APPENDIX A. SEARCH STRATEGIES

Database: MEDLINE (via PubMed)

Search date: 01/06/15

Set #	Search Terms	Results
#1	"Accelerometry"[Mesh] OR "Magnetometry"[Mesh] OR "Motor Activity/instrumentation"[Mesh] OR fitness track*[tiab] OR activity track*[tiab] OR fitness monitor*[tiab] OR gps[tiab] OR “global positioning”[tiab] OR activity monitor*[tiab] OR motion sens*[tiab] OR accelerometer[tiab] OR accelerometers[tiab] OR accelerometry[tiab] OR gyroscope[tiab] OR gyroscopic[tiab] OR gyroscopes[tiab] OR actograph[tiab] OR actographic[tiab] OR actography[tiab] OR actographs[tiab] OR wearable system[tiab] OR wearable systems[tiab] OR wearable sensor[tiab] OR wearable sensors[tiab] OR ((step[tiab] OR steps[tiab]) AND (counting[tiab] OR counted[tiab] OR counter[tiab] OR counters[tiab] OR count[tiab])) OR actigraph[tiab] OR (basis[tiab] AND peak[tiab]) OR “bowflex boost”[tiab] OR “fit link”[tiab] OR (misfit[tiab] AND shine[tiab]) OR (polar[tiab] AND loop[tiab]) OR bodybugg[tiab] OR bodymedia[tiab] OR fitbit[tiab] OR fitbug[tiab] OR fuelband[tiab] OR garmin[tiab] OR gowear[tiab] OR gruve[tiab] OR ibitz[tiab] OR iqua[tiab] OR lumo[tiab] OR motoactiv[tiab] OR runtastic[tiab] OR scosche[tiab] OR smartband[tiab] OR striiv[tiab] OR tomtom[tiab] OR vivofit[tiab] OR vivosmart[tiab] OR wahoo[tiab] OR wakemate[tiab] OR withings[tiab]	52,751
#2	"Movement"[Mesh] OR "Exercise Movement Techniques"[Mesh] OR "Exercise Therapy"[Mesh] OR "Physical Fitness"[Mesh] OR "Physical Endurance"[Mesh] OR "Physical Exertion"[Mesh] OR fitness[tiab] OR activity[tiab] OR active[tiab] OR walk*[tiab] OR run*[tiab] OR step[tiab] OR steps[tiab] OR exercise[tiab] OR move*[tiab]	3,555,057
#3	(randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR randomised[tiab] OR randomization[tiab] OR randomisation[tiab] OR randomly[tiab] OR trial[tiab] OR groups[tiab]) NOT (Editorial[ptyp] OR Letter[ptyp] OR Case Reports[ptyp] OR Comment[ptyp])	2,079,904
#4	#1 AND #2 AND #3	4858
#5	#4 NOT ("Child"[Mesh] NOT "Adult"[Mesh])	4355
#6	#5, English, 2000 - present	3506

Database: Embase

Search date: 01/06/15

Set #	Search Terms	Results
#1	'accelerometry'/exp OR 'magnetometry'/exp OR (fitness NEAR/2 track*):ab,ti OR (activity NEAR/2 track*):ab,ti OR (fitness NEAR/2 monitor*):ab,ti OR gps:ab,ti OR 'global positioning':ab,ti OR (activity NEAR/2 monitor):ab,ti OR (motion NEAR/2 sens*):ab,ti OR accelerometer:ab,ti OR accelerometers:ab,ti OR accelerometry:ab,ti OR gyroscope:ab,ti OR gyroscopic:ab,ti OR gyroscopes:ab,ti OR actograph:ab,ti OR actographic:ab,ti OR actography:ab,ti OR actographs:ab,ti OR 'wearable system':ab,ti OR 'wearable systems':ab,ti OR 'wearable sensor':ab,ti OR 'wearable sensors':ab,ti OR ((step OR steps):ab,ti AND (counting OR counted OR counter OR counters OR count):ab,ti) OR actigraph:ab,ti OR (basis NEAR/3 peak):ab,ti,df OR 'bowflex boost':ab,ti,df OR 'fit link':ab,ti,df OR (misfit NEAR/3 shine):ab,ti,df OR (polar NEAR/3 loop):ab,ti,df OR bodybugg:ab,ti,df OR bodymedia:ab,ti,df OR fitbit:ab,ti,df OR fitbug:ab,ti,df OR fuelband:ab,ti,df OR garmin:ab,ti,df OR gowear:ab,ti,df OR	45,316

Set #	Search Terms	Results
	gruve:ab,ti,df OR ibitz:ab,ti,df OR iqua:ab,ti,df OR lumo:ab,ti,df OR motoactiv:ab,ti,df OR runtastic:ab,ti,df OR scosche:ab,ti,df OR smartband:ab,ti,df OR striiv:ab,ti,df OR tomtom:ab,ti,df OR vivofit:ab,ti,df OR vivosmart:ab,ti,df OR wahoo:ab,ti,df OR wakemate:ab,ti,df OR withings:ab,ti,df	
#2	'movement (physiology)'/exp OR 'physical activity, capacity and performance'/exp OR 'kinesiotherapy'/exp OR 'fitness'/exp OR fitness:ab,ti OR activity:ab,ti OR active:ab,ti OR walk*:ab,ti OR run*:ab,ti OR step:ab,ti OR steps:ab,ti OR exercise:ab,ti OR move*:ab,ti	4,564,954
#3	('randomized controlled trial'/exp OR 'crossover procedure'/exp OR 'double blind procedure'/exp OR 'single blind procedure'/exp OR random*:ab,ti OR factorial*:ab,ti OR crossover*:ab,ti OR (cross NEAR/1 over*):ab,ti OR (doubl* NEAR/1 blind*):ab,ti OR (singl* NEAR/1 blind*):ab,ti OR assign*:ab,ti OR allocat*:ab,ti OR volunteer*:ab,ti) NOT ('case report'/exp OR 'case study'/exp OR 'editorial'/exp OR 'letter'/exp OR 'note'/exp)	1,431,100
#4	#1 AND #2 AND #3	3250
#5	#4 NOT ('child'/exp NOT 'adult'/exp)	2888
#6	#5 AND [embase]/lim NOT [medline]/lim	1051
#7	#6, Limits: English, 2000-	988

Database: CINAHL

Search date: 01/06/15

Set #	Search Terms	Results
#1	(MH "Accelerometry") OR (MH "Magnetics+") OR TI ("fitness track*" or "activity track*" or "fitness monitor*" or gps or "global positioning" or "activity monitor*" or "motion sens*" or accelerometer or accelerometers or accelerometry or gyroscope or gyroscopic or gyroscopes or actograph or actographic or actography or actographs or "wearable system" or "wearable systems" or "wearable sensor" or "wearable sensors" or ((step or steps) and (counting or counted or counter or counters or count)) or actigraph or (basis and peak) or "bowflex boost" or "fit link" or (misfit and shine) or (polar and loop) or bodybugg or bodymedia or fitbit or fitbug or fuelband or garmin or gowear or gruve or ibitz or iqua or lumo or motoactiv or runtastic or scosche or smartband or striiv or tomtom or vivofit or vivosmart or wahoo or wakemate or withings) OR AB ("fitness track*" or "activity track*" or "fitness monitor*" or gps or "global positioning" or "activity monitor*" or "motion sens*" or accelerometer or accelerometers or accelerometry or gyroscope or gyroscopic or gyroscopes or actograph or actographic or actography or actographs or "wearable system" or "wearable systems" or "wearable sensor" or "wearable sensors" or ((step or steps) and (counting or counted or counter or counters or count)) or actigraph or (basis and peak) or "bowflex boost" or "fit link" or (misfit and shine) or (polar and loop) or bodybugg or bodymedia or fitbit or fitbug or fuelband or garmin or gowear or gruve or ibitz or iqua or lumo or motoactiv or runtastic or scosche or smartband or striiv or tomtom or vivofit or vivosmart or wahoo or wakemate or withings)	14,089
#2	(MH "Movement+") OR (MH "Exercise+") OR (MH "Therapeutic Exercise+") OR (MH "Physical Activity") OR (MH "Physical Fitness+") OR (MH "Exertion+") OR TI (OR fitness OR activity OR active OR walk* OR run* OR step OR steps OR exercise OR move*) OR AB (OR fitness OR activity OR active OR walk* OR run* OR step OR steps OR exercise OR move*)	361,653
#3	(MH "Treatment Outcomes+") OR randomized OR PT clinical trial	317,587
#4	#1 AND #2 AND #3	636
#5	#4, English, 2000-	602

Database: SPORTDiscus

Search date: 01/06/15

Set #	Search Terms	Results
#1	DE "ACCELEROMETERS" OR TI ("fitness track*" or "activity track*" or "fitness monitor*" or gps or "global positioning" or "activity monitor*" or "motion sens*" or accelerometer or accelerometers or accelerometry or gyroscope or gyroscopic or gyroscopes or actograph or actographic or actography or actographs or "wearable system" or "wearable systems" or "wearable sensor" or "wearable sensors" or ((step or steps) and (counting or counted or counter or counters or count)) or actigraph or (basis and peak) or "bowflex boost" or "fit link" or (misfit and shine) or (polar and loop) or bodybugg or bodymedia or fitbit or fitbug or fuelband or garmin or gowear or gruve or ibitz or iqua or lumo or motoactiv or runtastic or scosche or smartband or striiv or tomtom or vivofit or vivosmart or wahoo or wakemate or withings) OR AB ("fitness track*" or "activity track*" or "fitness monitor*" or gps or "global positioning" or "activity monitor*" or "motion sens*" or accelerometer or accelerometers or accelerometry or gyroscope or gyroscopic or gyroscopes or actograph or actographic or actography or actographs or "wearable system" or "wearable systems" or "wearable sensor" or "wearable sensors" or ((step or steps) and (counting or counted or counter or counters or count)) or actigraph or (basis and peak) or "bowflex boost" or "fit link" or (misfit and shine) or (polar and loop) or bodybugg or bodymedia or fitbit or fitbug or fuelband or garmin or gowear or gruve or ibitz or iqua or lumo or motoactiv or runtastic or scosche or smartband or striiv or tomtom or vivofit or vivosmart or wahoo or wakemate or withings)	6204
#2	(random* OR trial)	56299
#3	#1 AND #2	639
#4	#3, English, 2000-, Academic Journals	543

Database: Cochrane CENTRAL

Search date: 01/06/15

Set #	Search Terms	Results
#1	[mh Accelerometry] OR [mh Magnetometry]	341
#2	"fitness track*":ab,ti or "activity track*":ab,ti or "fitness monitor*":ab,ti or gps:ab,ti or "global positioning":ab,ti or "activity monitor*":ab,ti or "motion sens*":ab,ti or accelerometer:ab,ti or accelerometers:ab,ti or accelerometry:ab,ti or gyroscope:ab,ti or gyroscopic:ab,ti or gyroscopes:ab,ti or actograph:ab,ti or actographic:ab,ti or actography:ab,ti or actographs:ab,ti or "wearable system":ab,ti or "wearable systems":ab,ti or "wearable sensor":ab,ti or "wearable sensors":ab,ti or ((step:ab,ti or steps:ab,ti) and (counting:ab,ti or counted:ab,ti or counter:ab,ti or counters:ab,ti or count:ab,ti)) or actigraph:ab,ti or (basis:ab,ti and peak:ab,ti) or "bowflex boost":ab,ti or "fit link":ab,ti or (misfit:ab,ti and shine:ab,ti) or (polar:ab,ti and loop:ab,ti) or bodybugg:ab,ti or bodymedia:ab,ti or fitbit:ab,ti or fitbug:ab,ti or fuelband:ab,ti or garmin:ab,ti or gowear:ab,ti or gruve:ab,ti or ibitz:ab,ti or iqua:ab,ti or lumo:ab,ti or motoactiv:ab,ti or runtastic:ab,ti or scosche:ab,ti or smartband:ab,ti or striiv:ab,ti or tomtom:ab,ti or vivofit:ab,ti or vivosmart:ab,ti or wahoo:ab,ti or wakemate:ab,ti or withings:ab,ti	2945
#3	#1 OR #2	3204
#4	[mh "Movement"] OR [mh "Exercise Movement Techniques"] OR [mh "Exercise Therapy"] OR [mh "Physical Fitness"] OR [mh "Physical Endurance"] OR [mh "Physical Exertion"]	29,268

Set #	Search Terms	Results
#5	fitness:ab,ti OR activity:ab,ti OR active:ab,ti OR walk*:ab,ti OR run*:ab,ti OR step:ab,ti OR steps:ab,ti OR exercise:ab,ti OR move*:ab,ti	134,034
#6	#4 OR #5	140,071
#7	#3 AND #6	1630
#6	#5, 2000 – present, In Trials	1281

APPENDIX B. PEER REVIEWER COMMENTS TABLE

Question Text	Reviewer Number	Comment	Response
Are the objectives, scope, and methods for this review clearly described?	3	Yes	N/A
	4	Yes	N/A
	5	Yes	N/A
	6	No - My primary concern with this document is the broad conceptualization of the difference between an accelerometer and a pedometer. A pedometer is something that counts steps. An accelerometer is something that counts accelerations possibly with some additional metric of intensity. In the old days, pedometers counted steps using a spring and magnet internal mechanism. Now, most pedometers are actually using internal accelerometers to measure step counts. So, is a pedometer that uses an internal mechanism of an accelerometer a pedometer or an accelerometer. These are not technically mutually exclusive categories. Examples of accelerometer based pedometers include Stepwatch, Omron HJ-720 ITC and Fitbits. Many interventions using classic accelerometers such as actigraphs actually only feed back step count data even if they could feed back the full accelerometer data so would these count in this synthesis? It appears that you chose to exclude studies of interventions that use activity monitors with internal accelerometer mechanisms that report step counts back to the user rather than the full accelerometer data. The decision to exclude interventions that use accelerometer based activity trackers to give step count feedback over the internet seems arbitrary. Accelerometer based pedometers have all of the advantages of accelerometers except that they filter out non-step count accelerations before presenting the data (step count) to the wearer. If you want to do a synthesis of trials that feedback non-step count physical activity metrics obtained from an accelerometer, then the intro and justification needs to be rewritten to reflect this focus. As it is written, it does not	Thank you for these comments. This report and other products have been explicitly developed to meet the needs of our stakeholder partners. There have been several excellent reviews of the effects of pedometers on physical activity and other health outcomes (Bravata, 2007, JAMA; Richardson, 2008, Annals of Family Medicine). As such, we developed a “white paper” that provides a review of recent good- and fair-quality systematic reviews on the effect of pedometer use on weight change, physical activity, and specific conditions of interest (*eg*, osteoarthritis, COPD, heart disease) to summarize the evidence for our primary stakeholders. Stakeholders were also interested in wearable technologies that measured activity beyond step counts (non-pedometer–based wearable motion sensing technologies), as those technologies tend to be more costly than traditional pedometers that only capture or report step counts. We agree that distinguishing between pedometers and accelerometers can be challenging. Our inclusion criteria consisted of the use of a wearable activity device that provided objective feedback to the wearer and was not defined as a pedometer-only device by study authors. To determine this, we used the author’s definition of the device. If the underlying mechanics of a device were unclear, we searched online resources to determine each device type and manufacturer to ascertain if the predominate technology used something beyond, or in addition to, pedometers for step counts. We have added this information to Appendix C. All of the included wearable devices were considered to be accelerometers by manufacturer’s definition. Our exclusion criteria did seek to exclude pedometer-based studies only if they

Question Text	Reviewer Number	Comment	Response
		currently make sense. It is simply not true that a) pedometers are less accurate than accelerometers (because many pedometers these days actually are accelerometers), b) accelerometers can link to electronic networks and devices but pedometers cannot (since the early days of the sportbrain, even spring and magnet pedometers have been able to upload step count data to networks and devices, now fitbits etc are accelerometer based pedometers that link up) . I think you need to rewrite the criteria and clearly state that your question is - does feedback related to accelerometer count and intensity change physical activity , weight and other health outcomes. It is the data that is fed back to the user that varies - either step counts vs accelerations with intensity ratings.	identified themselves as a pedometer and feedback was not part of the intervention. We did not exclude studies where the intervention gave step count feedback over the internet. We did not restrict the type of feedback that was provided to the participant, and several articles included studies that measured physical activity on different scales and with different measures including step counts.
	7	Yes	N/A
Is there any indication of bias in our synthesis of the evidence?	3	No	N/A
	4	No	N/A
	5	No	N/A
	6	No	N/A
	7	No	N/A
Are there any published or unpublished studies that we may have overlooked?	3	No	N/A
	4	No	N/A
	5	No	N/A
	6	Yes - If you decide to include accelerometer based interventions that limit feedback to step count data then you have missed many studies. If the focus and exclusion criteria are really intended to exclude accelerometer based step count feedback interventions and if these criteria are made more coherent, then I think you may have all of the relevant studies.	Thank you for this comment. Our eligibility criteria did not exclude studies that limit feedback to step count data. We included any objective feedback that was provided to the participant (wearer) and that was not defined as a pedometer-only study by study authors.
	7	No	N/A
Additional suggestions or comments	3	Overall thorough and appears to be well-done. Key questions are addressed as well as can be for the amount of data available.	Thank you.

Question Text	Reviewer Number	Comment	Response
can be provided below. If applicable, please indicate the page and line numbers from the draft report.		1) In the abstract, you report the SMD for the 9 studies using an inactive comparator for physical activity, and in the conclusions, you choose to highlight the SMD for the overall. I recommend being consistent in which estimate you highlight to avoid confusion. 2) In the abstract, you conclude that the devices produce small positive effects on physical activity and weight that are not likely to have a clinically significant impact on health outcomes. This statement strikes me as too definite of a conclusion. I think that your support for the small positive effects is well-substantiated in the methods, results, and conclusions. I think your support for the interpretation of the lack of clinically significant impact on health outcomes is lacking. If you wish to keep this statement in the conclusions of the abstract, you need to provide support in the Discussion for the fact that these small differences in physical activity and weight do not translate to differences in clinical outcomes (ok to make this judgment using data from other studies). If you don't provide adequate support for this statement, you may need to leave this more open-ended. Furthermore, the confidence intervals for effects are still relatively wide, and do not exclude a medium-sized effect. 3) On Forrest plots, it would be easier/faster to interpret if the subgroup "Summary" line was labeled (e.g. Inactive Comparator Summary, Active Comparator Summary). 4) It wasn't a pre-defined KQ2 item, but it is mentioned a couple of times - would it be worth it to do a formal analysis on differences by duration of intervention?	1) We agree about being consistent with the estimates we provide. We now provide inactive, active, and overall summary estimate for both outcomes. 2) We agree that our conclusion was originally written too definitively. We have made changes to soften the conclusion and highlight the limitations in this body of literature. Specifically, we have indicated that the small positive effects found for these devices on physical activity and weight may not result in clinically important outcomes. We have also highlighted in the Abstract's conclusion that the small number of studies with small sample sizes and the moderate to high heterogeneity limit the conclusions that may be drawn. 3) We have added labels to all the stratified summary estimates. 4) We did abstract the information on duration of intervention from individual studies. We did not, however, include intervention duration in the *a priori* analysis plan developed in collaboration with our primary stakeholders. As such, we report on those analyses that are *a priori*. We agree that formal analysis on differences by duration of intervention would be interesting, and we will explore including

Question Text	Reviewer Number	Comment	Response
			these in other analyses beyond this report. Thank you.
		I think the section on Evidence Gaps and Future Research will end up being very helpful!	
	4	Overall, I commend the authors on an extremely well written synthesis of this literature. I was unable to locate any additional RCTs that would meet the search criteria. I believe this report to be unbiased and a fair assessment of or current knowledge of these technologies. I have made some minor comments below for clarification and consideration.	Thank you.
		(p5, Abstract) – The abstract briefly mentions KQ2 in the background (i.e. factors affecting use), but nowhere else. The authors may consider adding a line about the paucity of literature in this regard should text limit be available.	We agree. We have added a sentence to the Results section that we did not identify any moderating factors that significantly impacted the effectiveness of the outcomes. This was our KQ 2 objective.
		(pg5, Abstract) – In my opinion, the concluding statements could be revised somewhat to acknowledge the limitations of these data and relative immaturity of this field.	We agree. We have made changes to soften the conclusion and highlight the limitations in this body of literature.
		(pg9, Introduction) – As the targeted audience for this report is VA clinicians, managers and policymakers – the authors may consider adding in some stats that are specific to Veterans and physical activity. For example, I believe there is some evidence that VA users in comparison to non-users are less likely to meet PA recommendations (Littman et al. 2009, MSSE). In addition, Consider including some relevant studies from VHA describing health-care costs and exercise capacity in Veterans (Weiss et al. 2004 Chest; Myers 2008 Curr Sports Med Report, etc.) including data derived from the Veterans Exercise Testing Study from Jon Myers' group in Palo Alto.	Thank you for the suggestion to more clearly highlight the relevance of this inactivity problem for our stakeholders and intended audience. We have expanded the Introduction to include specific statistics on Veterans and physical (in)activity as well as the healthcare cost implications of sedentary behavior/lifestyle, citing the compelling literature you provided.
		(p61, Appendix B) – I'm not sure a column for risk of bias	Thank you for this comment. We decided to add the risk of

Question Text	Reviewer Number	Comment	Response
		is necessary here as this was thoroughly covered in a prior section.	bias to the Appendix C table (formerly Appendix B table) since it was a standalone table and we felt that many readers may want to view the risk of bias assessment alongside the individual studies and study characteristics.
	5	This report is a very elegant piece of work that clearly represents a tremendous amount of work undertaken to synthesize all of the available data on this topic. My concern is that the major take-home message of this report, from my perspective, may be a bit misleading which may to lead to erroneous assumptions about the outcomes. "We found that use of the wearable devices produces small positive effects that are not likely to have a clinically significant impact on health outcomes. Clinicians and policymakers should consider these findings before widespread use of this technology etc". I believe some of the evidence gaps should be noted in the concluding statement. Policy makers might be inclined to conclude that there is no point in investing in this technology when in fact your data suggest that there is a paucity of well designed studies and that more research is needed that could better inform this decision. For example, on page 14 regarding KQa,the final sentence of the summary states that the "small number of studies, small sample sizes within these studies, and the moderate to high heterogeneity limits conclusions that may be drawn." This statement sounds like a more overall accurate conclusion than what is currently stated on the abstract main conclusion which is what most people will be most likely to read. I also fear that it is a big jump to make a conclusion about clinical impact on health outcomes when the focus of this report is on behaviors (activity and weight management).	Thank you for your thorough and thoughtful review. We agree about the conclusions in the previous draft report. We have made changes to soften the conclusions and highlight the limitations in this body of literature. Specifically, we have indicated that the small positive effects found for these devices on physical activity and weight may not result in clinically important outcomes. We have also highlighted in the Abstract's conclusion that the small number of studies with small sample sizes and the moderate to high heterogeneity limit the conclusions that may be drawn.
		On page 28 - Summary of findings. The last sentence is not clear. It has a double negative which I am not sure makes sense 'The same trend was not seen for decreases in PA etc." It seems that it should be "The same trend was not seen for greater increases in PA' etc.	Thank you for identifying this error. We have changed to "greater increases in PA" as suggested.

Question Text	Reviewer Number	Comment	Response
		On page 39 in the bottom paragraph of Clinical and Policy implications. This paragraph seems to be "promoting" use of devices and has some cautionary verbiage about the limitations of the evidence which seems to be contradictory to the conclusion in the structured abstract. It would seem to me that you can't have it both ways. These seem like mixed messages. I believe the data support this second conclusion more than the one in the structured abstract. The gaps and future research table is very useful. Hopefully this will guide future research. It was interesting to note the final row in which it was stated that no studies were recruited through clinical settings which should have a huge bearing on clinical policy makers in that we truly have no evidence in favor or against the use of wearable monitors in clinical settings.	We agree. We have changed the structured Abstract as mentioned above to highlight the limitations in the body of literature. Thank you.
	6	2) There are several intervention characteristics that we know have an impact on behavior change. Goal-setting is one that may be the most critical given the focus on self-monitoring. Others include strategies to overcome barriers, motivational interviewing etc. It would be helpful to understand if / how participants set or were prescribed activity count goals for each of the included studies. Did all the trials include some kind of coaching around goal setting. If not, does explicit attention to goal setting impact outcomes 3) The second question related to heterogeneity of treatment effect is so profoundly limited by small sample size that it probably should be reported as unable to judge due to risk of type 2 error rather than as not difference detected. 4) Further limitations should be emphasized – there is insufficient evidence to determine if accelerometer based feedback is inferior, equivalent or superior to pedometer	2) Thank you for posing this question. Due to the high heterogeneity in adjunctive interventions delivered alongside the activity devices, we were unable to explore these additions quantitatively. Table 3 outlines the types of adjunctive interventions used for each study. Thus, we chose to categorize the use of the activity device alongside the adjunct intervention as “major vs minor.” It would be interesting for future analyses to examine the impact on outcomes that goal-setting may have with these devices. 3) We agree. We have highlighted in the report the small sample sizes found in individual trials. We added to the Limitations section that the small sample sizes found within this literature may have resulted in a type II error. 4) Thank you for this suggestion. We have added this information to the Research Gaps/Future Research section of the report.

Question Text	Reviewer Number	Comment	Response
		based feedback for any of the outcomes.	
	7	These comments are submitted on behalf of the National Center for Health Promotion and Disease Prevention (NCP). The report was thorough and organized and the information was presented in a clear manner. There were two points of potential clarification that we wanted to bring to the attention of the authors: 1. Pg. 1(lines 22-24)- physical activity diaries are included as a self-reported measure that "does little to motivate or change physical activity behavior..." While diaries and other real time records of self-monitored behavior are self-reported, they are not intended to be the same as questionnaires and interviews that gather self-reported data retrospectively. In addition, the act of attending to a target behavior using self-monitoring strategies has been shown to result in behavior change. Unless there is evidence to suggest that self-monitoring of behavior IS NOT associated with behavior change, or self-monitoring of physical activity is NOT associated with changes in physical activity, it may be helpful to reword this sentence. 2. Pg. 16 (lines 33-54), Figure 4 - What does the absence of color/white colored bar represent? Also, it appears that the overall percentage of high risk of bias (as indicated by the proportion of the bar colored red in the "Overall" row) is much larger than one would expect given the relatively low risk of bias (as depicted by minimal red coloring in each of the individual risk of bias items). Additional description of the information in Figure 4 may provide clarity on these issues.	Thank you for the positive comments about the thoroughness and organization of the report. 1) We agree with the review team that the way the sentence on page1, lines 22-24, is written is misleading. We initially intended to indicate that these self-report measures, such as diaries, may not be an optimal measurement strategy rather than imply them as intervention strategies. We have since revised the report to read, “Physical activity has previously been measured using self-reported measures (*eg,* questionnaires, interviews.); however, these do little to motivate or change physical activity behavior and can be subject to reporting bias.” 2) Thank you for noticing this error. We have revised the Risk of Bias figure and removed the “clear” space from the PA and weight questions. This occurred since overall we had 14 studies included; however, some studies did not include both outcomes of interest. There is high risk of bias in many of the studies even without individual questions being rated as high risk because of the way the overall evaluation is calculated. In the Methods section, we describe the scoring process for “high risk” which includes two or more domain questions that are “not clear.” As such, many of the studies had “not clear” domain questions, leading to an overall high risk of bias. We have added the scoring as a footnote to Figure 4.

APPENDIX C. CHARACTERISTICS OF INCLUDED STUDIES

Study	Population N Randomized Device Name	Intervention	Comparator	Outcomes	Duration (Weeks)	Funding Source	Risk of Bias
Greene, 2013[1]	Healthy volunteers 513 NR	6 months access to online social network to post about weight and PA progress + continuous accelerometer use and feedback	Printed lifestyle guidelines on diet (sample daily meal plan with recommended serving sizes), recommendations on daily level of exercise, and articles on benefits of exercise and healthy eating	PA: Yes Weight: Yes Satisfaction: No	12 to 24	Industry	High
Koizumi, 2009[2]	Older adults 68 Kenz Lifecorder accelerometer	12 weeks of accelerometer with feedback + goal-setting	12-week blinded accelerometer with instruction to continue normal daily activity	PA: Yes Weight: No Satisfaction: No	12 to 24	NR	High
Luley, 2014[3]	Chronic medical illness 184 Aipermotion 440 accelerometer	3-arm study (2 interventional): <u>4s intervention:</u> 1-time, 2-hour instruction on diet & PA + 12 months of accelerometer use + 52 weekly individual letters with feedback on weight, diet, and PA <u>ABC intervention:</u> 1-time, 2-hour instruction on diet & PA + 12 months of accelerometer use + 12 monthly behavioral counseling calls	1-time, 2-hour session, consisting of diet education, diet regimen, and PA education	PA: No Weight: Yes Satisfaction: No	25+	Gov	Unclear

Study	Population N Randomized Device Name	Intervention	Comparator	Outcomes	Duration (Weeks)	Funding Source	Risk of Bias
Nicklas, 2014[4]	Older adults 48 Lifecorder PlusVR tri-axial accelerometer	5-month weight loss intervention that included hypocaloric diet (2 prepared meals a day) + 4 days/week supervised exercise + self-regulatory intervention that involved wearing an accelerometer, documenting activity, and 6 weekly sessions of behavioral counseling	5-month weight loss intervention consisting of diet education and regimen (individualized hypocaloric intake), PA education, structured exercise (supervised treadmill) and in-person counseling	PA: Yes Weight: Yes Satisfaction: No	25+	Gov	High
Paschali, 2005[5]	Chronic medical illness 30 BioTrainer accelerometer	12 weeks of continuous accelerometer use and feedback + 4 monthly in-person exercise behavioral counseling sessions + workbook	12-week blinded accelerometer with 4 monthly in-person counseling sessions to review exercise diary. A 24-page information book and home based walking plan with PA education, behavioral self-management, weight goal-setting, and chronic disease-monitoring.	PA: Yes Weight: No Satisfaction: No	12 to 24	Gov	High

Study	Population N Randomized Device Name	Intervention	Comparator	Outcomes	Duration (Weeks)	Funding Source	Risk of Bias
Polzien, 2007[6]	Overweight/ obese and/or sedentary 57 SenseWear Pro Armband	3-arm study: <u>Standard in-person behavioral weight control program:</u> 7 in-person individualized counseling session over 12 weeks <u>Continuous technology-based behavioral weight control program:</u> 7 in-person individualized counseling session over 12 weeks + 12 weeks of continuous accelerometer use and feedback <u>Intermittent technology-based behavioral weight control program:</u> 7 in-person individualized counseling session over 12 weeks + 3 weeks of accelerometer use and feedback over 12 weeks	7 in-person individualized counseling sessions consisting of diet education, diet regimen (1200 to 1500 kcal/day; dietary fat <20% of total energy intake), PA education, and weight goal-setting	PA: Yes Weight: Yes Satisfaction: No	12 to 24	Industry	High
Reijonsaari, 2012[7]	Healthy volunteers 544 Uni-axial accelerometer	12 months of continuous accelerometer use and feedback + access to telephone counseling (frequency NR)	Written and verbal explanation of results of physical exams, general PA, and health information and occupational healthcare	PA: Yes Weight: Yes Satisfaction: No	25+	Fdn/Indiv	Low

Study	Population N Randomized Device Name	Intervention	Comparator	Outcomes	Duration (Weeks)	Funding Source	Risk of Bias
Shrestha, 2013[8]	Overweight/ obese and/or sedentary 28 Polar FA20 accelerometer	1-time, 1.5 hour lifestyle instruction + 6 months of continuous accelerometer use and feedback	Self-directed exercise and/or US Army mandated physical training	PA: Yes Weight: Yes Satisfaction: No	12 to 24	Gov	High
Shuger, 2011[9]	Overweight/ obese and/or sedentary 197 BodyMedia SenseWear Armband	4-arm study (3 interventional arms) : <u>Group-based behavioral weight loss:</u> 14 group weight loss sessions + 6 individual phone calls + workbook over 9 months <u>Accelerometer alone:</u> 9 months of continuous accelerometer use and feedback <u>Group-based behavioral weight loss + accelerometer use:</u> 9 months of continuous accelerometer use and feedback + 14 group weight loss sessions + 6 individual phone calls + workbook	Self-directed weight loss manual with diet education, PA education, and weight goal-setting	PA: No Weight: Yes Satisfaction: No	25+	Industry	Unclear

Study	Population N Randomized Device Name	Intervention	Comparator	Outcomes	Duration (Weeks)	Funding Source	Risk of Bias
Slootmaker, 2009[10]	Overweight/ obese and/or sedentary 102 PAM (model AM101), uniaxial activity monitor + smartphone	3 months of continuous accelerometer use + tailored PA feedback and motivational tips via web-based portal	A single written brochure with brief PA recommendations	PA: Yes Weight: Yes Satisfaction: No	12 to 24	Gov	High
Tabak, 2014[11]	Chronic medical illness 29 Activity Coach (accelerometer-based activity sensor + smartphone)	Self-directed technology supported care program that included a tailored web-based exercise program, accelerometer-based activity senor and motivational messaging, COPD self-management module, and as needed web-portal teleconsultation conducted over 9 months	Usual care with regular physiotherapy, if prescribed	PA: Yes Weight: No Satisfaction: No	25+	Gov	Unclear
Thompson, 2014[12]	Overweight/ obese and/or sedentary 20 GRUVE triaxial accelerometer	12 weeks of continuous accelerometer use and feedback + weekly brief counseling sessions on increasing activity + treadmill desk	12 weeks of monitoring without feedback, then crossed over to receive monitoring, plus feedback, counting, and treadmill desk for 12 weeks	PA: Yes Weight: Yes Satisfaction: No	12 to 24	Fdn	High

Study	Population N Randomized Device Name	Intervention	Comparator	Outcomes	Duration (Weeks)	Funding Source	Risk of Bias
Thompson, 2014[13]	Older adults 49 FitBit	24 weeks of continuous accelerometer use and feedback + weekly brief telephone counseling sessions focused on accelerometer feedback + 6 in-person brief counseling sessions	24 weeks of accelerometer without feedback	PA: Yes Weight: Yes Satisfaction: No	25+	Gov/Fdn	Unclear
Wijsman, 2013[14]	Older adults 235 DirectLife	12 weeks of continuous accelerometer use and feedback + personal website + personal e-coach who gives updates on activity status and advice via web portal	3-month waitlist control	PA: Yes Weight: Yes Satisfaction: No	12 to 24	Gov/ Industry	Low

Abbreviations: COPD=chronic obstructive pulmonary disease; Fdn=foundation; Gov=government; Indiv=individual; N=number; NR=not reported; PA=physical activity

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