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Weighing up the evidence: A systematic review of the effectiveness of workplace interventions to tackle socio-economic inequalities in obesity

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ABSTRACT

Background: Addressing socio-economic inequalities in obesity is a public health priority and the workplace is seen as a potential health promotion site. However, there is a lack of evidence on what works. This paper systematically reviews studies of the effects of workplace interventions on socio-economic inequalities in obesity.

Methods: Following PRISMA guidelines, we searched for published or unpublished experimental and observational evaluation studies. Nine electronic databases were searched as well as websites and bibliographies. Included studies were data extracted, quality assessed, and narratively synthesised.

Results: 18 studies were included of which 14 examined behavioural interventions and 4 mixed or environmental ones. Whilst most studies (n=12) found no effects on inequalities in obesity – and a minority found increases (n=3), there was also some evidence of potentially effective workplace interventions (n=3) especially in terms of physical activity interventions targeted at lower occupational groups.

Conclusion: There is experimental evidence that workplace delivered physical activity interventions have the potential to reduce inequalities in obesity by targeting lower occupational groups. However, overall, the evidence base is small, largely from the USA, and of a low quality. More high-quality, experimental study designs are required.

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BACKGROUND

Tackling obesity is one of the major contemporary public health policy challenges and is vital in terms of addressing health inequalities [1, 2] . Obesity is causally linked to diabetes, coronary heart disease, stroke, hypertension, osteoarthritis and certain forms of cancer. Socio-economic inequalities in obesity and risk factors for obesity are large and widening [1, 3-6]. For example, in some areas of the UK, obesity rates in the most deprived areas are almost double those in the most affluent areas[7, 8]. Addressing inequalities in obesity therefore has a very high profile on the public health agenda internationally, nationally and locally.

However, there is increasing recognition that tackling inequalities in obesity requires integrated policy action across different levels[1, 9], targeting the broader societal determinants of obesity [4]. This is because the aetiology of obesity is complex – it is the outcome of important structural drivers in the food system and in the contemporary organisation of society. Settings-based approaches, as proposed by the Ottawa Charter for health promotion and alluded to in the Foresight Review [1] have therefore been proposed as potentially important ways in which inequalities in obesity can be reduced.

Workplaces are potentially promising settings for health promotion given that adults spend a substantial amount of their time at work, they are controlled environments, and have existing delivery infrastructure and social networks [10]. The workplace is also widely recognised as a social determinant of health and health inequalities[11], with both the physical and the psychosocial work environments themselves associated with obesity[12]. The workplace is therefore considered to be one of the

ways in which interventions can address inequalities via action on the social and behavioural determinants of health – living and working conditions[13].

However, existing systematic reviews only examine the effects of workplace interventions that reduce overall levels of obesity, as opposed to the effects on *inequalities* in obesity[14-17]. There is, therefore, no information to help policymakers and service commissioners assess what types of workplace interventions are most effective at reducing inequalities in obesity. Further, systematic reviews in public health have seldom examined the implementation of interventions. Context is increasingly recognised as an important factor in the success of public health interventions[18]. Similarly, questions around implementation have been shown to be important in relation to other types of workplace interventions[19]. However, the assessment of implementation has not really featured strongly in previous systematic reviews.

Against this backdrop – and as part of a wider review of inequalities in obesity (<http://www.nets.nihr.ac.uk/projects/phr/09301014>), the objectives of this systematic review were twofold:

- (1) To systematically review the effectiveness of workplace interventions in reducing socio-economic inequalities in obesity; and
- (2) To establish how such interventions are organised, implemented and delivered.

The aim of the review to uncover how inequalities in obesity can be addressed through workplace interventions by focusing on whether or not obesity reduction is achieved by all SES groups or benefitting/disadvantaging lower SES groups.

METHODS

This paper is part of a wider systematic review commissioned by the National Institute for Health (NIHR) to examine the effectiveness of interventions to reduce inequalities in obesity in a whole systems way (<http://www.nets.nihr.ac.uk/projects/phr/09301014>). The review was registered with PROSPERO (registration number: CRD42013003612) and the protocol is available online[20]. This paper reports only on the findings of the studies of workplace interventions.

Inclusion/exclusion criteria

Studies of adults aged over 18 years, in any country, in any language were included. Interventions had to be implemented in actual workplaces and so non-workplace laboratory-based studies were excluded. Any behavioural (e.g. health education or exercise), environmental (such as removal of unhealthy foods, replacement of lifts with stairs) or organisational (e.g. changes to working hours) workplace interventions were included. Interventions were also classified in terms of whether they took a universal approach and included participants of all socio-economic status or a targeted approach i.e. they were aimed at low occupation participants only[21].

Measures and proxy measures of SES were income, education, occupation or area level disadvantage. In terms of outcomes, we only included studies if they included a primary outcome for obesity. Obesity was measured in terms of proxies for body fat (weight and height; BMI; waist measurement/waist-to-hip ratio; percentage of fat content; skin fold thickness). Data on related secondary outcomes (such as physical activity levels; dietary intake; blood results such as cholesterol, and glucose) were also extracted from those included studies that had a primary outcome. Both objective and self-reported measures were included. Interventions involving drugs or surgery were excluded.

In keeping with previous workplace reviews, we included experimental (including cluster trials) and observational evaluation studies (prospective and retrospective with or without control groups [22-24]. Only studies with duration of at least 12 weeks (combination of intervention and follow up) were included.

Searches

Nine databases were searched from their start dates to 11th October 2012: MEDLINE; EMBASE; CINAHL; PsycINFO; Social Science Citation Index; ASSIA; IBSS; Sociological Abstracts; and the NHS Economic Evaluation Database. We searched for documents of any type, from any country, at any time and in any language using terms related to intervention, outcome and study design. The electronic database searches were supplemented with website and grey literature searches. The full search strategy is available in Web Appendix 1.

Data extraction and quality assessment

The initial screening of titles and abstracts was conducted by one reviewer with a random 10% of the sample independently checked by a second reviewer. Data extraction was conducted by one reviewer using established data extraction forms and independently checked by a second reviewer. Methodological quality was appraised independently by two reviewers using the Cochrane Public Health Review Group recommended Effective Public Health Practice Project Quality Assessment Tool for Quantitative Studies [25, 26](Web Appendix 2). Any discrepancies were resolved through discussion between the authors and, if consensus was not reached, with the project lead.

Implementation

Data on the organisation, implementation and delivery of interventions was extracted by adapting and refining the Egan and colleagues methodological tool for the assessment of implementation of complex public health interventions in systematic reviews (see Box 1)[18].

Data analysis

The studies identified were not considered to be sufficiently homogenous to enable meta-analysis to be undertaken [22-24, 27]. We therefore use narrative synthesis to summarise the results, reporting study findings separately by type of intervention (behavioural or environmental) and reporting the main characteristics of included studies along with information regarding the study quality.

RESULTS

Our database searches identified 70 730 records (Web Figure 1). After title and abstract screening 3142 papers were retrieved for full paper review. Supplementary searching revealed four additional studies. After full paper screening, 76 studies met our full review inclusion criteria (reported elsewhere <http://www.nets.nihr.ac.uk/projects/phr/09301014>) of which 18 related to workplace interventions. Success of interventions to reduce inequalities is assessed by having shown that workplace interventions are effective at reducing obesity in all groups equally (if a universal study) or lower SES groups (if targeted).

14 studies evaluated behavioural interventions (including exercise, counselling, and education), three studies examined behavioural and environmental interventions (e.g. behaviour interventions plus access to healthy food, stairwell enhancements) and one study examined a workplace food voucher scheme. There were no studies located of the effects of organisational changes on inequalities in obesity. Nine studies examined interventions targeted at lower grade workers, whilst ten were universal and examined the effects of interventions on the social gradient in obesity.

Interventions were usually focused on particular occupational settings including manufacturing, health care, or education. A number of studies were of predominantly male (n=5) or female (n=6) populations. Thirteen studies were from the USA (with one each from Chile, Brazil, Australia, Korea, and Germany). There were only five experimental studies and the rest were observational. Overall, the quality of the evidence was low as there were only two 'strong' and eight 'moderate' quality studies.

These are summarised in Tables 1-4 and synthesised narratively by intervention type (behavioural, mixed, environmental), level (targeted or universal) and study design/quality.

Behavioural Interventions (n=14)

Behavioural - targeted (n=8)

A strong quality RCT[28] examined a 5-year workplace health promotion programme amongst 538 blue collar female workers in the USA. There were two interventions across nine worksites - individualised computer-tailored health messages and lay health advisors – and a waiting list control. There were two follow-ups at six and eighteen months. There were no significant changes in BMI in either intervention group.

A strong quality cluster RCT[29] investigated the effects of workplace interventions in four manufacturing workplaces in the USA amongst predominantly male, middle-aged, blue collar workers (n=690). Intervention site A received health screening and health education; site B received health screening, health education and follow-up counselling; and site C received health screening, health education, follow-up counselling and organised physical activities. The control site received health screening only. At 3-year follow-up, the results showed that only intervention group C experienced significant weight loss (2kg; $p<0.001$).

A small (n=37), moderate quality RCT[30] investigated the effects of a workplace exercise programme amongst blue collar, female workers in the USA. Participants engaged in walking, jogging, or cycling for three days a week. At follow-up (24 weeks), the intervention group lost an average of 2 kg relative to the control group (between group difference $p < 0.025$). There was no difference between the groups in terms of in body fat ($p < 0.056$).

A small (n=30), weak quality, non-randomised controlled trial [31] investigated the effects of an 8-week computer-assisted instruction weight management programme for overweight middle-aged, predominantly male, blue collar employees of an automobile manufacturing company in the USA. A second worksite acted as a non-randomised control group. There were no statistically significant changes in weight at one year follow up.

A weak quality, controlled prospective cohort design (using a self-selected comparison group) was used to investigate the effects of a cardiovascular health awareness programme[32]. The intervention - which involved health screening and individual and group counselling - was conducted amongst 198 mainly middle-aged, low-income female employees of a hospital in the USA. There were no statistically significant differences in BMI or waist circumference at the 4 year follow-up point.

Three small, weak quality, uncontrolled prospective cohort studies of lifestyle counselling interventions in Chile [33, 34], Germany [35] and the USA [36] found no significant effects on BMI or weight.

Behavioural - universal (n=6)

A moderate quality RCT [37] examined telephone and internet behaviour counselling interventions compared to a control group. The participants were mainly female and from a variety of workplaces in the USA. The study found significant reductions after six months in waist circumference amongst both the telephone (-1.9cm, 95% CI -2.7; -1.0cm) and the internet groups (-1.2cm, 95% CI -1.7; -0.5 cm) as well as reductions in weight (telephone -1.5 kg, 95% CI -2.2; -0.8KG; internet group -0.6 kg, 95% CI -1.3; -0.01 kg). There were no differences in outcomes by educational background.

A moderate quality, uncontrolled prospective cohort study evaluated a pedometer physical activity programme amongst 604 middle-aged, participants in Australia[38]. It found a significant difference in waist circumference reduction by education group: between baseline and four-month follow-up, participants who had completed tertiary education at baseline had a 2.1cm larger reduction than lower educated participants.

Four uncontrolled observational studies (moderate/weak quality) of advice based interventions in the USA [39-41]and Korea [42] found no significant differences in weight loss or BMI by occupational grade or income.

Behavioural and environmental workplace interventions (n=3)

Universal (n=3)

A moderate quality cluster RCT investigated the effects of a mixed weight prevention intervention in predominantly female hospital employees, conducted across six worksites in the USA (n=648) [43]. The intervention included social marketing, environmental strategies promoting physical activity (e.g. stairway signs, walking groups) and healthy eating (cafeteria signs, Farmer's Markets), and strategies promoting interpersonal support. There was no significant impact on BMI at 12 or 24 month follow-up. However, differential effects were found in terms of weight gain with those with a higher education or income level least likely to gain weight.

A moderate quality controlled prospective cohort study (with 1- and 5-year follow-ups) investigated the effects of a worksite wellness programme in the USA which comprised individual action plans with environmental modifications. Individual action plans included maintaining an exercise journal and joining 'Weight Watchers At Work' [44]. The environmental modifications involved opening up and decorating the stairwell (prompts were also used) and replacing unhealthy options in the vending machines. 19,559 participants were recruited into the study with a national control group taken from insurance records. The results showed that participants lost weight relative to the control with a 1.10% average reduction in BMI ($p < 0.01$). However, lower educated participants lost weight at a quicker rate (college graduate: -0.88%, $p < 0.01$; some college: -1.41%, $p < 0.01$; high school only: -1.45%, $p < 0.01$).

A moderate quality, uncontrolled prospective cohort study of 1,222 employees in six organisations in the USA [45] found that whilst body weight decreased on average, there were no differences after two years by educational level as a result of a mixed environmental and behavioural intervention. Interventions included making healthy

foods/beverages affordable, increasing access to healthy foods, aesthetic stairwell enhancements, free pedometers, on-site self-weighing, worksite advisory groups, and site-wide publicity of nutrition and exercise activities.

Environmental-level studies (n=1)

Targeted (n=1)

A weak quality, retrospective controlled cohort study of routine annual workplace health monitoring surveys of 10,368 workers, investigated the annual effects of the Brazilian national Food Workers' Programme over a 5 year period (1995-2000) [46, 47]. Implemented since the 1970's, the programme aimed to ensure adequate nourishment for low-income workers by funding employers to provide food or food coupons. The study found that the incidence of overweight increased per year to a greater extent in workplaces implementing a food programme compared with workplaces with no programme: odds ratio of overweight = 1.91 (95% CI 1.26-2.91). There were significant differences by occupational group with higher incidence of overweight in low and medium grade workers compared to higher grade workers.

Summary of results

Three of the 18 studies [29, 30, 44] are deemed successful as they found significant effects of workplace interventions in the desired direction with BMI and weight decreasing following multi-component programmes, with all three including physical activity. They were strong-moderate quality studies; two of which were universal studies [29, 44] and the other was targeted at lower income blue collar employees [30] thus benefitting all employees equally and also reducing inequality. However, three other studies (moderate-weak) found significant effects of the interventions

which increased inequality in obesity [38, 43, 47]. These interventions were varied including pedometer based intervention, a social marketing campaign, and food coupons. They were all universal interventions benefitting higher income or educated. The remaining studies did not find significant changes in anthropometric measures or BMI so were inconclusive.

Assessment of implementation

Data on the organisation, implementation and delivery of interventions was reported for all of the studies, with 15 providing information for five or more of the ten domains of the methodological tool(6). These are summarised in Web Appendix 1. Most of the studies provided data for motivation, context, experience of the intervention team and resources. The type and level of information varied substantially for each of the domains making comparisons between the studies difficult. There were no apparent differences between interventions that were successful in reducing inequalities in obesity and those that were not. There appeared to be no differences in the experience of intervention team between successful and unsuccessful interventions (for example trained or professional facilitators were reported for both), and interventions reporting a level of resources (incentives, supportive materials, contact time and training of facilitators) did not appear to be related to outcomes. Only three studies reported consultation or collaboration processes (for example public or participant involvement) [28, 29, 40]. Some studies mentioned problems affecting sustainability, for example Scoggins et al [44] discussed the willingness of employees as a significant resource and how it was important to incentivise employees to participate in the programme.

DISCUSSION

Main findings

The evidence reviewed here suggests that counselling or advice-based interventions – whether targeted or universally delivered - are ineffective in reducing inequalities in obesity, with none of the eleven studies of these finding any effects on BMI or weight. Another systematic review conducted by Rongen and colleagues [15] which examined the effectiveness of workplace health promotion interventions on various health outcomes including obesity similarly found that workplace interventions with a counselling component were not as effective as other intervention types. However, two RCTs (strong/moderate quality) found that physical activity interventions targeted at low income workers could be effective in reducing inequalities in obesity with small weight reductions (2kg) detected in both evaluations[29, 30]. However, an observational study (moderate quality) of a universally delivered physical activity intervention found that it increased educational inequalities in waist circumference [38].

The effects on inequalities in obesity of interventions that combined behavioural interventions with environmental modifications were inconclusive. A moderate quality cluster RCT found that weight gain was least likely amongst higher educated participants [43], whilst a controlled prospective cohort study (moderate quality) found that BMI reductions were slowest amongst this group [44]. The third study – a moderate quality uncontrolled prospective cohort study - found no significant differences by education. Additionally, the weak quality, retrospective controlled cohort study of an employer delivered food voucher scheme found that there was a

higher incidence of overweight in low and medium grade workers compared to higher grade workers [46, 47].

What is already known on this subject?

Obesity is causally linked to such chronic diseases as diabetes, coronary heart disease, stroke, hypertension, osteoarthritis and certain forms of cancer. It is a major cause of premature mortality as well as long term incapacity and associated reductions in quality of life. [20] Obesity is associated with social and economic deprivation in developed countries worldwide, with higher prevalence in the lowest income quintile[9, 48-50]. In the UK, there are strong associations between obesity and socio-economic status[7]. In some areas, obesity rates in the most deprived quintile were almost double those in the least deprived quintile [7, 8]. Tackling inequalities in obesity is seen to be a public health priority [51].

The workplace has potential as a site of health promotion and the National Institute for Health, Social Care and Clinical Excellence (NICE) has released guidance that highlights the important role of workplaces in public health [52, 53]. Systematic reviews have found that workplace smoking cessation interventions can be effective[52]. There is also evidence that workplace interventions – both behavioural and environmental - can be effective in terms of changing risk factors for obesity e.g. by increasing physical activity [53]. Workplace interventions also have some promise in terms of reducing overall rates of obesity [14-17]. However, it has recently been found that the overall effectiveness of workplace health promotion interventions is small and those with counselling components are less effective [54], which is mirrored by the results of this analysis.

There is also little prior research on how workplace interventions can be used to tackle socio-economic inequalities in obesity. The meta-analysis by Rongen et al (ref) shows that workplace health promotion interventions are more effective in predominantly white-collar individuals, which implies that such interventions may widen rather than narrow inequalities in health outcomes. Their suggestion that workplace interventions be tailored to specific groups is valid given the varied and mixed findings in our systematic review.

What this study adds

This is the first study to systematically review the effects of workplace interventions on inequalities in obesity. It has found a small (n=18), generally low quality, and largely observational international evidence base dominated by behavioural interventions. Whilst there is no evidence of effectiveness for workplace lifestyle advice/counselling interventions and the evidence of environmental interventions is inconclusive, there is some experimental evidence to suggest that workplace delivered physical activity interventions may be effective in reducing inequalities in obesity.

Limitations

This review entailed an extremely thorough search of the international literature with a very broad inclusion and exclusion criteria that has ensured that the entire relevant experimental and observational evidence base was captured. The evidence base itself is subject to a number of limitations, most notably the small number of experimental studies, the dominance of studies from the USA, and the few environmental studies found and the entire lack of any studies of the effects of

organisational interventions of inequalities in obesity. Furthermore, a limited number of studies (10%) were double screened; a pragmatic decision made based on the high volume of studies elicited from the searches as part of the wider review (70,730). It is often necessary to make pragmatic decisions in systematic reviews [55].

Conclusion

There is some experimental evidence that workplace delivered physical activity interventions have the potential to reduce inequalities in obesity by targeting lower occupational groups. However, overall, the evidence base is small, largely from the USA, and of a low quality. More high-quality, experimental study designs are required.

Conflict of interest

The authors have nothing to disclose.

Contributions of authors

JMC was responsible for data collection, and contributed to analysis and synthesis. JMC and CB drafted this article jointly. CB was the Principal Investigator and was responsible for overall design, co-ordination and project management. She provided methodological and conceptual direction, and led analysis, synthesis and interpretation. FH contributed to data collection, analysis and synthesis. HM designed and conducted the searches and contributed to data collection. CS provided methodological input. All authors contributed to revised successive drafts of this article and approved the final version submitted for publication.

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Box 1: Thematic checklist for the appraisal of the reporting, planning and implementation of workplace interventions*

Theme	Checklist Question for Workplace Reviews
A. Motivation	Does the study describe why the management decided to subject the employee population to the organisational change?
B. Theory of Change	Was the intervention design influenced by a theory of change describing the proposed pathway from implementation to health outcome?
C. Context	Does study provide any useful contextual information relevant to implementation of the intervention (e.g. political, economic or managerial factors)?
D. Experience	Does study establish whether those implementing the intervention had appropriate experience (e.g. Had the implementers conducted similar interventions before; or if managers/employees were involved, were they appropriately trained for new roles)?
E. Consultation	Is there a report of consultation/collaboration processes between managers, employees and any other relevant parties during the planning stage?
F. Collaborations	Is there a report of consultation/collaboration processes between managers, employees and any other relevant parties during the delivery stage?
G. Manager support	Were on-site managers/supervisors supportive of the intervention (eg. Do authors comment on manager's views of intervention?)?
H. Employee support	Were employees supportive of the intervention (e.g. do authors comment on employee's views of intervention?)?
I. Resources	Does study give information about the resources required in implementing the intervention (e.g. time, money, people, and equipment)?
J. Differential effects, population characteristics	Does the study provide information on the characteristics of people for whom the intervention was beneficial, and the characteristics of those for whom it was harmful or ineffective?

*From Egan et al, 2007[24]

Table 1: Targeted behavioural interventions (n=8)

Study	Design & Quality Appraisal ¹	Setting & Participants	Intervention & Implementation ²	Inequality ³	Summary of Effects on Inequalities in Obesity ⁴	
					↑ = increased ↓ = decreased ↔ = no effect	
Campbell et al 2002[28]	Cluster randomised controlled trial 6 and 18 month follow up Final sample = 538 Quality = Strong	9 worksites, USA 100% Women No mean age provided	Health Works for Women (HWW) – Two strategies: (1) individualised computer-tailored health messages combined health behaviour change theory, communication theory, social marketing, and new technology (2) a natural helpers program at the workplace (lay health advisor) designed to affect behavioural and social change through the ‘natural’ social networks of individuals Implementation = 5	Targeted: low income workplaces	BMI	↔
Erfurt et al 1991[29]	Cluster randomised controlled trial 3 year follow up Final sample = 690 Quality = Strong	4 Workplaces, USA 39-43 years Predominately male	Workplace Wellbeing interventions: screening only (control) vs. screening + health education (A) vs. screening + health education + follow up counselling (B) vs. screening + health education + follow up counselling + organised physical activities (C) Implementation = 6	Targeted: blue collar employees	Body weight Intervention A Intervention B Intervention C	↔ ↔ ↓

Grandjean et al 1996[30]	Randomised controlled trial 24 week follow up Final sample = 37 Quality = Moderate	Workplace, USA 100% female Sedentary	Workplace exercise programme – walking, jogging, cycling or combination at least three days per week for 24 weeks (individualised exercise prescription) carried out at workplace fitness facility. Implementation = 3	Targeted: blue collar employees	Weight Body fat	↓ ↔
Dennison et al 1996 [31]	Controlled (quasi-experimental) trial 1 year follow up Final sample = 30 Quality = Weak	2 workplaces, USA 47 years 90% male 20-35% over ideal weight	“Weigh to Go” programme – Nutrition information; computerised food intake and activity analysis and feedback; personal guidelines; incentives for weight loss (t-shirts, lunch bags, books) Implementation = 6	Targeted: blue collar workers	Weight	↔
Pescatello et al 2001 [32]	Prospective controlled cohort study 4 years follow-up Final sample = 198 Quality = Weak	1 workplace, USA Mean = 41 years 87% female	Cardiovascular health awareness program (CHAP) – Annual cardiovascular screens and results counselling (individualised feedback and methods to adopt or maintain healthy lifestyle behaviours) Encouragement to participate in formal, group education and behavioural support programs held at the workplace and off site Implementation = 3	Targeted: low income employees	BMI Waist Circumference Waist-to-hip ratio	↔ ↔ ↔

Kain et al 2010 [34]	Uncontrolled prospective cohort 5 and 24 month follow up Final sample = 47 Quality = Weak	Workplaces (schools), Chile Teachers Age/sex not reported	Teacher intervention: 3x 15 minute counselling sessions healthy eating and physical activity; plus goal setting – with nutritionist Implementation = 6	Targeted: low income area	BMI Waist circumference	↔ ↔
Hugk and Winkelvoss 1985 [35]	Uncontrolled before/after study 1 year follow up Final sample = 50 Quality = Weak	1 workplace, Germany 22-67 years 95% male Obese	Outpatient weight reduction programme; individual doctor interviews discussing current behaviours diet, lifestyle; nutrition and physical activity education; calorie reduced diet Implementation = 3	Targeted: blue collar workers	Body weight	↔
Williams & Wold 2000[36]	Uncontrolled prospective cohort 1 year follow-up Final sample = 71 Quality = Weak	2 workplaces, USA Working age	Mobile nursing cardiovascular risk factor identification programme – screening; individualised education-based interview focused on dietary and physical activity behaviour change; follow-up report and letter Implementation = 6	Targeted: low- income areas	BMI	↔

¹ Global Quality appraisal from EPHPP see Web Appendix 2

² Number of implementation appraisal criteria met out of 10

³ Targeted/Universal approach to inequality, measure of inequality/SES

⁴ $p < 0.05$. For controlled studies this is for the relative mean differences between intervention and control at follow-up. For uncontrolled studies, it represents the change between baseline and follow-up. BMI = body mass index.

Table 2: Universal behavioural interventions (n=6)

Study	Design & Quality Appraisal ¹	Setting & Participants	Intervention & Implementation ²	Inequality ³	Summary of Effects on Inequalities in Obesity ⁴	
					↑ = increased ↓ = decreased ↔ = no effect	
Van Wier et al 2009 [37]	Randomised controlled trial 3 arms: phone, internet and control 6 months follow up Final sample size = 982 Quality = Moderate	Work settings, USA Overweight employees with BMI ≥ 25 kg/m ² Mean age = 43 years 65% female	Treatment: Three-arm randomized controlled trial. Two arms received a 6-month lifestyle intervention with behaviour counselling by either phone (phone group) or e-mail (internet group). The third arm received usual care in the form of lifestyle brochures (control group). 10 x biweekly counselling sessions by phone and e-mail. Implementation = 6	Universal: education	Body weight Waist circumference	↔ ↔
Freak-Poli et al 2011 [38]	Prospective cohort study 4 months follow up Final sample = 604 Quality = Moderate	10 workplaces, Australia Mean age ≈ 40 years 57% female	Pedometer-based workplace health intervention – target of at least 10,000 steps/day for 125 days; weekly encouragement emails; website for logging daily steps, accessing additional health information, communication amongst participants and comparing team progress. Implementation = 6	Universal: education	Waist circumference	↑

Jeffery et al 1985 [39]	Uncontrolled prospective cohort study 6 month follow up Final sample = 34 Quality = Moderate	Workplace, USA 86% female Mean age = 42 years	weigh-ins; group education sessions – diet, physical activity; weight loss manual; monitoring diet intake; incentive Implementation = 5	Universal: occupation	Body weight	↔
Hwang et al 2011 [42]	Uncontrolled prospective cohort study 3 months follow up Final sample = 62 Quality = Weak	Electronics company in Korea High BMI workers (> 27 kg/m ²) Mean age = 33.6 ± 7.4 years 88% Male	3-month, obesity management programme “Turn fat into gold”; counselling by factory nurses, self-help group, free gym facilities, trainers and health information; health information via email Implementation = 6	Universal: office vs. factory workers	BMI Body weight Body fat	↔ ↔ ↔
Stunkard et al 1989 [40]	Uncontrolled prospective cohort study 12 week follow-up Final sample = 1146 Quality = Weak	15 workplaces, USA 38 years 52% female Overweight	Workplace weight loss competitions – weekly weigh-ins; weight loss advice; teammate support; public awareness of progress in; cash incentive for winning team Implementation = 6	Universal: blue collar vs. white collar	Body weight	↔

Rohrer et al 2010 [41]	Uncontrolled retrospective cohort study 6 months follow up Final sample = 936 Quality = Weak	Workplace, USA 18 + adult employees 64.1% males	Telephone coaching programme. Coaches called participants up to 7 times. Coaching was based on collaborative goal-setting and included self-management health education. Implementation = 6	Universal: income	Body weight	↔
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¹ Global Quality appraisal from EPHPP see Web Appendix 2

² Number of implementation appraisal criteria met out of 10

³ Targeted/Universal approach to inequality, measure of inequality/SES

⁴ $p < 0.05$. For controlled studies this is for the relative mean differences between intervention and control at follow-up. For uncontrolled studies, it represents the change between baseline and follow-up. BMI = body mass index.

Table 3: Behavioural and environmental interventions (n=3)

Study	Design & Quality Appraisal ¹	Setting & Participants	Intervention & Implementation ²	Inequality ³	Summary of Effects on Inequalities in Obesity ⁴	
					↑ = increased ↓ = decreased ↔ = no change	
Lemon et al 2010 [43]	Cluster randomised controlled trial 12 and 24 month follow up Final sample = 648 Quality = Moderate	6 hospital worksites, USA 18-65 years 80% female	Social marketing campaign, environmental strategies promoting physical activity, environmental strategies promoting healthy eating, and strategies promoting interpersonal support. Types of intervention strategies include stairway signs, cafeteria signs, Farmer's Markets, walking groups, challenges, workshops, educational displays, newsletters, project website, project information centre and print materials. Implementation = 7	Universal: education	BMI Weight gain	↔ ↑
Scoggins et al 2011 [44]	Controlled cohort study 1 year follow up Final sample = 19559 Quality = Moderate	Worksite, USA 18-69 years 49.9% female	'Healthy Incentives' weight management intervention sponsored by employer. Environmental modifications (e.g. decorating stairwells and prompting stair use, healthy options in vending machines, room converted to free gym, garden for employees to grow healthy food) plus individual action plans encouraging healthy activities, weight management, exercise, nutrition, stress management and smoking cessation; monthly electronic newsletter, website and poster campaigns Implementation = 6	Universal: education	BMI	↓

VanWormer et al 2012 [45]	Prospective cohort study 24 month follow up Final sample = 1222 Quality = Moderate	6 worksites, USA Mean age = 44.2 years 61% female	'HealthWorks' intervention –Healthy foods/beverages made affordable, access modifications to healthy foods, aesthetic stairwell enhancements, free access to pedometers and website step tracking tools, improved scale access for self-weighing (including balance beam scales placed at various locations within the workplace such as rest rooms), worksite advisory groups, and site-wide publicity of nutrition and physical activity. Implementation = 5	Universal: education	Body weight	↔
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¹ Global Quality appraisal from EPHPP see Web Appendix 2

² Number of implementation appraisal criteria met out of 10

³ Targeted/Universal approach to inequality, measure of inequality/SES

⁴ $p < 0.05$. For controlled studies this is for the relative mean differences between intervention and control at follow-up. For uncontrolled studies, it represents the change between baseline and follow-up. BMI = body mass index.

Table 4: Environmental interventions (n=1)

Study	Design & Quality Appraisal ¹	Setting & Participants	Intervention & Implementation ²	Inequality ³	Summary of Effects on Inequalities in Obesity ⁴	
					↑ = increased ↓ = decreased ↔ = no change	
Veloso & Santana 2002; Veloso et al 2007 [46, 47]	Retrospective cohort group with non-randomised comparison group 5 year follow up Final sample = 10,368 Quality = Weak	Workplaces, Brazil Working age 22% female	Prevention: Workers' Food Programme (Programa de Alimentação do Trabalhador; PAT) – coupons or food provided in workplace (main meal of 1400 calories & minor meals of 300 calories, & 6% protein). Implementation = 5	Universal: occupation	overweight	↑

¹ Global Quality appraisal from EPHPP see Web Appendix 2

² Number of implementation appraisal criteria met out of 10

³ Targeted/Universal approach to inequality, measure of inequality/SES

⁴ p<0.05. For controlled studies this is for the relative mean differences between intervention and control at follow-up. For uncontrolled studies, it represents the change between baseline and follow-up. BMI = body mass index.

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Web Appendix 1: Search Strategies

MEDLINE (Ovid)

1	"Body Weights and Measures"/
2	(BMI or Body Mass Index).ti,ab. or Body Weight/ or obesity.ti,ab. or obese.ti,ab. or overweight.ti,ab. or weight gain.ti,ab. or weight loss.ti,ab. or exp OBESITY/ or Body fat.ti,ab. or Fat mass.ti,ab. or Weight control\$.ti,ab. or Weight maintain\$.ti,ab. or Adipos\$.ti,ab. or Adipose tissue.ti,ab. or Skinfold thickness.ti,ab. or Waist circumference.ti,ab. or Waist hip ratio.ti,ab. or WHR.ti,ab.
3	1 or 2
4	Health Promotion/ or health promotion.ti,ab. or health behaviour.ti,ab. or health behavior.ti,ab. or (policy and (social or school or food or public or urban or environmental or fiscal)).ti,ab. or urban planning.ti,ab. or city planning.ti,ab. or built environment.ti,ab. or social environment.ti,ab. or physical environment.ti,ab. or cultural environment.ti,ab. or urban environment.ti,ab. or school environment.ti,ab. or neighbourhood.ti,ab. or community.ti,ab. or societal.ti,ab. or social interventions.ti,ab. or community interventions.ti,ab. or obesogenic environment.ti,ab. or individual level.ti,ab. or lifestyle.ti,ab. or individual.ti,ab. or tax\$.ti,ab. or subsid\$.ti,ab. or price\$.ti,ab. or health education.ti,ab. or social marketing.ti,ab. or (diet and (advice or counselling)).ti,ab. or (exercise and (advice or counselling)).ti,ab. or weight management.ti,ab. or cash transfer\$.ti,ab. or lifestyle counselling.ti,ab. or behavioural counselling.ti,ab. or behavioral counselling.ti,ab. or exercise on prescription.ti,ab. or exercise.ti,ab. or health trainer\$.ti,ab. or school.ti,ab. or workplace.ti,ab. or campaign\$.ti,ab. or (access adj1 facilities).ti,ab. or green space.ti,ab. or walk?ability.ti,ab. or food label\$.ti,ab. or food advert\$.ti,ab.
5	(evaluat\$ or effective\$ or Intervention or RCT or experiment\$ or randomi?ed controlled trial\$ or clinical randomi?ed controlled trial\$ or cluster randomi?ed controlled trial\$ or double blind randomi?ed controlled trial\$ or randomi?ed consent design or single blind randomi?ed controlled trial\$ or randomi?ed or placebo or random\$ or trial or quasi?experiment\$ or pre\$test or post\$test or trial or time series or evaluat\$ or intervention\$ or "before and after" or intervention\$ or community trial or non?randomi?ed or repeat\$ or repeat\$ measures).ti,ab. or (exp Clinical Trial/ or exp Randomized Controlled Trial/ or exp Randomization/ or exp Double-Blind

	Method/ or exp Single-Blind Method/ or exp Cross-Over Studies/) or clinical trial.ti,ab. or latin square.ti,ab. or random\$.ti,ab. or exp Evaluation/ or clinical trial.ti,ab. or clinical trial.pt. or (before adj1 after adj1 (stud\$ or trial\$ or design\$)).ti,ab. or random\$.ti,ab. or (quasi?experimental or pseudo?experimental).ti,ab. or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or quasi?randomi?ed).ti,ab. or ((population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) adj3 (intervention\$ or prevention or policy or policies or program\$ or project\$)).ti,ab.
6	3 and 4 and 5
7	limit 6 to humans

Embase Search Ovid

1	"Body Weights and Measures"/
2	(BMI or Body Mass Index).ti,ab. or Body Weight/ or obesity.ti,ab. or obese.ti,ab. or overweight.ti,ab. or weight gain.ti,ab. or weight loss.ti,ab. or exp OBESITY/ or Body fat.ti,ab. or Fat mass.ti,ab. or Weight control\$.ti,ab. or Weight maintain\$.ti,ab. or Adipos\$.ti,ab. or Adipose tissue.ti,ab. or Skinfold thickness.ti,ab. or Waist circumference.ti,ab. or Waist hip ratio.ti,ab. or WHR.ti,ab.
3	1 or 2
4	Health Promotion/ or health promotion.ti,ab. or health behaviour.ti,ab. or health behavior.ti,ab. or (policy and (social or school or food or public or urban or environmental or fiscal)).ti,ab. or urban planning.ti,ab. or city planning.ti,ab. or built environment.ti,ab. or social environment.ti,ab. or physical environment.ti,ab. or cultural environment.ti,ab. or urban environment.ti,ab. or school environment.ti,ab. or neighbourhood.ti,ab. or community.ti,ab. or societal.ti,ab. or social interventions.ti,ab. or community interventions.ti,ab. or obesogenic environment.ti,ab. or individual level.ti,ab. or lifestyle.ti,ab. or individual.ti,ab. or tax\$.ti,ab. or subsid\$.ti,ab. or price\$.ti,ab. or health education.ti,ab. or social

	marketing.ti,ab. or (diet and (advice or counselling)).ti,ab. or (exercise and (advice or counselling)).ti,ab. or weight management.ti,ab. or cash transfer\$.ti,ab. or lifestyle counselling.ti,ab. or behavioural counselling.ti,ab. or behavioral counselling.ti,ab. or exercise on prescription.ti,ab. or exercise.ti,ab. or health trainer\$.ti,ab. or school.ti,ab. or workplace.ti,ab. or campaign\$.ti,ab. or (access adj1 facilities).ti,ab. or green space.ti,ab. or walk?ability.ti,ab. or food label\$.ti,ab. or food advert\$.ti,ab.
5	(evaluat\$ or effective\$ or Intervention or RCT or experiment\$ or randomi?ed controlled trial\$ or clinical randomi?ed controlled trial\$ or cluster randomi?ed controlled trial\$ or double blind randomi?ed controlled trial\$ or randomi?ed consent design or single blind randomi?ed controlled trial\$ or randomi?ed or placebo or random\$ or trial or quasi?experiment\$ or pre\$test or post\$test or trial or time series or evaluat\$ or intervention\$ or "before and after" or intervention\$ or community trial or non?randomi?ed or repeat\$ or repeat\$ measures).ti,ab. or (exp Clinical Trial/ or exp Randomized Controlled Trial/ or exp Randomization/ or exp Double-Blind Method/ or exp Single-Blind Method/ or exp Cross-Over Studies/) or clinical trial.ti,ab. or latin square.ti,ab. or random\$.ti,ab. or exp Evaluation/ or clinical trial.ti,ab. or clinical trial.pt. or (before adj1 after adj1 (stud\$ or trial\$ or design\$)).ti,ab. or random\$.ti,ab. or (quasi?experimental or pseudo?experimental).ti,ab. or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or quasi?randomi?ed).ti,ab. or ((population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) adj3 (intervention\$ or prevention or policy or policies or program\$ or project\$)).ti,ab.
6	3 and 4 and 5
7	limit 6 to humans
8	limit 7 to last year

IBSS Search Proquest

S5	all((BMI OR Body Mass Index) OR (obesity) OR (obese) OR (overweight) OR (weight gain) OR
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	<p>(weight loss) OR (Body fat) OR (Fat mass) OR (Weight control*) OR (Weight maintain*) OR (Adipos*) OR (Adipose tissue) OR (Skinfold thickness) OR (Waist circumference) OR (Waist hip ratio) OR (WHR)) AND all((health promotion) OR (health behaviour) OR (health behavior) OR (policy AND (social OR school OR food OR public OR urban OR environmental OR fiscal)) OR (urban planning) OR (city planning) OR (built environment) OR (social environment) OR (physical environment) OR (cultural environment) OR (urban environment) OR (school environment) OR (neighbourhood) OR (community) OR (societal) OR (social interventions) OR (community interventions) OR (obesogenic environment) OR (individual level) OR (lifestyle) OR (individual) OR (tax*) OR (subsid*) OR (price*) OR (health education) OR (social marketing) OR (diet AND (advice OR counselling)) OR (exercise AND (advice OR counselling)) OR (weight management) OR (cash transfer*) OR (lifestyle counselling) OR (behavioural counselling) OR (behavioral counselling) OR (exercise on prescription) OR (exercise) OR (health trainer*) OR (school) OR (workplace) OR (campaign*) OR (access NEAR/1 facilities) OR (green space) OR (walk*ability) OR (food label*) OR (food advert*)) AND ((evaluat* or effective* or Intervention or RCT or experiment* or randomi?ed controlled trial* or clinical randomi?ed controlled trial* or cluster randomi?ed controlled trial* or double blind randomi?ed controlled trial* or randomi?ed consent design or single blind randomi?ed controlled trial* or randomi?ed or placebo or random* or trial or quasi?experiment* or pre*test or post*test or trial or time series or evaluat* or intervention* or "before and after" or intervention* or community trial or non?randomi?ed or repeat* or repeat* measures) or (clinical trial or latin square or random* or clinical trial) or (before NEAR/1 after NEAR/1 (stud* or trial* or design*)) or random* or (quasi?experimental or pseudo?experimental) or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or quasi?randomi?ed) or (population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) or (intervention* or prevention or policy or policies or program* or project*))Limits applied</p>
S4	<p>all((BMI OR Body Mass Index) OR (obesity) OR (obese) OR (overweight) OR (weight gain) OR (weight loss) OR (Body fat) OR (Fat mass) OR (Weight control*) OR (Weight maintain*) OR (Adipos*) OR (Adipose tissue) OR (Skinfold thickness) OR (Waist circumference) OR (Waist hip ratio) OR (WHR)) AND all((health promotion) OR (health behaviour) OR (health behavior) OR (policy AND (social OR school OR food OR public OR urban OR environmental OR fiscal)) OR (urban planning) OR (city planning) OR (built environment) OR (social environment) OR (physical</p>

	<p>environment) OR (cultural environment) OR (urban environment) OR (school environment) OR (neighbourhood) OR (community) OR (societal) OR (social interventions) OR (community interventions) OR (obesogenic environment) OR (individual level) OR (lifestyle) OR (individual) OR (tax*) OR (subsid*) OR (price*) OR (health education) OR (social marketing) OR (diet AND (advice OR counselling)) OR (exercise AND (advice OR counselling)) OR (weight management) OR (cash transfer*) OR (lifestyle counselling) OR (behavioural counselling) OR (behavioral counselling) OR (exercise on prescription) OR (exercise) OR (health trainer*) OR (school) OR (workplace) OR (campaign*) OR (access NEAR/1 facilities) OR (green space) OR (walk*ability) OR (food label*) OR (food advert*)) AND ((evaluat* or effective* or Intervention or RCT or experiment* or randomi?ed controlled trial* or clinical randomi?ed controlled trial* or cluster randomi?ed controlled trial* or double blind randomi?ed controlled trial* or randomi?ed consent design or single blind randomi?ed controlled trial* or randomi?ed or placebo or random* or trial or quasi?experiment* or pre*test or post*test or trial or time series or evaluat* or intervention* or "before and after" or intervention* or community trial or non?randomi?ed or repeat* or repeat* measures) or (clinical trial or latin square or random* or clinical trial) or (before NEAR/1 after NEAR/1 (stud* or trial* or design*)) or random* or (quasi?experimental or pseudo?experimental) or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or quasi?randomi?ed) or (population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) or (intervention* or prevention or policy or policies or program* or project*))</p>
<p>S3</p>	<p>(evaluat* or effective* or Intervention or RCT or experiment* or randomi?ed controlled trial* or clinical randomi?ed controlled trial* or cluster randomi?ed controlled trial* or double blind randomi?ed controlled trial* or randomi?ed consent design or single blind randomi?ed controlled trial* or randomi?ed or placebo or random* or trial or quasi?experiment* or pre*test or post*test or trial or time series or evaluat* or intervention* or "before and after" or intervention* or community trial or non?randomi?ed or repeat* or repeat* measures) or (clinical trial or latin square or random* or clinical trial) or (before NEAR/1 after NEAR/1 (stud* or trial* or design*)) or random* or (quasi?experimental or pseudo?experimental) or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or quasi?randomi?ed) or (population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) or (intervention* or</p>

	prevention or policy or policies or program* or project*)
S2	all((health promotion) or (health behaviour) or (health behavior) or (policy and (social or school or food or public or urban or environmental or fiscal)) or (urban planning) or (city planning) or (built environment) or (social environment) or (physical environment) or (cultural environment) or (urban environment) or (school environment) or (neighbourhood) or (community) or (societal) or (social interventions) or (community interventions) or (obesogenic environment) or (individual level) or (lifestyle) or (individual) or (tax*) or (subsid*) or (price*) or (health education) or (social marketing) or (diet and (advice or counselling)) or (exercise and (advice or counselling)) or (weight management) or (cash transfer*) or (lifestyle counselling) or (behavioural counselling) or (behavioral counselling) or (exercise on prescription) or (exercise) or (health trainer*) or (school) or (workplace) or (campaign*) or (access NEAR/1 facilities) or (green space) or (walk*ability) or (food label*) or (food advert*))
S1	all((BMI or Body Mass Index) or (obesity) or (obese) or (overweight) or (weight gain) or (weight loss) or (Body fat) or (Fat mass) or (Weight control*) or (Weight maintain*) or (Adipos*) or (Adipose tissue) or (Skinfold thickness) or (Waist circumference) or (Waist hip ratio) or (WHR))

ASSIA (Proquest)

S5	((BMI or Body Mass Index) or (obesity) or (obese) or (overweight) or (weight gain) or (weight loss) or (Body fat) or (Fat mass) or (Weight control*) or (Weight maintain*) or (Adipos*) or (Adipose tissue) or (Skinfold thickness) or (Waist circumference) or (Waist hip ratio) or (WHR)) AND ((health promotion) or (health behaviour) or (health behavior) or (policy and (social or school or food or public or urban or environmental or fiscal)) or (urban planning) or (city planning) or (built environment) or (social environment) or (physical environment) or (cultural environment) or (urban environment) or (school environment) or (neighbourhood) or (community) or (societal) or (social interventions) or (community interventions) or (obesogenic environment) or (individual level) or (lifestyle) or (individual) or (tax*) or (subsid*) or (price*) or (health education) or (social marketing) or (diet and (advice or counselling)) or (exercise and (advice or counselling)) or (weight management) or (cash transfer*) or (lifestyle counselling) or (behavioural counselling) or (behavioral counselling) or (exercise on prescription) or (exercise) or (health trainer*) or (school)
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	<p>or (workplace) or (campaign*) or (access NEAR/1 facilities) or (green space) or (walk*ability) or (food label*) or (food advert*)) AND ((evaluat* or effective* or Intervention or RCT or experiment* or randomi?ed controlled trial* or clinical randomi?ed controlled trial* or cluster randomi?ed controlled trial* or double blind randomi?ed controlled trial* or randomi?ed consent design or single blind randomi?ed controlled trial* or randomi?ed or placebo or random* or trial or quasi?experiment* or pre*test or post*test or trial or time series or evaluat* or intervention* or "before and after" or intervention* or community trial or non?randomi?ed or repeat* or repeat* measures) or (clinical trial or latin square or random* or clinical trial) or (before NEAR/1 after NEAR/1 (stud* or trial* or design*)) or random* or (quasi?experimental or pseudo?experimental) or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or quasi?randomi?ed) or (population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) or (intervention* or prevention or policy or policies or program* or project*))Limits applied</p>
S4	<p>((BMI or Body Mass Index) or (obesity) or (obese) or (overweight) or (weight gain) or (weight loss) or (Body fat) or (Fat mass) or (Weight control*) or (Weight maintain*) or (Adipos*) or (Adipose tissue) or (Skinfold thickness) or (Waist circumference) or (Waist hip ratio) or (WHR)) AND ((health promotion) or (health behaviour) or (health behavior) or (policy and (social or school or food or public or urban or environmental or fiscal)) or (urban planning) or (city planning) or (built environment) or (social environment) or (physical environment) or (cultural environment) or (urban environment) or (school environment) or (neighbourhood) or (community) or (societal) or (social interventions) or (community interventions) or (obesogenic environment) or (individual level) or (lifestyle) or (individual) or (tax*) or (subsid*) or (price*) or (health education) or (social marketing) or (diet and (advice or counselling)) or (exercise and (advice or counselling)) or (weight management) or (cash transfer*) or (lifestyle counselling) or (behavioural counselling) or (behavioral counselling) or (exercise on prescription) or (exercise) or (health trainer*) or (school) or (workplace) or (campaign*) or (access NEAR/1 facilities) or (green space) or (walk*ability) or (food label*) or (food advert*)) AND ((evaluat* or effective* or Intervention or RCT or experiment* or randomi?ed controlled trial* or clinical randomi?ed controlled trial* or cluster randomi?ed controlled trial* or double blind randomi?ed controlled trial* or randomi?ed consent design or single blind randomi?ed controlled trial* or randomi?ed or placebo or random* or trial or quasi?experiment* or pre*test or post*test or trial or time series or evaluat* or intervention*</p>

	<p>or "before and after" or intervention* or community trial or non?randomi?ed or repeat* or repeat* measures) or (clinical trial or latin square or random* or clinical trial) or (before NEAR/1 after NEAR/1 (stud* or trial* or design*)) or random* or (quasi?experimental or pseudo?experimental) or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or quasi?randomi?ed) or (population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) or (intervention* or prevention or policy or policies or program* or project*))</p>
S3	<p>(evaluat* or effective* or Intervention or RCT or experiment* or randomi?ed controlled trial* or clinical randomi?ed controlled trial* or cluster randomi?ed controlled trial* or double blind randomi?ed controlled trial* or randomi?ed consent design or single blind randomi?ed controlled trial* or randomi?ed or placebo or random* or trial or quasi?experiment* or pre*test or post*test or trial or time series or evaluat* or intervention* or "before and after" or intervention* or community trial or non?randomi?ed or repeat* or repeat* measures) or (clinical trial or latin square or random* or clinical trial) or (before NEAR/1 after NEAR/1 (stud* or trial* or design*)) or random* or (quasi?experimental or pseudo?experimental) or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or quasi?randomi?ed) or (population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) or (intervention* or prevention or policy or policies or program* or project*)</p>
S2	<p>(health promotion) or (health behaviour) or (health behavior) or (policy and (social or school or food or public or urban or environmental or fiscal)) or (urban planning) or (city planning) or (built environment) or (social environment) or (physical environment) or (cultural environment) or (urban environment) or (school environment) or (neighbourhood) or (community) or (societal) or (social interventions) or (community interventions) or (obesogenic environment) or (individual level) or (lifestyle) or (individual) or (tax*) or (subsid*) or (price*) or (health education) or (social marketing) or (diet and (advice or counselling)) or (exercise and (advice or counselling)) or (weight management) or (cash transfer*) or (lifestyle counselling) or (behavioural counselling) or (behavioral counselling) or (exercise on prescription) or (exercise) or (health trainer*) or (school) or (workplace) or (campaign*) or (access NEAR/1 facilities) or (green space) or (walk*ability) or</p>

	(food label*) or (food advert*)
S1	(BMI or Body Mass Index) or (obesity) or (obese) or (overweight) or (weight gain) or (weight loss) or (Body fat) or (Fat mass) or (Weight control*) or (Weight maintain*) or (Adipos*) or (Adipose tissue) or (Skinfold thickness) or (Waist circumference) or (Waist hip ratio) or (WHR)

Sociological Abstracts (Proquest)

S5	((BMI or Body Mass Index) or (obesity) or (obese) or (overweight) or (weight gain) or (weight loss) or (Body fat) or (Fat mass) or (Weight control*) or (Weight maintain*) or (Adipos*) or (Adipose tissue) or (Skinfold thickness) or (Waist circumference) or (Waist hip ratio) or (WHR)) AND ((health promotion) or (health behaviour) or (health behavior) or (policy and (social or school or food or public or urban or environmental or fiscal)) or (urban planning) or (city planning) or (built environment) or (social environment) or (physical environment) or (cultural environment) or (urban environment) or (school environment) or (neighbourhood) or (community) or (societal) or (social interventions) or (community interventions) or (obesogenic environment) or (individual level) or (lifestyle) or (individual) or (tax*) or (subsid*) or (price*) or (health education) or (social marketing) or (diet and (advice or counselling)) or (exercise and (advice or counselling)) or (weight management) or (cash transfer*) or (lifestyle counselling) or (behavioural counselling) or (behavioral counselling) or (exercise on prescription) or (exercise) or (health trainer*) or (school) or (workplace) or (campaign*) or (access NEAR/1 facilities) or (green space) or (walk*ability) or (food label*) or (food advert*)) AND ((evaluat* or effective* or Intervention or RCT or experiment* or randomi?ed controlled trial* or clinical randomi?ed controlled trial* or cluster randomi?ed controlled trial* or double blind randomi?ed controlled trial* or randomi?ed consent design or single blind randomi?ed controlled trial* or randomi?ed or placebo or random* or trial or quasi?experiment* or pre*test or post*test or trial or time series or evaluat* or intervention* or "before and after" or intervention* or community trial or non?randomi?ed or repeat* or repeat* measures) or (clinical trial or latin square or random* or clinical trial) or (before NEAR/1 after NEAR/1 (stud* or trial* or design*)) or random* or (quasi?experimental or pseudo?experimental) or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or
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	<p>quasi?randomi?ed) or (population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) or (intervention* or prevention or policy or policies or program* or project*))Limits applied</p>
<p>S4</p>	<p>((BMI or Body Mass Index) or (obesity) or (obese) or (overweight) or (weight gain) or (weight loss) or (Body fat) or (Fat mass) or (Weight control*) or (Weight maintain*) or (Adipos*) or (Adipose tissue) or (Skinfold thickness) or (Waist circumference) or (Waist hip ratio) or (WHR)) AND ((health promotion) or (health behaviour) or (health behavior) or (policy and (social or school or food or public or urban or environmental or fiscal)) or (urban planning) or (city planning) or (built environment) or (social environment) or (physical environment) or (cultural environment) or (urban environment) or (school environment) or (neighbourhood) or (community) or (societal) or (social interventions) or (community interventions) or (obesogenic environment) or (individual level) or (lifestyle) or (individual) or (tax*) or (subsid*) or (price*) or (health education) or (social marketing) or (diet and (advice or counselling)) or (exercise and (advice or counselling)) or (weight management) or (cash transfer*) or (lifestyle counselling) or (behavioural counselling) or (behavioral counselling) or (exercise on prescription) or (exercise) or (health trainer*) or (school) or (workplace) or (campaign*) or (access NEAR/1 facilities) or (green space) or (walk*ability) or (food label*) or (food advert*)) AND ((evaluat* or effective* or Intervention or RCT or experiment* or randomi?ed controlled trial* or clinical randomi?ed controlled trial* or cluster randomi?ed controlled trial* or double blind randomi?ed controlled trial* or randomi?ed consent design or single blind randomi?ed controlled trial* or randomi?ed or placebo or random* or trial or quasi?experiment* or pre*test or post*test or trial or time series or evaluat* or intervention* or "before and after" or intervention* or community trial or non?randomi?ed or repeat* or repeat* measures) or (clinical trial or latin square or random* or clinical trial) or (before NEAR/1 after NEAR/1 (stud* or trial* or design*)) or random* or (quasi?experimental or pseudo?experimental) or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or quasi?randomi?ed) or (population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) or (intervention* or prevention or policy or policies or program* or project*))</p>

S3	(evaluat* or effective* or Intervention or RCT or experiment* or randomi?ed controlled trial* or clinical randomi?ed controlled trial* or cluster randomi?ed controlled trial* or double blind randomi?ed controlled trial* or randomi?ed consent design or single blind randomi?ed controlled trial* or randomi?ed or placebo or random* or trial or quasi?experiment* or pre*test or post*test or trial or time series or evaluat* or intervention* or "before and after" or intervention* or community trial or non?randomi?ed or repeat* or repeat* measures) or (clinical trial or latin square or random* or clinical trial) or (before NEAR/1 after NEAR/1 (stud* or trial* or design*)) or random* or (quasi?experimental or pseudo?experimental) or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or quasi?randomi?ed) or (population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) or (intervention* or prevention or policy or policies or program* or project*)
S2	(health promotion) or (health behaviour) or (health behavior) or (policy and (social or school or food or public or urban or environmental or fiscal)) or (urban planning) or (city planning) or (built environment) or (social environment) or (physical environment) or (cultural environment) or (urban environment) or (school environment) or (neighbourhood) or (community) or (societal) or (social interventions) or (community interventions) or (obesogenic environment) or (individual level) or (lifestyle) or (individual) or (tax*) or (subsid*) or (price*) or (health education) or (social marketing) or (diet and (advice or counselling)) or (exercise and (advice or counselling)) or (weight management) or (cash transfer*) or (lifestyle counselling) or (behavioural counselling) or (behavioral counselling) or (exercise on prescription) or (exercise) or (health trainer*) or (school) or (workplace) or (campaign*) or (access NEAR/1 facilities) or (green space) or (walk*ability) or (food label*) or (food advert*)
S1	(BMI or Body Mass Index) or (obesity) or (obese) or (overweight) or (weight gain) or (weight loss) or (Body fat) or (Fat mass) or (Weight control*) or (Weight maintain*) or (Adipos*) or (Adipose tissue) or (Skinfold thickness) or (Waist circumference) or (Waist hip ratio) or (WHR)

NHS EED (NHS CRD)

1	descriptor Body Weights and Measures explode all trees in Economic Evaluations
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2	MeSH descriptor Obesity explode all trees in Economic Evaluations
3	BMI or Body Mass Index or Body Weight or obesity or obese or overweight or weight gain or weight loss or Body fat or Fat mass or Weight control* or Weight maintain* or Adipos* or Adipose tissue or Skinfold thickness or Waist circumference. or Waist hip ratio or WHR in Economic Evaluations
4	(#1 OR #2 OR #3)
5	MeSH descriptor Health Promotion explode all trees in Economic Evaluations
6	health promotion or health behaviour or health behavior or (policy and (social or school or food or public or urban or environmental or fiscal)) or urban planning or city planning or built environment or social environment or physical environment or cultural environment or urban environment or school environment or neighbourhood or community or societal or social interventions or community interventions or obesogenic environment or individual level or lifestyle or individual or tax* or subsid* or price* or health education or social marketing or (diet and (advice or counselling)) or (exercise and (advice or counselling)) or weight management or cash transfer* or lifestyle counselling or behavioural counselling or behavioral counselling or exercise on prescription or exercise or health trainer* or school or workplace or campaign* or (access adj1 facilities) or green space or walk?ability or food label* or food advert* in Economic Evaluations
7	(#5 OR #6)
8	(evaluat* or effective* or Intervention or RCT or experiment* or randomi?ed controlled trial* or clinical randomi?ed controlled trial* or cluster randomi?ed controlled trial* or double blind randomi?ed controlled trial* or randomi?ed consent design or single blind randomi?ed controlled trial* or randomi?ed or placebo or random* or trial or quasi?experiment* or pre*test or post*test or trial or time series or evaluat* or intervention* or "before and after" or intervention* or community trial or non?randomi?ed or repeat* or repeat* measures) or clinical trial or latin square or random* or exp Evaluation/ or clinical trial or clinical trial.pt. or (before adj1 after adj1 (stud* or trial* or design*)) or random* or (quasi?experimental or pseudo?experimental) or (nonrandomi?ed or non?randomi?ed or pseudo?randomi?sed or quasi?randomi?ed) or ((population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) adj3 (intervention* or

	prevention or policy or policies or program* or project*)) in Economic Evaluations
9	(#4 AND #7 AND #8) from 2011 to 2012
10	(#4 and #7 and #8) from 2011 to 2012 in Economic Evaluations

Social Science Citation Index (Web of Science)

1	TS=(Body Weights and Measures)
2	TS=(BMI or Body Mass Index) or TS=(obesity) or TS=(obese) or TS=(overweight) or TS=(weight gain) or TS=(weight loss) or TS=(Body fat) or TS=(Fat mass) or TS=(Weight control*) or TS=(Weight maintain*) or TS=(Adipos*) or TS=(Adipose tissue) or TS=(Skinfold thickness) or TS=(Waist circumference) or TS=(Waist hip ratio) or TS=(WHR)
3	#1 or #2
4	TS=Health Promotion
5	TS=(health promotion) or TS=(health behaviour) or TS=(health behavior) or TS=(policy and (social or school or food or public or urban or environmental or fiscal)) or TS=(urban planning) or TS=(city planning) or TS=(built environment) or TS=(social environment) or TS=(physical environment) or TS=(cultural environment) or TS=(urban environment) or TS=(school environment) or TS=(neighbourhood) or TS=(community) or TS=(societal or social interventions) or TS=(community interventions) or TS=(obesogenic environment) or TS=(individual level) or TS=(lifestyle) or TS=(individual) or TS=(tax*) or TS=(subsid*) or TS=(price*) or TS=(health education) or TS=(social marketing) or TS=(diet and (advice or counselling)) or TS=(exercise and (advice or counselling)) or TS=(weight management) or TS=(cash transfer*) or TS=(lifestyle counselling) or TS=(behavioural counselling) or TS=(behavioral counselling) or TS=(exercise on prescription) or TS=(exercise) or TS=(health trainer*) or TS=(school) or TS=(workplace) or TS=(campaign*) or TS=(access N1 facilities) or TS=(green space) or TS=(walk\$ability) or TS=(food label*) or TS=(food advert*)
6	#4 or #5
7	TS=(Clinical Trials) OR TS=(Randomized Controlled Trials) or TS=(Double-Blind Studies)

	or TS=(Single-Blind Studies) or TS=(Crossover Design)
8	TS=(evaluat* or effective* or Intervention or RCT or experiment* or randomi\$ed controlled trial* or clinical randomi\$ed controlled trial* or cluster randomi\$ed controlled trial* or double blind randomi\$ed controlled trial* or randomi\$ed consent design or single blind randomi\$ed controlled trial* or randomi\$ed or placebo or random* or trial or quasi\$experiment* or pre*test or post*test or trial or time series or evaluat* or intervention* or "before and after" or intervention* or community trial or non\$randomi\$ed or repeat* or repeat* measures) or TS=(clinical trial) or TS=(latin square) or TS=(random*) or TS=(clinical trial) or TS=(before N1 after N1 (stud* or trial* or design*)) or TS=(random*) or TS=(quasi\$experimental or pseudo\$experimental) or TS=(nonrandomi\$ed or non\$randomi\$ed or pseudo\$randomi\$ed or quasi\$randomi\$ed) or TS=((population level or population based or population orientated or population oriented or community level or community based or community orientated or community oriented) N3 (intervention* or prevention or policy or policies or program* or project*))
9	#7 or #8
10	#3 and #6 and #9

The following websites were searched: National Obesity Observatory, Association for the Study of Obesity, National Obesity Forum, Department of Health, International Association for the Study of Obesity and World Health Organisation; along with the following grey literature repositories: Obesity Learning Centre and NHS Evidence. We hand searched the bibliographies of all included studies and requested relevant information on unpublished and in-progress research from key experts in the field. In addition, we hand searched the last two years of the most common five journals revealed by the electronic searches (International Journal of Obesity; Preventative Medicine; Medicine and Science in Sport and Exercise; American Journal of Clinical Nutrition; Journal of the American Dietetic Association).

Web Appendix 2: EPHPP Quality Assessment Tool

Study	
Reviewer initials	
Date	



QUALITY ASSESSMENT TOOL FOR

QUANTITATIVE STUDIES

COMPONENT RATINGS

A) SELECTION BIAS

(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?

- 1 Very likely
- 2 Somewhat likely
- 3 Not likely
- 4 Can't tell

(Q2) What percentage of selected individuals agreed to participate?

- 1. 80 - 100% agreement
- 2. 60 – 79% agreement
- 3. less than 60% agreement
- 4. Not applicable
- 5. Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

B) STUDY DESIGN

Indicate the study design

- 1 Randomized controlled trial
- 2 Controlled clinical trial
- 3 Cohort analytic (two group pre + post)
- 4 Case-control
- 5 Cohort (one group pre + post (before and after))
- 6 Interrupted time series
- 7 Other specify _____
- 8 Can't tell

Was the study described as randomized? If NO, go to Component C.

No Yes

If Yes, was the method of randomization described? (See dictionary)

No Yes

If Yes, was the method appropriate? (See dictionary)

No Yes

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

C) CONFOUNDERS

(Q1) Were there important differences between groups prior to the intervention?

- 1 Yes
- 2 No
- 3 Can't tell

The following are examples of confounders:

- 1 Race
- 2 Sex
- 3 Marital status/family
- 4 Age
- 5 SES (income or class)
- 6 Education
- 7 Health status
- 8 Pre-intervention score on outcome measure

(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?

- 1 80 – 100% (most)
- 2 60 – 79% (some)
- 3 Less than 60% (few or none)
- 4 Can't Tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

D) BLINDING

(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?

- 1 Yes
- 2 No
- 3 Can't tell

(Q2) Were the study participants aware of the research question?

- 1 Yes
- 2 No
- 3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

E) DATA COLLECTION METHODS

(Q1) Were data collection tools shown to be valid?

- 1 Yes
- 2 No
- 3 Can't tell

(Q2) Were data collection tools shown to be reliable?

- 1 Yes
- 2 No
- 3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

F) WITHDRAWALS AND DROP-OUTS

(Q1) Were withdrawals and drop-outs reported in terms of numbers and/or reasons per group?

- 1 Yes
- 2 No

- 3 Can't tell
- 4 Not Applicable (i.e. one time surveys or interviews)

(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).

- 1 80 -100%
- 2 60 - 79%
- 3 less than 60%
- 4 Can't tell
- 5 Not Applicable (i.e. Retrospective case-control)

RATE THIS SECTION	STRONG	MODERATE	WEAK	
See dictionary	1	2	3	Not Applicable

G) INTERVENTION INTEGRITY

(Q1) What percentage of participants received the allocated intervention or exposure of interest?

- 1 80 -100%
- 2 60 - 79%
- 3 less than 60%
- 4 Can't tell

(Q2) Was the consistency of the intervention measured?

- 1 Yes
- 2 No
- 3 Can't tell

(Q3) Is it likely that subjects received an unintended intervention (contamination or co-intervention) that may influence the results?

- 1 Yes
- 2 No
- 3 Can't tell

H) ANALYSES

(Q1) Indicate the unit of allocation (circle one)

community organization/institution practice/office individual

(Q2) Indicate the unit of analysis (circle one)

community organization/institution practice/office individual

(Q3) Are the statistical methods appropriate for the study design?

- 1 Yes
- 2 No
- 3 Can't tell

(Q4) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?

- 1 Yes
- 2 No
- 3 Can't tell

GLOBAL RATING

COMPONENT RATINGS

Please transcribe the information from the gray boxes on pages 1-4 onto this page. See dictionary on how to rate this section.

A	SELECTION BIAS	STRONG	MODERATE	WEAK
		1	2	3
B	STUDY DESIGN	STRONG	MODERATE	WEAK
		1	2	3
C	CONFOUNDERS	STRONG	MODERATE	WEAK
		1	2	3
D	BLINDING	STRONG	MODERATE	WEAK
		1	2	3
E	DATA COLLECTION METHOD	STRONG	MODERATE	WEAK
		1	2	3
F	WITHDRAWALS AND DROPOUTS	STRONG	MODERATE	WEAK
		1	2	3
				Not Applicable

GLOBAL RATING FOR THIS PAPER (circle one):

- | | | |
|---|----------|----------------------------|
| 1 | STRONG | (no WEAK ratings) |
| 2 | MODERATE | (one WEAK rating) |
| 3 | WEAK | (two or more WEAK ratings) |

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

No Yes

If yes, indicate the reason for the discrepancy

- | | |
|---|---|
| 1 | Oversight |
| 2 | Differences in interpretation of criteria |
| 3 | Differences in interpretation of study |

Final decision of both reviewers (circle one):

- | | |
|---|----------|
| 1 | STRONG |
| 2 | MODERATE |
| 3 | WEAK |

Quality Assessment Tool for Quantitative Studies Dictionary



The purpose of this dictionary is to describe items in the tool thereby assisting raters to score study quality. Due to under-reporting or lack of clarity in the primary study, raters will need to make judgements about the extent that bias may be present. When making judgements about each component, raters should form their opinion based upon information contained in the study rather than making inferences about what the authors intended.

A) SELECTION BIAS

(Q1) Participants are more likely to be representative of the target population if they are randomly selected from a comprehensive list of individuals in the target population (score very likely). They may not be representative if they are referred from a source (e.g. clinic) in a systematic manner (score somewhat likely) or self-referred (score not likely).

(Q2) Refers to the % of subjects in the control and intervention groups that agreed to participate in the study before they were assigned to intervention or control groups.

B) STUDY DESIGN

In this section, raters assess the likelihood of bias due to the allocation process in an experimental study. For observational studies, raters assess the extent that assessments of exposure and outcome are likely to be independent. Generally, the type of design is a good indicator of the extent of bias. In stronger designs, an equivalent control group

is present and the allocation process is such that the investigators are unable to predict the sequence.

Randomized Controlled Trial (RCT)

An experimental design where investigators randomly allocate eligible people to an intervention or control group. A rater should describe a study as an RCT if the randomization sequence allows each study participant to have the same chance of receiving each intervention and the investigators could not predict which intervention was next. If the investigators do not describe the allocation process and only use the words 'random' or 'randomly', the study is described as a controlled clinical trial.

See below for more details.

Was the study described as randomized?

Score YES, if the authors used words such as random allocation, randomly assigned, and random assignment. Score NO, if no mention of randomization is made.

Was the method of randomization described?

Score YES, if the authors describe any method used to generate a random allocation sequence.

Score NO, if the authors do not describe the allocation method or describe methods of allocation such as alternation, case record numbers, dates of birth, day of the week, and any allocation procedure that is entirely transparent before assignment, such as an open list of random numbers of assignments.

If NO is scored, then the study is a controlled clinical trial.

Was the method appropriate?

Score YES, if the randomization sequence allowed each study participant to have the same chance of receiving each intervention and the investigators could not predict which intervention was next. Examples of appropriate approaches include assignment of subjects by a central office unaware of subject characteristics, or sequentially numbered, sealed, opaque envelopes.

Score NO, if the randomization sequence is open to the individuals responsible for recruiting and allocating participants or providing the intervention, since those individuals can influence the allocation process, either knowingly or unknowingly.

If NO is scored, then the study is a controlled clinical trial.

Controlled Clinical Trial (CCT)

An experimental study design where the method of allocating study subjects to intervention or control groups is open to individuals responsible for recruiting subjects or providing the intervention. The method of allocation is transparent before assignment, e.g. an open list of random numbers or allocation by date of birth, etc.

Cohort analytic (two group pre and post)

An observational study design where groups are assembled according to whether or not exposure to the intervention has occurred. Exposure to the intervention is not under the control of the investigators. Study groups might be non-equivalent or not comparable on some feature that affects outcome.

Case control study

A retrospective study design where the investigators gather 'cases' of people who already have the outcome of interest and 'controls' who do not. Both groups are then questioned or their records examined about whether they received the intervention exposure of interest.

Cohort (one group pre + post (before and after))

The same group is pretested, given an intervention, and tested immediately after the intervention. The intervention group, by means of the pretest, act as their own control group.

Interrupted time series

A time series consists of multiple observations over time. Observations can be on the same units (e.g. individuals over time) or on different but similar units (e.g. student achievement scores for particular grade and school). Interrupted time series analysis requires knowing the specific point in the series when an intervention occurred.

C) CONFOUNDERS

By definition, a confounder is a variable that is associated with the intervention or exposure and causally related to the outcome of interest. Even in a robust study design, groups may not be balanced with respect to important variables prior to the intervention. The authors should indicate if confounders were controlled in the design (by stratification or matching) or in the analysis. If the allocation to intervention and control groups is randomized, the authors must report that the groups were balanced at baseline with respect to confounders (either in the text or a table).

D) BLINDING

(Q1) Assessors should be described as blinded to which participants were in the control and intervention groups. The purpose of blinding the outcome assessors (who might also be the care providers) is to protect against detection bias.

(Q2) Study participants should not be aware of (i.e. blinded to) the research question. The purpose of blinding the participants is to protect against reporting bias.

E) DATA COLLECTION METHODS

Tools for primary outcome measures must be described as reliable and valid. If 'face' validity or 'content' validity has been demonstrated, this is acceptable. Some sources from which data may be collected are described below:

Self reported data includes data that is collected from participants in the study (e.g. completing a questionnaire, survey, answering questions during an interview, etc.).

Assessment/Screening includes objective data that is retrieved by the researchers. (e.g. observations by investigators).

Medical Records/Vital Statistics refers to the types of formal records used for the extraction of the data.

Reliability and validity can be reported in the study or in a separate study. For example, some standard assessment tools have known reliability and validity.

F) WITHDRAWALS AND DROP-OUTS

Score **YES** if the authors describe BOTH the numbers and reasons for withdrawals and drop-outs.

Score **NO** if either the numbers or reasons for withdrawals and drop-outs are not reported.

The percentage of participants completing the study refers to the % of subjects remaining in the study at the final data collection period in all groups (i.e. control and intervention groups).

G) INTERVENTION INTEGRITY

The number of participants receiving the intended intervention should be noted (consider both frequency and intensity). For example, the authors may have reported that at least 80 percent of the participants received the complete intervention. The authors should describe a method of measuring if the intervention was provided to all participants

the same way. As well, the authors should indicate if subjects received an unintended intervention that may have influenced the outcomes. For example, co-intervention occurs when the study group receives an additional intervention (other than that intended). In this case, it is possible that the effect of the intervention may be over-estimated. Contamination refers to situations where the control group accidentally receives the study intervention. This could result in an under-estimation of the impact of the intervention.

H) ANALYSIS APPROPRIATE TO QUESTION

Was the quantitative analysis appropriate to the research question being asked?

An intention-to-treat analysis is one in which all the participants in a trial are analyzed according to the intervention to which they were allocated, whether they received it or not. Intention-to-treat analyses are favoured in assessments of effectiveness as they mirror the noncompliance and treatment changes that are likely to occur

when the intervention is used in practice, and because of the risk of attrition bias when participants are excluded from the analysis.

Component Ratings of Study:

For each of the six components A–F, use the following descriptions as a roadmap.

A) SELECTION BIAS

Strong: The selected individuals are very likely to be representative of the target population (Q1 is 1) **and** there is greater than 80% participation (Q2 is 1).

Moderate: The selected individuals are at least somewhat likely to be representative of the target population (Q1 is 1 or 2); **and** there is 60 - 79% participation (Q2 is 2). 'Moderate' may also be assigned if Q1 is 1 or 2 and Q2 is 5 (can't tell).

Weak: The selected individuals are not likely to be representative of the target population (Q1 is 3); **or** there is less than

60% participation (Q2 is 3) **or** selection is not described (Q1 is 4); and the level of participation is not described (Q2 is 5).

B) DESIGN

Strong: will be assigned to those articles that described RCTs and CCTs.

Moderate: will be assigned to those that described a cohort analytic study, a case control study, a cohort design, or an interrupted time series.

Weak: will be assigned to those that used any other method or did not state the method used.

C) CONFOUNDERS

Strong: will be assigned to those articles that controlled for at least 80% of relevant confounders (Q1 is 2); **or** (Q2 is 1). **Moderate:** will be given to those studies that controlled for 60 – 79% of relevant confounders (Q1 is 1) **and** (Q2 is 2). **Weak:** will be assigned when less than 60% of relevant confounders were controlled (Q1 is 1) **and** (Q2 is 3) **or**

control of confounders was not described (Q1 is 3) **and** (Q2 is 4).

D) BLINDING

Strong: The outcome assessor is not aware of the intervention status of participants (Q1 is 2); **and** the study participants are not aware of the research question (Q2 is 2).

Moderate: The outcome assessor is not aware of the intervention status of participants (Q1 is 2); **or** the study participants are not aware of the research question (Q2 is 2); **or** blinding is not described (Q1 is 3 and Q2 is 3).

Weak: The outcome assessor is aware of the intervention status of participants (Q1 is 1); **and** the study participants are aware of the research question (Q2 is 1).

E) **DATA COLLECTION METHODS**

Strong: The data collection tools have been shown to be valid (Q1 is 1); **and** the data collection tools have been shown to be reliable (Q2 is 1).

Moderate: The data collection tools have been shown to be valid (Q1 is 1); **and** the data collection tools have not been shown to be reliable (Q2 is 2) **or** reliability is not described (Q2 is 3).

Weak: The data collection tools have not been shown to be valid (Q1 is 2) **or** both reliability and validity are not described (Q1 is 3 and Q2 is 3).

F) **WITHDRAWALS AND DROP-OUTS - a rating of:**

Strong: will be assigned when the follow-up rate is 80% or greater (Q2 is 1).

Moderate: will be assigned when the follow-up rate is 60 – 79% (Q2 is 2) **OR** Q2 is 5 (N/A).

Weak: will be assigned when a follow-up rate is less than 60% (Q2 is 3) or if the withdrawals and drop-outs were not described (Q2 is 4).