Week Five - Critical appraisal exercises

PRISMA checklist
Giles EL, Robalino S, McColl E, Sniehotta FF, Adams J. The effectiveness of financial incentives for health behaviour change: systematic review and meta-analysis. PLoS One. 2014 Mar 11;9(3):e90347.

Even though the paper provided a PRISMA checklist in their supplementary material, it is strong recommended to complete this PRISMA checklist yourself without looking at it. Then compare this PRISMA checklist with the checklist completed by the authors. Can you find any difference?

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
Explanation		'Systematic review and meta-analysis' was reported in the title.	
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1

Explanation		• Background, objectives, data sources and eligibility criteria were stated under each heading.
		• Participants: non-clinical adult populations, living in high-income countries
		• Interventions: financial incentive interventions for encouraging healthy behaviour change
		• Study appraisal: The Cochrane Risk of Bias tool
		• Synthesis methods: meta-analysis – to explore the effect of financial incentives interventions within groups of similar behaviour and overall. Meta-regression - to determine if effect varied according to post-intervention follow-up time, or incentive value.
		• Results:
		  ○ 17 papers reported 16 studies were included
		  ○ Health behaviors in the included studies: smoking cessation (n=10), attendance for vaccination or screening (n=5), and physical activity (n=1).
		  ○ Average effect of incentive interventions was greater than control. Relative risk (95% CI)
		  ▪ Smoking cessation:
		  • in short term (<=6mth): 2.48 (95%CI 1.77 – 3.46)	

		• in long term: 1.50 (95%CI 1.05 – 2.14) ▪ Attendance for vaccination or screening: 1.92 (95%CI 1.46 – 2.53) ▪ All behaviors: 1.62 (95%CI 1.38 – 1.91) ○ No convincing evidence that effects were different between behaviours ○ Limited evidence that effect sizes decreased with longer follow-up period and increased incentive, value. The latter, the author explained, may be confounded by the former. • Limitation: there may be errors in the meta-regression process • Conclusions: Available evidence suggests financial incentive interventions are more effective than usual care/no intervention in encouraging behaviour change. • Registration number is provided. • No implications for key findings were reported in the abstract.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2
Explanation		• Unhealthy behaviors are common in developed countries. • The authors explained the theory behind why financial incentives might work: time preference • HPFI are commonly considered to be more useful for encouraging simple one-off behaviours, but there is no systematic evidence for this. • A common concern that the effects of HPFI diminish quickly after incentives are withdrawn: external rewards can reduce an individual's internal motivation to pursue behaviour change. • Little is known about what makes an effective HPFI, in terms of value, format or other characteristics of the incentive, behaviour, or recipient. • Limitation of previous reviews: a. 'focus on single, specific bahaviours rather than exploring the full range of healthy behaviour.' Question: Do you think this is a limitation of previous studies?	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2
Explanation		P: non-clinical adult populations living in high-income countries I: HPFI (health promoting financial incentive interventions) C: non-intervention or usual care O: to encourage uptake of any healthy behaviours -How are these outcomes measured and then subsequently synthesised across the various healthy behaviours? S: a systematic review of primary studies To think about:	

		1. Are there any other comparators? For example, other health promotion programmes. Is it sensible to exclude other comparators? Perhaps if the literature on other comparators is too varied or doesn't exist. 2. Is the rationale sufficient to exclude the studies from the low and middle income countries? Perhaps if the amount of financial incentive isn't proportional across countries. 3. How do authors measure the 'uptake of any healthy behaviours'?	
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	2, File S1
Explanation		Supplementary material S1 with registration number in the CRD database. The author stated 'a number of the original research questions could not be answered due to limited data availability'. What were those questions?	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	2, Table S1
Explanation		P: non-clinical adult populations, living in high-income countries. The definition of 'high-income' was provided in supplementary material I: HPFI provided with guaranteed reward (contrary to entry to lottery) C: no intervention or usual care O: to encourage uptake of healthy behaviours Should the authors have defined outcomes for the specific health behaviours, e.g. Smoking cessation, vaccination and screening and physical activity more clearly? S: published and unpublished controlled studies Details are in supplementary material Table S1. Questions: 1.) If any unpublished studies were included, should the authors do subgroup analysis, i.e. meta-analysis of published studies and meta-analysis of unpublished studies and compare the results? 2.) The review only looked at the controlled studies. Are observational studies an appropriate study design for the aim of this type of intervention? Is this one of the reasons that not many health behaviours were identified? 3.) Again, how about the studies comparing HPFI versus other interventions for health behaviour change? Should the authors exclude them? For example if there are other ways which are more cost-effective than HPFI, then HPFI won't be the optimal choice for behaviour change.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	2
Explanation		Data sources: • electronic databases: Medline, Embase, Science Citation Index, CINAHL, Social Science Citation Index, PsycINFO, ASSIA, IBSS, Cochrane Library (DARE, CENTRAL, HTA and NHS EED). Details are provided in	

		the supplementary material • Online research registers (Current Controlled Trials, clinical trials.gov) • google.com • Jiscmail • Reference lists of relevant previous reviews (reference provided) and all the included papers • Citation searches of included papers using SCI and SSCI Dates of coverage: inception – April 2012	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Suppl S2
Explanation		An example of search strategy in MEDLINE was provided in supplementary file S2. The authors stated the search strategy in MEDLINE 'was adapted, as appropriate, for other databases'. Can you replicate their search strategy in other databases? Remember different databases have different search systems, different MeSH words etc. Limit: English studies Question: Is the search strategy sufficient? Are there any other terms you think might contribute to finding more relevant articles?	
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	2-3
Explanation		Process: Exclusion of duplicates, screening title and abstract by one researcher, screening full paper by two researchers. Disagreement was solved by discussions. Flow chart is provided.	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	3
Explanation		'Extracted independently by two researchers using a pro-forma.'	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Explanation		Study characteristics to extract were listed but full details were not given. The value of HPFI was converted into 2011 US dollars. Assumptions were not clear, e.g. defining the level of nicotine level assumed to be effective measure for the 'uptake of the behaviour change'	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	3
Explanation		Cochrane Risk of Bias Review Guidelines. Study quality was used in determining if the study would be included in meta-analysis (see paragraph 2nd to the last	

		on page 3)	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	3
Explanation		Risk ratios (RR)	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	3
Explanation		I^2, random-effects meta-analysis.	

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	3
Explanation		Contour enhanced funnel plot	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	3
Explanation		Subgroup analysis: by behaviour group Meta-regression: whether the log (RR) varied by incentive value, or follow-up period. Unrestricted maximum likelihood mixed-effects meta-regression. Meta-regression plots: with points proportional in size to comparison weights drawn. There was no indication of which analyses were pre-specified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	3-4, fig 1
Explanation		Yes, numbers are provided. Flow chart provided.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Supplementary table S2
Explanation		These characteristics were all presented in Supplementary Table 2	
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	3,5, fig 2
Explanation		Overall risk of bias: low or unclear One study was not included in meta-analysis or meta-regression due to insufficient data being presented, but	

		meta-analysis was stratified by quality of the included studies.	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	3-11 fig 3,6,11,14
Explanation		Subgroup meta-analysis forest plot were provided and summary data listed in the figures.	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	3-11 fig 3,6,11,14
Explanation		There is an error in the meta-analysis in figure 14-4.1.1. The number of events in the incentive group from Volpp et al.2009 study should be 41 (from the figure 6 and suppl table S2). The reported results of the overall risk ratio for smoking cessation would be artificially less effective, meaning their overall result may actually be more conservative than reported.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	5 fi 2
Explanation		Contour enhanced funnel plots are provided for all subgroups. The plots did not suggest any evidence of publication bias.	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	3-13
		This was sufficient.	
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	12
Explanation		This was sufficient; however, the authors did not consider relevance to key groups.	
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	12-13
Explanation		• Found few behaviours • Greater risk of bias in some areas among the included studies. • All included studies are US based, limiting the generalisability. • Few included studies exploring medium-size incentives. • Data reported in the included studies does not allow us to explore if the effect of HPFI varied according to recipient characteristics. • The author acknowledged that other study designs may also contribute to the review. • The author acknowledged that the review does not provide information about how HPFI compare to	

		other interventions.	
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	14
Explanation		A general interpretation of the result is provided in the conclusion, however, implications for future research are not provided.	
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	1
explanation		Funders had no role in the study design, conduct and manuscript.	

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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