will be stored securely and separately from the data. For audit, monitoring and for verifying findings, access to personal data may be required.

If you choose to withdraw from the study, your personal data will be destroyed. The personal information collected for the study will be processed by the University of the West of England in accordance with the General Data Protection Regulation as applied, enacted, and amended in UK law. All personal data is processed in accordance with the applicable UK data protection legislation. The Data Controller is the University of the West of England. For

We will not inform anyone that you have taken part and you will not be named in any of our reports or publications. You will not be identifiable in any ensuing reports or publication. We will use a study number for each participant and use pseudonyms in transcripts and reports to help protect the identity of individuals.

Who has reviewed the study?

This study was given a favorable ethical opinion by the Research Ethics Committee.

What if I have a concern about my participation in the study?

If you have any concerns about your participation in this study, please speak to the research team and they will do their best to answer your questions. Contact details can be found at the end of this information sheet.

Data Protection Notice

The data controller is the University of the West of England (UWE). We will hold your data securely and not make it available to any third party unless permitted or required to do so by law. Your personal information will be used/processed as described on this participant information sheet. You have a number of rights in relation to your personal data. You can request your data, ask to rectify it, erase it, restrict its processing, or withdraw any consent provided to its processing or complain to the Information Commissioner's office. If you would

If you remain unsatisfied, you may wish to contact the Information Commissioner's Office (ICO). Contact details, and details of data subject rights, are available on the ICO website at: https://ico.org.uk/for-organisations/data-protection-reform/overview-of-the-gdpr/individuals-rights/

Further information:

If you would like to take part in this research or would like further information, please contact: Principal Investigator: Shanara Abdin, Trainee Health Psychologist,

Thank you for taking time to read this information sheet. If you have any questions regarding the study, please don't hesitate to ask one of the research team.

Appendix 3: Consent Form

University of the West of England
BRISTOL

Birmingham Women's and Children's NHS Foundation Trust

Decision-making experiences on withdrawing a child and young person's treatment: From the perspective of professionals working in healthcare.

Consent Form

Please initial boxes

1.	I confirm that I have read and understand the Participant Information Sheet **(v0.5 08/02/19)** for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
2.	I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason and without my legal rights being affected.	
3.	I agree to my personal data and data relating to me collected during the study being processed as described in the Participant Information Sheet.	
4.	I understand that if during the study I tell the research team something that causes them to have concerns in relation to myself or another individual's welfare they may need to breach my confidentiality.	
5.	I agree to my interview being audio recorded and to anonymised direct quotes from me being used in publications resulting from the study will be attached to my job title.	
6.	I agree to take part in this study.	

Name of participant	Date	Signature

Job title of participant

Name of researcher	Date	Signature

University of the West of England
BRISTOL

Birmingham Women's and Children's NHS Foundation Trust

Decision-making experiences on withdrawing a child and young person's treatment: From the perspective of professionals working in healthcare.

Debrief Form

Thank you for taking part in this study.

What was the aim of this study?

The aim of this study was to explore and understand the experiences of health professionals in decision-making in terms of: professionals' understanding of their role in withdrawing treatment for a child; factors that influence professionals in deciding whether to withdraw a child from treatment and how decision-making is managed amongst staff.

Will my taking part in this study be kept confidential?

Yes. A code will be attached to all the data you provided to maintain confidentiality.

The data we collect will be stored in a secure document store (paper records) or electronically on a secure encrypted mobile device, password protected computer server or secure cloud storage device.

What will happen to the results of the study?

The results of this study may be published in scientific journals and/or presented at conferences. If the results of the study are published, your identity will remain confidential.

A lay summary of the results of the study will be available for participants when the study has been completed and the researchers will ask if you would like to receive a copy.

Who is funding the research?

No funding has been received for this research.

Who is organising this study and acting as data controller for the study?

This study has been organised by the University of the West of England in collaboration with Birmingham Children's Hospital.

Can I withdraw from the study?

You may withdraw from the study 2 weeks after your interview. After this time the data you provided will be analysed and a part of the research findings. If you wish to withdraw from the study, please email the chief investigator:

Appendix 5: Interview Schedule

University of the West of England
BRISTOL

Birmingham Women's and Children's NHS Foundation Trust

Decision-making experiences on withdrawing a child and young person's treatment: From the perspective of professionals working in healthcare.

Semi- structured interview guide for professionals

- Can you please tell me what decision-making means to you?

- Tell me about how decisions regarding withdrawing child's treatment are made
  - How are the decisions made?
  - Who are involved?
  - What are their contributions in the process?

- Can you tell me what are the challenges during the process?
  - What were the challenges?
  - What worked well? What didn't?
  - What could be done differently/better?

- Tell me about your role in the decision-making process?
  - What is your contribution?
  - How valued did you feel your contribution was?

- How did this experience impact you personally?
  - How did you manage this?
  - What type of support did you receive?
  - What would have been helpful?

- What involvement do the child's family have in this process?
  - How is that negotiated and communicated?

- Tell me about any conflicts that you have encountered with families regarding withdrawal of treatment?
  - What happened?
  - How was this conflict resolved?
  - If you have not encountered any conflict, how might you manage such conflicts in the future?

- How are parents supported during the decision-making process?
  - What was the parent's contribution /involvement in this process?

- What else could be done to support parents?

- Have you heard of the Charlie Gard case? How would you have handled this case?
  - What advice would you find useful should you experience a case like this?

- Is there anything you would like to add?

Appendix 6: Interview Distress Protocol

Decision making experiences on withdrawing a child and young person's treatment: From the perspective of professionals working in healthcare.

Interview Distress Protocol

Appendix 7: Thematic Analysis Codebook

Name	Description	
Best Interests of child	All decisions are based on the child.	"it's the best interests of the child to withdraw treatment"
➢ Competency of child	Taking into consideration the child's perspective/viewpoint during the decision-making process	"I think its children being empowered making decision for themselves"
➢ Discussions around severity of Child's Condition	Decision-making process includes the severity of the child's condition	"whether the child should be informed that they are dying" "families compare themselves well their child to other families so like they will look at the bed next to them and see the other child looks a lot more ill than their child and they would talk to the other family and say to us well the other child looks more ill than mine and that makes things worse"
➢ True Realisation of Child's Illness	Parents/families and professionals realising the true extent of the child's illness and withdrawing treatment is in the best interest of the child.	"tell them honestly the situations and the case of the child we offer too much emotional support and give them too much power when they don't know the full background"
Multidisciplinary Approach	Decision-making conversations consist of a multi-disciplinary approach	"affiliated by the clinician with the family"
➢ Medical Model	Health care professionals mention the importance of adhering to the medical model and using biology as ~~a~~part of the decision-making process.	"you know it can be difficult with family and parents there because they don't see or sometimes understand the medical model"

Name	Description	
		"families don't understand our way of thinking the medical model and that makes it difficult when talking about treatment"
➢ Joint decision-making	Views of professionals and families are respected and taken into consideration	"no one is in the wrong"
➢ Support from Allied Health Professionals	The decision-making process consists of a wider team with clarity from allied health professionals.	"sometimes they will just bring in like somebody like chaplaincy"
➢ Competency of Professional	Health care professionals view their job differently depending on their role and how they perceive the importance within the decision-making process.	"we are equipped to deal with them changing their minds"
External Factors in decision-making	There are other factors and influences of the decision-making process i.e. culture, religion and other external bodies.	"external people who are neutral who don't know the professionals or the family"
➢ Cultural Considerations	Health professionals should take into consideration cultural factors of the child and family.	"It's a cultural issue with regards to how authority decision-making is made within that family and culture it might very well"
➢ Impartial Body	Sometimes cases appear in court for external neutral individuals to decide when professional's and families can't agree.	"it even needs to be taken out from the hands of a clinician where sometimes a third arbitrary person so say I've examined all the evidence"
➢ Religion and Spiritual Considerations	Decision-making involves religion and spiritual consideration whereby parents and families are influenced by their own beliefs.	"there is a huge dilemma particularly in religions such as Islam where they understand that only Allah has the right to take life and those breakdown in communication are because they have cultural and religious

Name	Description	
		beliefs of what withdrawal of treatment means to them”
➢ Supporting the child, parents and family members	Health professionals identified that parents are supported-by staff as part of the decision-making process. Support from professionals include taking the competency of the child into consideration	“they get a lot of support from staff” “those conversation will have distress of the child and the parent and I just wonder whether we could do more to help those families and figure it why not and how could we help with their child who is perhaps 13 14 15 16”
Psychological Wellbeing	As part of the decision-making process and conversations, psychological wellbeing of both professionals and parents are vital.	
➢ Psychological Wellbeing of HCPs	Withdrawing treatment of a child and deciding on treatment is a difficult decision for professionals which in turn effects their psychological wellbeing.	“I have coping mechanisms which work well so after work I go for long walks just aimlessly in the park just to clear my head before I walk into the doors at home”
➢ Psychological Wellbeing of Parents	The nature of withdrawing treatment has an influence on parental psychological wellbeing.	“psychological wellbeing with the occasional family member who feels it's been them that has then killed their child because they have agreed for their child's treatment to be withdrawn.” “I really believe all this needs a psychological perspective we need some psychology support or therapy for parents” “we use to have a psychologist for families before but she left and I don’t think they have or will replace her she was needed I think as professionals we can do more to support the wellbeing of parents you know its not easy it must be so

Name	Description	
		upsetting for them to see their child like this"
Recommendations to support decision-making	Professionals feel further training and support is required to assist with the decision-making process	"staff need more training"
➢ Supporting Professionals with Decision-making	Professionals feel training around withdrawing treatment and death should be more prominent amongst their development to support them.	"actually a lot of training around death and dying" "team huddles and of course clinical supervision which happens mostly monthly"
➢ Supporting parents with decision-making	Professionals reported on current support available for parents/families as part of the decision-making process.	"its helped we've had dad's talk to other dads and you know males keep their emotions to themselves but these groups help them speak out and tackle whatever is going through their mind"

The effectiveness of physical activity interventions in improving wellbeing across workplace settings: A Systematic Review

Author:

Module: Systematic Review in Health Behaviour (USPJKH-30-M)

Module Leader: Dr Jane Meyrick

Word Count: 5355

Word Limit: 6000

The effectiveness of physical activity interventions in improving wellbeing across workplace settings: A Systematic Review

Abstract

Objective

The purpose of this review was to systematically investigate the effectiveness of physical activity within workplace settings, as an intervention to improve wellbeing in adults. The review aimed to assess the quality of the research into this topic area.

Methods

A systematic review of physical activity interventions across workplaces published from 2007 to April 2017 was performed across seven databases. Extraction of articles and quality assessment of included studies was performed independently by two reviewers. Only review articles investigating workplace physical activity interventions in promoting wellbeing were included. To be eligible for inclusion, articles had to report wellbeing assessed through a range of measures and assessments. Extraction of articles and quality assessment of included papers were performed independently by two authors using the Cochrane's data extraction form and the Cochrane's risk of bias. Due to heterogeneity in population characteristics, intervention components, outcomes measures and the durations of interventions, a narrative synthesis was conducted.

Results

The review identified 5 workplace physical activity interventions in promoting wellbeing. The included studies varied substantially in sample size characteristics, methodological quality, and duration of follow up, types of interventions and assessed outcomes. Three out of the five included studies were of high quality. The types of physical activity intervention included yoga, exercise and three studies focussing on walking interventions. Positive effects of wellbeing were found across all five studies.

Conclusion

Conclusions regarding the effects of workplace physical activity interventions in improving wellbeing are positive. The findings suggested that any form of physical activity was better in improving wellbeing across workplace settings compared to no intervention. However, the

findings remain tentative due to the methodological and quality limitations of a number of the included studies.

Systematic review registration: PROSPERO CRD42017068826

Introduction

The workplaces, along with schools and hospitals have been established as one of the priority settings for health promotion in the 21st century (Malik, Blake & Suggs, 2014). The workplace has been shown to directly influence the physical, mental, economic and social wellbeing of its employees and as a result the health of their families. It offers an ideal setting and infrastructure to support the promotion of health of a large audience. Regrettably the concept that the workplace is an important area for health campaigns of many kinds, as well as basic occupational health and safety programmes is not yet widely accepted (Aked, Mark, Cordon & Thompson, 2008). The concept of promoting health in the workplace is becoming increasingly relevant as more organisations recognise the importance of a healthy workforce to obtain success across their organisation.

Public health strategies place huge emphasis on promoting physical activity within workplaces. Many employers recognise that they have a duty to the health and wellbeing of their workforce. There are a number of benefits for employers in investing in the health of their employee such as reduced sickness absence, increased productivity and better staff retention (National Institute for Health and Care Excellence, 2012). Studies have shown there to be a decline in physical activity interventions across workplaces due to the increase in time spent in sedentary occupations (Chan, Ryan & Tudor-Locke, 2004; Rajaratnam & Arendth, 2001). Being sedentary is not just a lack of physical activity. It involves activities that do not increase energy expenditure much above resting levels for example sitting and reading (National Institute for Health and Care Excellence, 2008).

Individuals spend over 60% of their waking hours at work and with many individuals holding relatively sedentary jobs, the risk of poor health and wellbeing increases (Chan, Ryan & Tudor-Locke, 2004). For many individuals, working allows a sense of life satisfaction and with wellbeing underpinning all aspects of an individual's life, the need for wellbeing promotion across workplaces is vital (Department of Health, 2014). According to the Department of Health (2014), terminology around wellbeing is often used interchangeably and sometimes incorrectly. Wellbeing consists of an individual's experience of their life, with a comparison of life circumstances with social norms and values. It refers to an individual realising their own capabilities and able to feel good and function well with the normal stresses of life whilst working (Aked, Mark, Cordon & Thompson, 2008). The World Health Organisation (WHO) recognises that wellbeing is an important marker of health and plays an

important role in employee and employer relations as well as job satisfaction and productivity (Kemp, Naswall, Malinen & Kuntz, 2017; Hemp, 2004). The need for developing physical activity interventions across workplaces is vital to improve the health and wellbeing of the working population (National Institute for Health and Care Excellence, 2008). Physical inactivity has been linked with lower emotional wellbeing (Galper et al, 2006). Therefore, highlighting the need to implement physical activity interventions to promote wellbeing.

Current public health guidelines recommend that healthy adults aged from 19- 64 years should engage in a minimum of 150 minutes every week (Department of Health, 2011; World Health Organisation, 2011). According to the World Health Organisation (2011) only 6% of men and 4% of women meet the recommended levels of physical activity each week (150 minutes' moderate exercise a week).The benefits of being active daily are widely documented throughout literature (Chu, Koh, Moy & Muller-Riemenschneider, 2014).Moderate intensity activity increases breathing and heart rate where the individual feels warmer and their pulse can be felt (Department of Health, 2011).

Physical activity interventions have been shown to be cost effective across workplaces (Aittasalo et al, 2017; Roux et al, 2008; Hagberg & Lindhol,2006). The cost of preventative measures and decrease sickness absence rates has been shown to be substantial (Department of Health, 2011). Numerous studies have conveyed the importance of physical activity in improving mental health and wellbeing (Ivandic et al, 2017; Brown, Gilson, Burton & Brown, 2011; Paluska & Schwenk, 2000; Penedo & Dahn, 2005).It has been widely documented in literature that regular physical activity has been found to reduce symptoms of fatigue, promote coping, increase quality of life and life satisfaction (Ivandic et al, 2017). A review published in 2015, included studies from 1990 to 2013 and highlighted that workplace physical activity intervention and yoga programmes were found to be associated with a significant reduction in mental health outcomes such as depressive symptoms and anxiety (Chu, Koh, Moy, Muller-Riemenschneider, 2015).Physically active employees are less likely to suffer from major health problems, less likely to take sickness leave and less likely to have an accident at work (Dishman, DeJoy, Wilson, Vandenberg, 2009). Physical activity in the workplace reduces sickness absence by up to 20% (National Institute for Health and Care Excellence, 2008). Moreover, it has been widely emphasised that workplace physical activity strategies to improve mental wellbeing and employee productivity should focus on reducing sitting time by increasing physical activity across workplaces (Puig-Ribera et al, 2015).

However, a systematic review examined workplace health interventions for increasing physical activity and found the evidence to be inconclusive (Malik, Blake & Suggs, 2014).

Although the benefits of physical activity in promoting wellbeing are widely accepted, links between physical activity interventions and wellbeing across workplace settings remain unclear and often anecdotal. This is the first review to the author's knowledge where the effectiveness of physical activity in improving wellbeing is synthesised. Given the importance of wellbeing in workplace settings, it seems worthwhile to explore this emerging area. This article examines the impact of physical activity on employee wellbeing across workplace. It provides a review of current evidence, identifies issues and recommendations for future research.

Objectives

This review systematically investigated the evidence of effectiveness of physical activity as an intervention to improve wellbeing in adults across workplaces. The review aimed to assess the quality of the research into this topic area.

Methods

The approach of this systematic review was based on the Cochrane handbook for systematic reviews of interventions (Higgins and Green, 2011). This approach ensured that this systematic review consisted of limited bias and the evidence provided in this review was of a reliable nature. The review has been registered with PROSPERO CRD42017068826.

Systematic search

The following electronic databases were searched for studies that assessed wellbeing in physical activity interventions amongst employees: PsycINFO, PubMed, Science Direct, Web of Science, EMBASE, MEDLINE and the Cochrane library was conducted from 2007 to April 2017.

The following MESH search terms were used across the databases: Physical activity, exercise, wellbeing, work, workplace, worksite, employees, employee

Keyword Combination
Physical Activity OR Exercis* AND Wellbeing OR Employee*OR Work OR Workplace

Figure 1 Search strategy used for literature search.

Peer reviewed studies published in English Language from 2007 to April 2017 were retrieved. Additional reference lists of included studies and related systematic reviews were manually checked for further relevant articles.

Study inclusion and Exclusion criteria

Studies were eligible for inclusion in the review if they were published, peer reviewed, in English Language, described a physical activity intervention conducted in the workplace to promote wellbeing amongst employees and included an outcome measure assessing level of wellbeing. All study designs were eligible. To be eligible for inclusion, articles had to report wellbeing, and this can be assessed through a range of measures and assessments.

Studies that did not meet these criteria were excluded from the review. Additionally, studies that were published in a non-English language were excluded. There were no restrictions on the basis of sample size, participant characteristics, study length or duration of follow up. Three researchers independently reviewed all potentially relevant articles identified from the literature search for eligibility. Any disagreements between them were resolved by discussion.

Data extraction

The final sample of selected studies was reviewed by two researchers who extracted data on the country of origin, participant characteristics, intervention and study design, and measures used to assess wellbeing and the results of each paper in relation to physical activity and wellbeing outcomes. Selection bias was kept at a minimum, by allowing the two authors to assess articles separately and any disagreements were discussed and settled. Studies that were excluded at this stage from the review were discussed between the authors and reasons for exclusion were explained. If no agreement could be reached regarding disagreement, it was planned a third author would decide. Data for all eligible studies were reported using The Cochrane Collaboration Data Extraction Form (see appendix 1). Two authors were contacted for further information relating to their studies.

Quality assessment

The quality of eligible studies was assessed using the Cochrane's risk of bias tool (see appendix 2). Each study was then assessed independently by three reviewers to limit bias. The risk of bias tool covers six domains of bias: selection bias, performance bias, detection bias, attrition bias, reporting bias and other bias. This quality assessment tool measures the

risk of bias using low risk, high risk and unclear. A low risk of bias refers to the unlikelihood that the plausible bias may seriously alter results (Higgins et al, 2011). High risk bias refers to weakening the confidence of results. Unclear risk of biases refers to the doubt that may arise in terms of the results and the study (Higgins et al, 2011). A methodologically strong high quality paper will have low risk for each domain. Whilst, a study that is methodologically of a low quality will have either high risk or unclear risk of bias. Any uncertainty and disagreement between the levels of risk of bias for each study was discussed between two authors. The risk of bias was assessed in the studies to measure to what extent the results reflected true effects. A sensitivity analysis was adapted using the Cochrane's collaboration's risk of bias tool (Higgins et al, 2001).

Validity, reliability and rigour

The review has followed Cochrane methods and processes, including the use validated tools of assessment of risk of bias. None of the authors have any conflicts of interest that would affect the interpretation of the evidence in this review.

Results

Due to heterogeneity in population characteristics, intervention components outcomes measures and the durations of interventions, a meta-analysis was not feasible (Popay et al, 2006). A narrative synthesis was conducted for this review.

The literature search of all databases yielded 33,213 titles. A total of 33,183 articles were excluded after removing duplicates and after the inclusion and exclusion criteria was applied. The majority of articles were initially excluded due to irrelevance of titles and abstracts. A total of 30 full text articles were selected and examined for further review, of which 25 were excluded, with wellbeing not reported as the main reason for exclusion.

A total of 5 studies met the inclusion criteria and were included in the systematic review. No unpublished relevant studies were obtained. Details regarding the process following the review and selection of the studies are presented in figure 2.

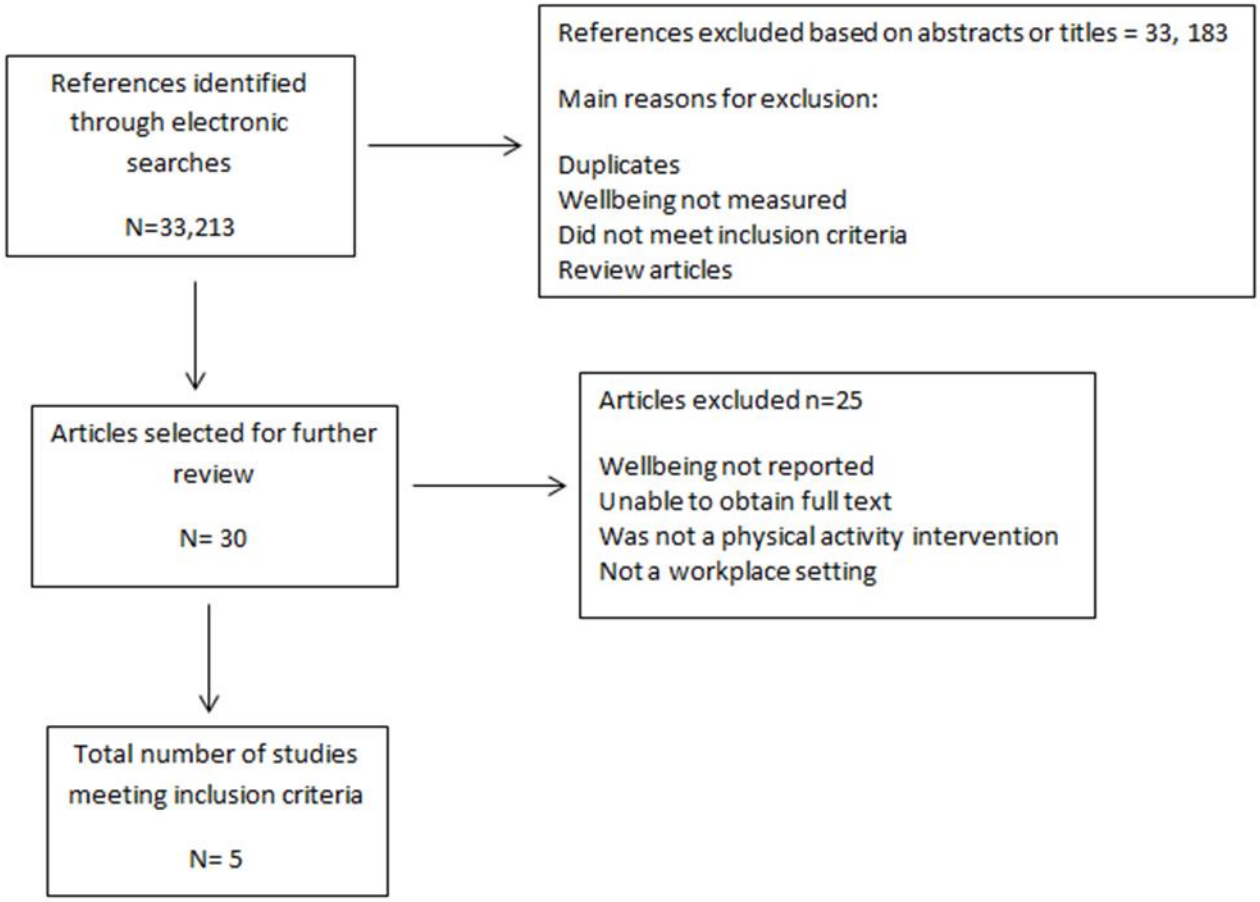

Figure 2: Flow diagram of study selection

For each study, characteristics of the studies such as sample size and setting, type of physical activity intervention, findings and a quality assessment were reported. Additionally, table 1 summarises the characteristics of the five included studies.

Study design and location

The selected studies included three randomised control trials (Kettunen, Vuorimaa & Vasankari, 2015; Puig-Ribera,McKenna, Gilson & Brown, 2008; Hartfiel et al, 2011), one experimental design (Freak-Poli, Wolfe, Wong & Peeters, 2014) and one uncontrolled feasibility trial (Thogersen-ntoumani et al, 2014).

Three high quality studies were conducted in University settings (Thogersen-ntoumani et al, 2014; Hartfiel et al, 2011; Puig-Ribera, McKenna, Gilson & Brown, 2008), one low quality study was conducted amongst small to medium sized organisations (Kettunen, Vuorimaa & Vasankari; 2015), and one high quality study did not report the type of workplace setting (Freak-Poli, Wolfe, Wong & Peeters, 2014) however it was mentioned that 10 worksites were involved.

Four studies were undertaken across Europe (Kettunen, Vuorimaa & Vasankari, 2015; Hartfiel et al, 2011; Thogersen-ntoumani et al, 2014; Puig-Ribera, McKenna, Gilson & Brown, 2008) and one was conducted in Australia (Freak-Poli, Wolfe, Wong, & Peeters, 2014). All studies expect one high quality study (Freak-Poli et al, 2014) were conducted at a single workplace, with the latter being conducted across ten Australian worksites. Therefore, highlighting the vast difference across the studies in terms of location may hinder the findings.

Participants

The sample size of the 5 studies ranged from 48 (Hartfiel et al, 2011) to 762 (Freak-Poli, Wolfe, Wong & Peeters, 2014) participants. Study participants generally consisted of more females than male across all 5 included studies. However, one high quality study (Thogersen-Ntoumani et al, 2014) did not mention the number of males or females in the study. With the daily guidelines of physical activity different for male and female (World Health Organisation, 2011), the included studies highlighted the heterogeneity across participants in the studies.

Type of physical activity intervention

The mode of physical activity interventions across the studies included exercise, yoga and walking. All studies included a behaviour change intervention where participants were actively taking part in a physical activity workplace setting intervention. The length of studies ranged from a minimum of 9 weeks (Puig-Ribera, McKenna, Gilson & Brown, 2008) to two years (Kettunen, Vuorimaa & Vasankari, 2015).

Measures

All of the included studies measured wellbeing differently using a range of questionnaires and scales. Although all of the included studies were physical activity interventions, two high quality studies (Thogersen-ntoumani et al, 2014; Hartfiel et al, 2011) did not report physical activity outcomes. However, they were suitable for eligibility as this systematic review investigated the effect of physical activity interventions in promoting wellbeing across workplace settings and physical activity improvements were not necessarily required.

Yoga

Hartfiel, Havenhand, Khalsa, Clarke and Krayer (2011) found that yoga was more effective at significantly increasing wellbeing compared to control group. The yoga programme consisted of 1 hour and 15 minutes yoga classes per week. The yoga participants at the end of the six week programme felt significantly less anxious ($p<0.0005$), less confused ($p<0.0005$), less depressed ($p<0.01$), tired ($p<0.002$) and less unsure ($p<0.010$). Moreover, yoga participants had a greater sense of life purpose and satisfaction ($p<0.0.009$) and were more confident during stressful situations ($p<0.001$). Although, participants in the yoga group reported feeling less hostile than the control group, this was not significantly evident ($p>0.189$). The control group received no form of intervention and therefore concluding that a form of intervention is better than none. According to the quality assessment, the study was of high quality. However, this study did not report physical activity as a measure. This may be due to the nature of yoga as the programme consisted of directed breathing and relaxation techniques which are difficult to report. Moreover, although this study was of a high quality, it should be mentioned that the study included individuals who were highly motivated as they were self-selected in partaking in the programme. With a sample size of 48 individuals, participants may have already had an interest in practising Yoga and their expectation of taking part in the programme may have motivated them further to do well in the programme. As a result, this expectation may have influenced participants self-reporting of perceived benefit.

Therefore, concluding that yoga based physical activity intervention is effective in promoting wellbeing across a workplace setting. However, with this being the only yoga based intervention in this review the effectiveness should be taken with caution. Although yoga is a form of physical activity (World Health Organisation, 2011), the nature of yoga is different compared to other forms of physical activity such as walking and exercise. Yoga has been found to focus on the mind and body both internally and externally compared to exercise which generally focuses on the external nature of an individual (Ross & Thomas, 2010). This may explain the findings of this high quality RCT.

Walking

Three studies investigated walking as an intervention for improving wellbeing in adults across workplaces (Thogersen-ntoumani, Loughren, Taylor, Duda & Fox, 2014; Freak-Poli, Wolfe, Wong & Peeters, 2014; Puig-Ribera, McKenna, Gilson & Brown, 2008). The three

studies found walking interventions to be effective in promoting wellbeing. However, one of the studies (Freak-Poli et al, 2014) was of low quality and as a result the quality of the three studies compromises the strength of the findings.

Thogersen-Ntoumani et al (2014) focused their walking intervention on a 16 week lunchtime programme in physically inactive 75 university employees. The first 10 weeks of the intervention consisted of three group led 30 minute lunchtime walks and two self-initiated weekend walks per week. In the following 6 weeks of the intervention all walks were self-initiated. To measure wellbeing, Thogersen-Ntoumani et al (2014) used a number of measures and instrumentation. Health perception was measured using one item from the 36 item short form MOS health survey, subjective vitality scale was used to measure general feelings of energy, The job affect scale measured job affect within the past week, Global work performance was assessed using the question 'How would you rate your overall performance on the days you worked during the past 7 days? This was taken from the World Health Organisation Health and Work Performance questionnaire. The positive and negative affect scale measured positive and negative affect. They found significant improvement ($P<0.001$) in health perceptions, subjective vitality, work performance and fatigue. These changes were sustained at four months follow up. However, the study highlighted that there were no changes identified for enthusiasm, nervousness and relaxation at work. Although this high quality study found walking to be somewhat effective in improving wellbeing, they did not report physical activity outcomes compared to the other two studies (Freak-Poli, Wolfe, Wong & Peeters, 2014; & Puig-Ribera, McKenna, Gilson & Brown, 2008). Although pedometers were provided to participants, no measures of step counts were recorded at baseline. Therefore, compared to the other walking interventions, a physical activity outcome was not recorded.

Moreover, Freak-Poli, Wolfe, Wong & Peeters, (2014) used a team based pedometer based workplace health programme to improving the wellbeing of 762 adults. After the four month intervention, subjective wellbeing improved significantly immediately ($p<0.001$) and was sustained eight months after completion of the programme ($p<0.001$). Of the 25% of individuals with poor wellbeing at baseline, 49.5% moved into positive wellbeing category immediately after intervention and sustained this eight month after ($p<0.001$). This low quality study suggests that the effectiveness of this intervention should be questioned. A large proportion of the sample (75%) reported positive wellbeing at baseline on the WHO-5 wellbeing questionnaire. It may be difficult to draw conclusions relating to the effectiveness

of the intervention as it is not possible to state whether the intervention truly improved wellbeing with such a high wellbeing percentage at baseline. Compared to the other two walking studies, this study used an educational element to the intervention by offering participants health information relating to walking and calorie loss. Therefore, it could be argued that behavioural change interventions with an education element may improve wellbeing.

Furthermore, Puig-Ribera, McKenna, Gilson & Brown (2008) examined the effect of walking amongst employees using two intervention groups of walking routes and walking whilst working and a control group who were asked to maintain their normal activity. Wellbeing was measured using the SF-12 questionnaire. The study found that individuals who were low active at baseline, showed the greatest increase in step counts, improved quality of life and wellbeing and work productivity ($p<0.01$). However, the findings demonstrated no significant group differences in changes to workday step counts. Although, participants in the intervention groups maintained their step counts, control participants step counts decreased with the approach of winter. This high quality study minimised the risk of bias in a number of areas throughout the study. Although suggesting that the strength of this RCT is promising, the duration of this study consisted of 9 weeks compared to high quality 4 months walking study (Thogersen-Ntoumani et al,2014). The short study length may explain the reasons as the why no significant group differences were found.

Therefore, the included studies highlight that walking interventions can be effective in promoting wellbeing across workplace settings. However, due to the low quality of one study and some methodological issues with some studies, the findings should be taken with caution.

Exercise

Only one study (Kettunen, Vuorimaa & Vasankari, 2015) found that wellbeing was improved by an exercise intervention. The 12 month exercise programme which contained two days training at sports camps found that stress symptoms of the exercise group decreased by 16% ($p<0.001$) and mental resources, leisure time physical activity and cardiorespiratory fitness improved during the intervention and these positive changes were retained after 1 year follow up. The control group received no exercise or programme and reported no change after the follow up. This study of low quality suggests that participants were not randomised to intervention or control group, and there was a significant difference in numbers between control and intervention groups. Therefore, suggesting that although exercise a form of

physical activity in the workplace can be effective, the results are compromised due to the low quality of this RCT study.

Table 1 –physical activity Interventions to promote wellbeing across office employees

Study	Sample and Setting	Design and Intervention	Measures	Findings	Quality Assessment
Kettunen et al (2015) Finland Aim: To investigate the effect of an exercise-training programme with a moderate volume and low intensity on stress symptoms, mental resources and cardiorespiratory fitness of healthy working adults. Study Length:2 years	Sample: 371 employees from small and medium-sized companies. Intervention group: N = 338, mean age 45± 8.8, Women = 212, Male – 126 Control Group: n=33, mean age = 41±6.9. Women= 17, Male = 16	RCT, 1 year intervention with 1 year follow up., data collections occurred at baseline, 4 month, 8 month, 12 month and 24 months. Intervention Group: 12 month exercise programme which contained 2 days training camps at a sport institute. Individuals were put into groups and each group had the same coach for the duration of the intervention. Every participant had an individualised exercise programme.	Physical Activity The weekly leisure time physical activity (LTPA) questionnaire. Cardiorespiratory fitness Maximal oxygen uptake Wellbeing The Occupational stress questionnaire (OSQ) measured the characteristics and stress factors of work and stress reactions of employees. Mental resource index (MRI)	Stress symptoms of the exercise group decreased by 16% ($p<0.0001$) and mental resources, leisure time physical activity as well as cardiorespiratory fitness improved during the 12 month intervention and these positive changes remained after the follow up year.	Low Quality

		Control group: received no supervised exercise or programme			
Hartfiel et al (2011) United Kingdom Aim: To examine the effectiveness of yoga in enhancing emotional wellbeing and resilience to stress amongst university employees. Study Length: 1 Year	Sample: 48 employees from a British University. Intervention Group: N = 20 N= 17 Female, Mean age: 40.6 Control Group: N=20, Women: n=19, Mean Age: 38.0	RCT Intervention Group: Attended at least 1 of 3 60 minute lunchtime classes per week for six weeks with a yoga instructor. Each participant received a Yoga CD which included a guided 35 minute home practice session. Control Group: No intervention	Physical Activity: Wellbeing: Profile of Mood States Bipolar (POMS-Bi) Inventory of positive psychological attitudes (IPPA)	The yoga participants at the end of the program felt significantly less anxious ($p<0.0005$), confused, ($p<0.0005$), depressed ($P<0.01$), tired ($P<0.002$) and unsure ($P < 0.010$) and had a greater sense of life purpose and satisfaction ($P<0.009$) and were more confident during stressful situations ($p<0.001$). Although the yoga group reported feeling less hostile than the control group, this	High Quality

				difference was not statistically significant (p>0.189).	
Freak-Poli et al (2014) Australia Aim: To evaluate whether the participation in a four month, team based pedometer based workplace health program known to improve biomedical risk factors is associated with improved wellbeing. Study length: 4 Months	Sample: 762 adults from 10 Australian worksites.	Data was collected at baseline, four months, and eight months after completion of the programme. Intervention: The Global Corporate Challenge (GCC) consisted of a team-based, visible step count pedometer challenge. The target is for teams to achieve 10,000 steps per day to virtually walk around a world map. Weekly encourage emails were sent. A website was used for logging	Physical Activity: Reported as part of a self-reported questionnaire incorporating demographic information and behavioural measures including meeting physical activity guidelines. Wellbeing: WHO-Five Wellbeing Index (WHO-5) to assess subjective wellbeing.	Wellbeing improved immediately after the health program (P<0.001) and was sustained eight months later (P<0.001). Out of the 25% of individuals with poor wellbeing initially, 49.5% moved into positive wellbeing category immediately after program completion and sustained eight months later (P<0.001).	Low Quality

		daily steps, access to additional heath information such as the number of steps required to burn off food item were offered.			
Thogersen-ntoumani et al (2014) United Kingdom Aim: To examine well-being and work performance changes accompanying participation in a 16 weeks lunchtime walking intervention Study length: 4 months	Sample: 75 physically inactive non-academic employees from a large British university. 92% female mean age= 47.68. All individuals had desk based jobs. Participants were eligible to take part in the intervention if they reported engaging in less than the recommended levels of physical	Uncontrolled feasibility trial. Intervention: first 10 weeks consisted of 3 groups led 30 minute lunchtime walks and 2 self-initiated weekend walks per week. In the following 6 weeks, all walks were self-initiated. Participants were provided with unsealed pedometers.	Physical Activity: Wellbeing: MOS Health Survey Subjective Vitality Scale The job Affect Scale (JAS) World Health Organisation Health and Work Performance Questionnaire (WHO HPQ) Positive and Negative Affect Scale (PANAS)	Increases in perceptions of health, subjective vitality and work performance and decreases in fatigue at work were observed. Changes were sustained four months after the end of the intervention. No changes were identified for enthusiasm, nervousness and relaxation at work.	High Quality

	activity and worked full time.				
Puig-Ribera et al (2008) Spain Aim: To examine the impact of two walking interventions on quality of life and job performance of University employees. Study length: 9 Weeks	Sample: 70 university employees	RCT Intervention Group 1: n= 19 Walking Route Intervention Group 2: n= 25 Walking while working Control: n= 26	Physical Activity: Step Count Wellbeing: SF-12 Questionnaire Work limitations Questionnaire	Low active participants showed the greatest increase in step counts and improved quality of life and work productivity.	High Quality

Discussion

The aim of this review was to systematically examine the effect of physical activity interventions in promoting wellbeing across workplaces. There have been numerous systematic reviews conducted in the past relating to workplace and physical activity (Abraham & Grahma-Rowe, 2009; Dugdill et al, 2008; Malik, Blake & Suggs, 2014). However, this was the first review to the author's knowledge that investigated wellbeing across physical activity interventions in the workplace. Inconsistency of measures and outcomes meant it was not possible to pool the data of the included studies into a meta-analysis. The findings of this review demonstrated that the five studies assessed in this review found positive and significant effects of wellbeing on physical activity interventions. The types of physical activity interventions varied across the 5 included studies with the majority implementing a walking intervention, one study implemented yoga and the fifth study consisted of an exercise programme. All intervention types were able to elicit some improvement in wellbeing versus control group with no active placebo. One RCT found no significant group differences in quality of life and step counts (Puig-Ribera, McKenna, Gilson & Brown, 2008). However, when data from the two intervention groups were pooled, positive changes were found compared to the control group. Therefore, suggesting that some form of physical activity intervention is better at improving wellbeing than nothing. Although the findings demonstrated positive results, due to the differences in quality of the included studies, the results should be taken with caution. The study investigating exercise on wellbeing (Kettunen, Vuorimaa & Vasankari, 2015) and one of the studies investigating a walking intervention (Freak-Poli, Wolfe, Wong & Peeters, 2014) were of a low quality and therefore the effectiveness and the findings of the results should be questioned.

Out of the 5 studies, three studies included a sample size of under 100 (Thogersen-ntoumani et al, 2014; Hartfiel et al, 2011; Puig-Ribera, McKenna, Gilson & Brown, 2008). Moreover, two studies in particular (Thogersen-ntoumani et al, 2014; Puig-Ribera et al, 2008) did not follow participants for a sufficient duration to allow definitive conclusions to be made regarding the effects of wellbeing. Furthermore, due to the heterogeneity of the difference in settings definitive conclusions cannot be drawn. All five studies varied in their outcomes of wellbeing and physical activity, with two studies opting to not report physical activity in their studies.

Recommendations for future research and limitations

The evidence from this review indicates that further work is required to define and measure wellbeing. An important finding of this review was the wide variation in how studies conceptualised and assessed wellbeing. This is complex due to the multi-faceted constructs of health and wellbeing across the globe and the heterogeneity across the studies. However, failure to do so precludes vigorous evidence synthesis and the exploration of most effective interventions. Given this issue, it is clear that a limitation of this review is that the keywords used during the search strategy may not have yielded all published articles. However, the comprehensive search that was conducted explored the relationship between physical activity, wellbeing and workplace. It is clear that efforts to develop a standardised definition and measure of wellbeing is designed and established for evaluating interventions consistently across different locations and workplaces. The Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS, Tennant et al, 2007) is a measure of mental wellbeing that focuses on the positive aspects of health. As a short and robust scale this tool has predominately been used to monitor wellbeing across a number of studies (Mitchell, 2013). It is recommended that more physical activity interventions in promoting wellbeing are conducted across workplaces using similar measures. This would enable reviews to examine the explanations for heterogeneity across different physical activity workplace interventions.

Moreover, various limitations in study designs were identified across the included studies. Methodological limitations across the studies included self-reported measures and short duration of follow up. In particular, the main limitation of one study (Freak-Poli, Wolfe, Wong & Peeters, 2014) was the lack of a control group. It cannot be said that an intervention is better than nothing with this particular study. Thus, emphasising that it would be difficult to draw conclusions on the effectiveness of this walking intervention.

Although this review provides promising findings, limitations to this review should be taken into account when interpreting the findings. First, the literature review was limited to academic studies published in the English Language, therefore may have missed some relevant studies published in other language or in grey literature sources. Furthermore, despite a comprehensive search of the literature across a wide range of databases, this review identified only five studies in improving wellbeing through physical activity interventions. The limited number of studies found in this review cause difficulty in establishing a link between the effectiveness of physical activity interventions in promoting wellbeing.

Moreover, this review investigated all types of physical activity interventions in workplaces. With only one study focusing on yoga, one on exercise and three on walking, the differentiation across types of physical activity interventions make it difficult to reach a straightforward conclusion on the topic.

Two of the included studies in this review were carried out in the United Kingdom, one in Spain, one study in Australia and the other in Finland. The vast difference amongst study settings raises the question about the generalisability of the findings to other countries. The feasibility and the effectiveness of these physical activity interventions are potentially limited due to differences across the globe in infrastructure, workplace settings, policies and social norms. To assess the effectiveness of physical activity interventions and wellbeing across different cultures, future reviews should focus only on one specific country. However, this may be difficult due to the limited number of original researches in the topic area. A recent systematic review (Ivandic et al, 2017) investigated the effectiveness of brief interventions targeting wellbeing in organisational settings. Similar to this review, Ivandic et al (2017) emphasised the need for high quality studies evaluation wellbeing interventions in workplace settings. Future studies should use rigorous designs and methods to provide conclusive evidence around workplace interventions and wellbeing.

Interventions should incorporate a theoretical framework and use behavioural change techniques (Abraham & Michie, 2008) to implement interventions across the targeted workforce population. A recent systematic review (Malik, Blake & Suggs, 2014) investigated a review of behaviour change techniques within workplace health promotion interventions for increasing physical activity. Although the studies included in the review demonstrated evidence that workplace physical activity interventions are somewhat effective, overall the results were inconclusive.

Due to the nature of a systematic review, there remains a risk of publication bias as interventions yielding a negative or insignificant outcome are less likely to be published (Dwan et al, 2008). Additionally, the quality of the studies was not consistent: as three studies were of high quality and two were of low quality. To minimise any bias, two researchers were involved in stages of paper selection and three researchers were involved in data extraction of each study. The great heterogeneity within the evidence of the review makes it challenging to provide details recommendations for policy makers and health professionals. Nonetheless, the evidence gathered in this review offers conclusions relating to the

effectiveness of physical activity interventions in promoting wellbeing across workplaces. This conclusion allows recommendations beyond generic physical activity benefits and can provide practitioners with conclusions relating to workplace health interventions. This review emphasises the importance of physical activity interventions in workplace settings to improve the health of the working population. The findings highlighted that a form of intervention regardless of the type of physical activity is better than no intervention at all.

The conclusions of this systematic review are promising. However, the findings are limited primarily by the methodological quality of evidence. Some of the included studies were of a low quality with a number of concerns relating to high risk of bias. Current evidence indicates that employees can improve their wellbeing by participating in physical activity interventions in the workplace. However, the evidence base on the most effective intervention type is inconclusive and lacks the range of behavioural underpinnings. Researchers would need to investigate this topic further to draw well founded conclusions relating to this area of workplace health.

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Appendices

Appendix 1: The Cochrane Collaboration Data Extraction Form

Intervention review

This form can be used as a guide for developing your own data extraction form. Sections can be expanded and added, and irrelevant sections can be removed. It is difficult to design a single form that meets the needs of all reviews, so it is important to consider carefully the information you need to collect and design your form accordingly. Information included on this form should be comprehensive and may be used in the text of your review, 'Characteristics of included studies' table, risk of bias assessment, and statistical analysis.

Notes on using a data extraction form:

- Be consistent in the order and style you use to describe the information for each report..
- Record any missing information as unclear or not described, to make it clear that the information was not found in the study report(s), not that you forgot to extract it.
- Include any instructions and decision rules on the data collection form, or in an accompanying document. It is important to practice using the form and give training to any other authors using the form.

Review title or ID

Study ID *(surname of first author and year first full report of study was published e.g. Smith 2001)*

Report IDs of other reports of this study *(e.g. duplicate publications, follow-up studies)*

Notes:

1. General Information

Date form completed *(dd/mm/yyyy)*	
Name/ID of person extracting data	
Report title *(title of paper/ abstract/ report that data are extracted from)*	
Report ID *(ID for this paper/ abstract/ report)*	
Reference details	
Report author contact details	
Publication type *(e.g. full report, abstract, letter)*	
Study funding sources *(including role of funders)*	
Possible conflicts of interest *(for study authors)*	
Notes:	

2. Study Eligibility

Study Characteristics	**Eligibility Criteria** *(Insert eligibility criteria for each characteristic as defined in the Protocol)*	Yes	No	Unclear	**Location in text** *(pg & ¶/fig/table)*
Type of study	Randomised Controlled Trial	☐	☐	☐	
	Controlled Clinical Trial *(quasi-randomised trial)*	☐	☐	☐	

Participants		☐ ☐ ☐	
Types of intervention		☐ ☐ ☐	
Types of outcome measures		☐ ☐ ☐	
INCLUDE ☐ **EXCLUDE** ☐			
Reason for exclusion			
Notes:			

DO NOT PROCEED IF STUDY EXCLUDED FROM REVIEW

3. Population and setting

	Description *Include comparative information for each group (i.e. intervention and controls) if available*		**Location in text** *(pg & ¶/fig/table)*
Population description *(from which study participants are drawn)*			
Setting *(including location and social context)*			
Inclusion criteria			
Exclusion criteria			
Method/s of recruitment of participants			
Informed consent obtained	☐ ☐ ☐ Yes, No Unclear		
Notes:			

4. Methods

	Descriptions as stated in report/paper	**Location in text** *(pg & ¶/fig/table)*
Aim of study		
Design *(e.g. parallel, crossover, cluster)*		

Unit of allocation *(by individuals, cluster/ groups or body parts)*			
Start date			
End date			
Total study duration			
Ethical approval needed/ obtained for study	☐ ☐ ☐ Yes, No Unclear		
Notes:			

5. Participants

Provide overall data and, if available, comparative data for each intervention or comparison group.

	Description as stated in report/paper	**Location in text** (pg & ¶/fig/table)
Total no. randomised *(or total pop. at start of study for NRCTs)*		
Clusters *(if applicable, no., type, no. people per cluster)*		
Baseline imbalances		
Withdrawals and exclusions *(if not provided below by outcome)*		
Age		

Sex		
Race/Ethnicity		
Severity of illness		
Co-morbidities		
Other treatment received *(additional to study intervention)*		
Other relevant sociodemographics		
Subgroups measured		
Subgroups reported		
Notes:		

6. Intervention groups

Copy and paste table for each intervention and comparison group

Intervention Group 1

	Description as stated in report/paper	**Location in text** *(pg & ¶/fig/table)*
Group name		
No. randomised to group *(specify whether no. people or clusters)*		
Theoretical basis *(include key references)*		

Description *(include sufficient detail for replication, e.g. content, dose, components)*		
Duration of treatment period		
Timing *(e.g. frequency, duration of each episode)*		
Delivery *(e.g. mechanism, medium, intensity, fidelity)*		
Providers *(e.g. no., profession, training, ethnicity etc. if relevant)*		
Co-interventions		
Economic variables *(i.e. intervention cost, changes in other costs as result of intervention)*		
Resource requirements to replicate intervention *(e.g. staff numbers, cold chain, equipment)*		
Notes:		

7. Outcomes

Copy and paste table for each outcome.

Outcome 1

	Description as stated in report/paper	**Location in text** *(pg & ¶/fig/table)*
Outcome name		
Time points measured		

Time points reported		
Outcome definition *(with diagnostic criteria if relevant)*		
Person measuring/reporting		
Unit of measurement *(if relevant)*		
Scales: upper and lower limits *(indicate whether high or low score is good)*		
Is outcome/tool validated?	☐ ☐ ☐ Yes, No Unclear	
Imputation of missing data *(e.g. assumptions made for ITT analysis)*		
Assumed risk estimate (*e.g. baseline or population risk noted in Background)*		
Power		
Notes:		

8. Results

Copy and paste the appropriate table for each outcome, including additional tables for each time point and subgroup as required.

Dichotomous outcome

	Description as stated in report/paper	**Location in text** *(pg & ¶/fig/table)*
Comparison		

Outcome					
Subgroup					
Timepoint *(specify whether from start or end of intervention)*					
Results	**Intervention**		**Comparison**		
	No. events	No. participants	No. events	No. participants	
No. missing participants and reasons					
No. participants moved from other group and reasons					
Any other results reported					
Unit of analysis *(by individuals, cluster/groups or body parts)*					
Statistical methods used and appropriateness of these methods *(e.g. adjustment for correlation)*					
Reanalysis required? *(specify)*	☐ ☐ ☐ Yes, No Unclear				
Reanalysis possible?	☐ ☐ ☐ Yes, No Unclear				
Reanalysed results					
Notes:					

Continuous outcome

	Description as stated in report/paper						**Location in text** *(pg & ¶/fig/table)*
Comparison							
Outcome							
Subgroup							
Timepoint *(specify whether from start or end of intervention)*							
Post-intervention or change from baseline?							
Results	**Intervention**			**Comparison**			
	Mean	SD (or another variance)	No. participants	Mean	SD (or another variance)	No. participants	
No. missing participants and reasons							
No. participants moved from other group and reasons							
Any other results reported							
Unit of analysis *(individuals, cluster/ groups or body parts)*							
Statistical methods used and appropriateness of these methods *(e.g. adjustment for correlation)*							
Reanalysis required? *(specify)*	☐ ☐ ☐ Yes, No Unclear						

Reanalysis possible?	☐ ☐ ☐ Yes, No Unclear		
Reanalysed results			
Notes:			

Another outcome

	Description as stated in report/paper				**Location in text** *(pg & ¶/fig/table)*
Comparison					
Outcome					
Subgroup					
Timepoint *(specify whether from start or end of intervention)*					
Results	Intervention result	SD (or another variance)	Control result	SD (or another variance)	
	Overall results		SE (or another variance)		
No. participants	Intervention		Control		
No. missing participants and reasons					
No. participants moved from other group and reasons					
Any other results reported					

Unit of analysis *(by individuals, cluster/groups or body parts)*			
Statistical methods used and appropriateness of these methods			
Reanalysis required? *(specify)*	☐ ☐ ☐ Yes, No Unclear		
Reanalysis possible?	☐ ☐ ☐ Yes, No Unclear		
Reanalysed results			
Notes:			

9. Applicability

Have important populations been excluded from the study? *(consider disadvantaged populations, and possible differences in the intervention effect)*	☐ ☐ ☐ Yes, No Unclear	
Is the intervention likely to be aimed at disadvantaged groups? *(e. g. lower socioeconomic groups)*	☐ ☐ ☐ Yes, No Unclear	
Does the study directly address the review question? *(any issues of partial or indirect applicability)*	☐ ☐ ☐ Yes, No Unclear	
Notes:		

10. Other information

	Description as stated in report/paper	**Location in text** *(pg & ¶/fig/table)*
Key conclusions of study authors		
References to other relevant studies		
Correspondence required for further study information *(from whom, what and when)*		
Notes:		

Appendix 2: Cochrane's risk of bias tool

11. Risk of Bias assessment

See Chapter 8 of the Cochrane Handbook

Domain	**Risk of bias** Low risk ☐ High risk ☐ Unclear ☐	**Support for judgement**	**Location in text** *(pg & ¶/fig/table)*
Random sequence generation *(selection bias)*	☐ ☐ ☐		
Allocation concealment *(selection bias)*	☐ ☐ ☐		
Blinding of participants and personnel *(performance bias)*	☐ ☐ ☐	**Outcome group: All/**	
(if required)	☐ ☐ ☐	**Outcome group:**	
Blinding of outcome assessment *(detection bias)*	☐ ☐ ☐	**Outcome group: All/**	
(if required)	☐ ☐ ☐	**Outcome group:**	
Incomplete outcome data *(attrition bias)*	☐ ☐ ☐		
Selective outcome reporting? *(reporting bias)*	☐ ☐ ☐		
Other bias	☐ ☐ ☐		

Notes:

Appendix 3: Inclusion and Exclusion Criteria

	Inclusion	Exclusion
Population	Any individuals in a workplace setting	Non-workplace setting
Interventions	Any physical activity/Exercise behavioural intervention to promote wellbeing	Providing education/counselling interventions
Comparators	Any	Any
Outcomes	1. WEMWBS (Warwick-Edinburgh Mental Wellbeing Scale) 2. Physical activity levels 3. BMI	Wellbeing not measured
Study design and Quality	RCTs Published between 2007-2017	Published before 2007

Appendix 4: Quality Assessment

	Type of physical activity intervention	Random sequence generation	Allocation Concealment	Blinding of participants & personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Other bias	Quality assessment
Hartfiel et al 2011	Yoga	+	+	?	+	+	+	+	High quality
Freak-Poli et al 2014	Walking	-	-	?	+	+	+	?	Low quality
Puig-Ribera et al 2008	Walking	+	+	-	+	+	+	-	High quality
Thogersen-ntoumani et a 2014	Walking	+	+	?	+	+	+	+	High quality
Kettunen et al 2015	Exercise	-	-	?	+	-	+	-	Low quality