Author’s response to reviews

Title: Points-Based Physical Activity: A novel approach to facilitate changes in body composition in inactive women with overweight and obesity. A randomised control trial.

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Author’s response to reviews:

Response to Reviewers’ Comments

(A word document version of the Response to Reviewers has been included in the submission as Supplementary Material for easy of access)

On behalf of my co-authors and I, I would like to sincerely thank the reviewers for their time and efforts in providing a very thorough, insightful, helpful and fair review of our manuscript. All comments have been taken on board and addressed. Great effort has been made to amend the manuscript to meet with the recommendations and requests of the reviewers. As such, we feel that their input has vastly improved our manuscript; for this we are very grateful.

Amendments to the manuscript have been highlighted. Our response to specific comments can be found below.

Reviewer 1

This manuscript by Holliday et al. presents findings from a 24-week RCT exercise intervention. The main purpose of this trial was to compare how two physical activity interventions, a "points-based program", and a "prescription program" influenced body composition and body mass of previously inactive adult women with overweight/obesity. A control group was also included.
Secondary outcomes included self-reported and acceletometry measured physical activity and self-reported dietary intake.

The authors report that the points-based physical activity program resulted in decreases in body mass and fat mass while there was no change in these outcomes in the "prescription program" group. Strengths of the current study include the randomised control design, a longer (24-week) intervention period than the typical 12-week exercise interventions normally reported in the literature, and the fact that this study addresses an important topic regarding more effective PA interventions.

However, there are also limitations to the current trial beyond what were addressed by the authors. The main flaw is that the largest difference between intervention conditions is the degree of choice individuals were allowed with the types of activity they could do. The prescribed exercise group was given the option of "1 or two modes of exercise" (line 159), while participants assigned to the points-based program were "provided with a table of different activities" that they could use to achieve their weekly points goal. [Note that the Appendix with this table is missing, so it was not possible to determine how many options were provided to participants, and if the assigned point values were accurately applied from MET values.]

Therefore, this study is truly evaluating programs which differ in choices participants have, not a novel 'points-based' system that participants can utilize in order to meet PA goals. While exercise guidelines do recommend 30 minutes, 5 days per week, the guidelines from I think every professional, national, and/or international organization also clearly state that a variety of exercises can be used to achieve this goal, and that it can be accumulated in bouts of 10 or more minutes. Therefore, actual exercise guidelines are more flexible than the "prescription program" the authors test in this study. Other limitations include the reliance on self-reported PA and dietary intake and the low number of participants who had objectively measured PA data for analyses. This work has merit and is of importance. However, I recommend substantial revisions prior to publication.

In light of these comments, it is felt warranted to change the naming of the “prescribed exercise” condition to “structured exercise”, as this perhaps better describes the purpose of this condition.

The discussion between the researcher and participant was to identify a structured routine completing the required bouts of exercise (5 x 30 minutes). The participant was not specifically restricted to “one or two modes of exercise”, but simply encouraged to adhere to the discussed and agreed routine, which typically had identified one or two modes of activity that the participants felt could be adopted. This is hopefully now clearer in the manuscript:

“Through discussion with a member of the research team, considering exercise preference, perceived ability and feasibility (based on time, access to facilities and cost), participant identified a structured routine for completing 5 x 30 minutes of exercise each week to which they
felt they would be able to adhere. All identified one or two modes of exercise to form their routine.” (Lines 161-164).

It is true that a primary difference between the two activity conditions was the degree of flexibility and choice; the points-based approach and the focus on physical activity, rather than just on structured exercise, was adopted as a means of increasing this choice while allowing a degree of autonomy. (A subtle adjustment has been made to the study aim paragraph to emphasise that we were “using PA points to provide choice and flexibility…” (See line 118)). It is well evidenced that perceptions of autonomy foster more intrinsic motivation, and subsequently adoption and maintenance of behaviour (e.g., see Teixeira, Carraca, Markland, Silva, & Ryan, 2012). Further, the points-based approach offered the opportunity to accumulate activity without the requirement to structure it into a perceived busy daily schedule, and with a focus on physical activity rather than exercise. Hence, it was hypothesised that this would overcome prominent barriers to physical activity: a perceived lack of time and a lack of enjoyment of exercise. This has been explained more clearly and thoroughly in the Background section of the manuscript.

We also acknowledge that much public health advice, and the advice of many practitioners and health care professionals undoubtedly advocates acquiring PA through a variety of activities. We appreciate that actually our data supports this message. This has been added to the Discussion section:

“Results therefore suggest a PBPA centred intervention may be more effective towards encouraging changes in PA behaviour likely to contribute meaningfully towards weight-loss, relative to exercise interventions that promote the following of a structured routine with less choice and flexibility. This study provides some evidence to support public health messages, and advice from practitioners and health care professionals, that advocate accumulating PA through the adoption of a variety and range of activities.” (Lines 375-380)

We hope this adds some clarity to the rationale for, and construction of, the conditions of this study. Additions have been made to the Background and Methods sections in an attempt to make this clear to readers of the manuscript.

General Comments:

1. The title and manuscript text should be edited to use of "people-first" language rather than "condition-first" language. The participants should be referred to as "women with overweight/obesity", not overweight/obese women. See position stand from TOS, AND, and other organizations here: [http://www.obesity.org/obesity/publications/position-and-policies/people-first](http://www.obesity.org/obesity/publications/position-and-policies/people-first).
Thank you for this advice. The title has been amended and the suggested terminology has been used throughout the manuscript.

2. Authors should be consistent with use of operational definitions. They currently fluctuate between body weight and body mass. Pick one for use throughout. Same situation for referring to participants as "women" or "female". In general, though not a set rule, "women" preferred term for human subjects, verse "female" for rodent models.

Thank you for this observation. The term “female” has been replaced with “woman” throughout. There is now also a consistent use of “body weight”.

3. Appendix with MET table is missing from document. Not sure if the authors did not include it, or if the journal did not provide it to reviewers.

Specific Comments:

Abstract:

1. Add a sentence on what statistical analyses was utilized. Without this information it is difficult to determine if the results are valid.

This information has been added to the Results subsection of the abstract as follows: “Mixed-design ANOVAs demonstrated…”

2. Adherence to protocols should be presented in the abstract results.

Adherence to the study protocol has been added to the beginning of the Results subsection of the abstract as follows:

“Fifty-eight women completed the study, and provided data for primary outcomes. Of these, n =41 and n =19 provided data for food intake and objectively assessed PA.”

3. Not sure if diet information needs to be included in the abstract since it is not the main objective of the trial.

While this was a secondary outcome measure, the authors feel that this data is important for the findings of the study (the changes in dietary intake largely drive the changes in body
composition and body weight. Preference is for inclusion of this data and these results in the abstract.

Great efforts have been made to provide more information in the abstract. This is difficult given the word limit, so some information is provided very briefly.

Background:

1. You mention both exercise and PA, which makes readers think that you want to differentiate between the two constructs. However, later the terms appear to be used interchangeably. It would be helpful for you to describe to readers how you are intending these terms to be used in the manuscript and if you are indeed using them interchangeably.

The two terms are not intended to be used interchangeably. The authors would hope that the reader appreciates the subtle difference between the two: that physical activity is defined as any bodily movement that requires an increase in energy expenditure, whereas exercise is the undertaking of structured, purposeful activity with the objective of maintaining or improving a component of fitness. Given the context of this study, it is acknowledged that outlining this early in the manuscript may be beneficial. The sentence, “Most commonly, PA is accumulated through participation in structured exercise (i.e., purposeful, structured physical activity with the objective of maintaining or improving a component of fitness)” attempts to do so. (Lines 83-85).

2. Lines 82-83 - change "dietary restraint" to "caloric reduction" or "dietary modification", etc. The construct of dietary restraint is separate from energy intake. An individual can have a high level of dietary restraint, but not lose weight - for instance, if they also have a high level of dietary disinhibition, and do not actually decrease energy intake.

This term has been changed to “caloric reduction” for greater accuracy.

3. Line 88 - adherence to exercise is also low, not just to PA. Are you using these terms interchangeably? If so, no need for both exercise and PA to be in the first part of the sentence. If not, should also include that adherence to exercise is also low.

Thank you for highlighting this oversight. The sentence has been amended for clarity and accuracy, now reading, “Nevertheless, uptake of, and adherence to structured exercise programmes remains low [13-15].” (Lines 90-91).
4. Lines 88-90: Indicate if this is a global adherence rate, or where specifically this adherence rate is from.

It has now been made clear that this data is in relation to England, UK. (Line 97).

5. Lines 94-96 posits that lack of time is a barrier to PA and therefore interventions should be time-efficient. However it is well-established that it is actually the perception of time, not the actual time available that is problematic. Refer to a behavior theory like the theory of planned behavior and see Heesch and Masse 2004 as an example.

Apologies if this is not clear. It is stated that these are “prominent perceived barriers”, however, the sentence has been restructured for greater clarity. We have also included a reference that refers to Self-determination theory (see references 20 and 21, line 109), in our explanation of the rationale behind the PBPA intervention. We have not gone into detail regarding the tenets of this theory so as not to overburden the reader with information, and detract from the main message of the manuscript.

6. Lines 99-101: This sentence is out of place as the conclusion for this paragraph. It is true that few wt loss centered PA interventions have been able to evaluate sustained PA adherence, however this is not a flaw your study can overcome as it is still a short-term intervention in the grand scheme.

It is acknowledged that the duration of our study is not long-term at 24 weeks. However, in line with NICE Guidance for health behaviour interventions, it can be deemed of sufficient length for the adoption of behaviour. As such, the wording of the sentence has been altered to reflect this more accurately.

Methods:

1. Lines 140-146: Insufficient information for power analysis to be checked, e.g. - were the sample sizes you calculated sufficient to power you at .80 to determine if between group differences existed, etc.?

Greater detail has been included to clarify that the sample was powered to detect between-condition differences of the magnitude stated. This now reads:

“Based on previous studies demonstrating fat mass or body weight reductions of >5% [27-30] calculations revealed a necessary sample of between 33 and 54 participants to detect between-group differences of medium-large effect (f=0.35-0.45, power=0.8, α=0.05).” (Lines 143-145)
2. Line 163: Appendix is not included.

Apologies for this oversight. The table has now been appended.

3. Line 164: Can you provide further explanation for how the points were derived, and what is meant by "adjusted for the MET score of 1 for sitting"? (This may be clear if the Appendix was available for review, but as is, this sentence could be more clear).

It has been corrected in the Method section that the points score was corrects for the MET score used as the definition of sedentary behaviour (≤1.5 METs). It is hoped the following more detailed explanation and example clarifies how points were derived:

“Points values were derived from METs scores [36], and adjusted for the MET score of 1.5 for sedentary behaviour. (Points score per 10 minutes of activity = MET score for that activity - 1.5. For example, the MET score for mowing the lawn is 5.5 METs; so the points score for mowing the lawn = 5.5 – 1.5 = 4 points).” (Lines 168-171).

4. Line 166: Authors should be clear that the conditions were matched on "assigned" or "prescribed" PA-related energy expenditure, not actual PA-related energy expenditure.

“PA-related energy expenditure” now reads “MET-assigned PA-related energy expenditure.” (Line 173).

5. Lines 179-181: How did researchers determine if participants adhered to this dietary restriction?

Additional detail has been provided in the manuscript as follows: “Participants would be asked to replicate this intake the day prior to all subsequent test days, with one-day food diaries completed on the day before each trial visit to allow for a check of adherence to the dietary control.” (Lines 199-202).

6. Lines 181-183: Can this sentence be reworded to be more clear. Were the food diaries and activity monitors picked up by participants or mailed if they could not come in to pick up? The choice of the word "collected" leads readers to think the researchers collected these from the participants, not vice versa (though this could be my misunderstanding based on conventionally used phrases/words in the US vs UK).
This should now be clearer that the equipment was either collected by or posted to the participant. (Line 203).

7. Lines 215-218: How to researchers ensure participants used a weighed food record? Were food scales provided? Were food records assessed upon return and the participant queried for missing/forgotten information and foods consumed? Due to the limitations of self-reported dietary intake, it is crucial that food records be reviewed upon return for accuracy.

Additional information has been added to this paragraph of the Methods section for greater detail and clarity. This now reads:

“Food intake was recorded using a 3-day weighed food diary (two weekdays and one weekend day). Prior to the collection of data, participants were provided with weighing scales and instructed how to accurately complete the diary. They were also provided with an example of a highly-detailed recording of intake. Participants were asked to avoid recording on days when it was expected that eating behaviour would be atypical. The completed food diaries were inspected upon collection from the participants and any foods or weights that were lacking detail or clarity were question to help obtain necessary additional information. Food diaries were analysed using Dietplan (version 6.0) to gain mean daily intakes of total energy (kcal), carbohydrate, protein and fat (grams).” (Lines 241-248).

Results:

General: I recommend presenting the text results in the same order as the figures/tables. E.g. - Anthropometrics are presented first in the text, but are listed at the bottom of table 1. Also, the figures are mislabeled. Anthropometric changes are actually Figure 3, not 2, and body composition is actually figure 2 and not 1. Since the title is based on body composition, perhaps put that first in results.

The body composition data not precedes the anthropometric data in the text, to align with the table 1 and the order in the method section. The figures are now correctly ordered.

1. Lines 281: PA and PA minute-equivalents should be referred to as "self-reported".

2. Lines 289-306: Dietary intake needs to be referred to as "self-reported".

The term “self-reported” has been added where necessary.
Discussion:

General: Need to add the self-reported nature of PA and diet records as a limitation.

A section critiquing these methods of measuring PA and food intake has been added to the Discussion:

“Further, adherence to the PBPA and StructEx conditions, and dietary intake were measured using self-report methods. It is acknowledged that such approaches can result in misreporting and inaccuracy of data. However, preference was for free-living measures and the assessment of the effectiveness, rather than efficacy, of the interventions. Self-reported PA data was also supported with data on objectively measured PA at baseline and week 24. However, we acknowledge that compliance with accelerometer protocols was low (33%), and as such, firm conclusions regarding the role of interventions tested herein, cannot be drawn on the basis of this data. Still, results provide an initial indication of the relative efficacy of these interventions for promoting engagement in light, moderate and vigorous PA, and reducing sedentary time. Despite the long-held appreciation of the limitations of food diaries [65, 66], this approach is still commonly-used in weight-management research [8, 11, 28, 31, 32]. Recently proposed electronic dietary intake assessment approaches, utilizing technology to allow ecological momentary analysis [67] have shown promise [68], and warrant consideration for use in future research.” (Lines 473-484).

1. Lines: 324-327: This is an inaccurate representation of current PA guidelines. Current recommendations do advocate for flexibility and choice by encouraging people to do PA they enjoy, and by acquiring it over bouts of at least 10 minutes. Therefore, your points based program is actually representative of current recommendations, where the "prescription" program is a more restrictive program that is not in line with current PA guidelines.

It is agreed that the conclusion of this paragraph lacks accuracy. The revised statements, we feel, is more accurate:

“Results therefore suggest a PBPA centred intervention may be more effective towards encouraging changes in PA behaviour likely to contribute meaningfully towards weight-loss, relative to exercise interventions that promote the following of a structured routine with less choice and flexibility. This study provides some evidence to support public health messages, and advice from practitioners and health care professionals, that advocate accumulating PA through the adoption of a variety and range of activities.” (Lines 375-380).

2. Lines 368-375: Dietary intake needs to be referred to as "self-reported".
“Self-reported” has been added.

3. Lines 376-388: A recent paper (currently epub ahead of press) by Beer NJ et al in MSSE titled "Providing Choice in Exercise Influences Food Intake at the Subsequent Meal" can be cited to support your view about the points-based system's greater flexibility and change to dietary intake. This was an acute study that compared a bout of exercise with and without choice on directly measured ad libitum EI, and is in line with your longer-term more free-living approach showing change in dietary intake with the exercise program that gave participants more choices.

Thank you very much for bringing this paper to our attention and recommending its inclusion. This data supports our findings and interpretation very nicely. It has been included as follows:

“Interestingly, a recent study by Beer et al. [64] observed a greater energy intake, driven by a high prevalence of “unhealthy” food choices, after an acute bout of exercise when participants had no choice over the mode, intensity, duration and time of commencement of the exercise, compared with participants who had choice over these factors. This was despite no difference in subjective appetite ratings. The authors propose that choice resulted in a greater perception of autonomy with regards to their PA engagement, and that this may have also resulted in greater perceived self-regulation in another health-related context (i.e., diet), facilitating the selection of healthier food choices. It is possible that the same mechanism underpinned healthier food choices for participants in PBPA, compared with those in StructEx. As such, a points-based approach to PA, while having small, positive effects on activity and sedentarism, may infer meaningful and beneficial effects on other health behaviors, such as diet.” (Lines 449-458).

Tables 2 and 3. Put the n of each group in these tables as well since they are very small.

This information has been added. Please note that there were errors in the analyses of dietary intake measures. The initial analyses conducted and presented in the original submission was done so with an incomplete set of our data. This has now been corrected, with analyses re-done. Hence, the number of samples are higher for the control and StructEx groups. The “message” of these data has not changed with the new analyses.

Figure 1 - Consort. In the bottom 3 boxes, I think you meant to write "objectively measured PA", not "objectively measures PA".

Thank you. This has been corrected. The ordering of the conditions has also been changed to align with the ordering of data presented in tables.
Figures 2 and 3 - Not sure that presenting change from baseline in addition to absolute changes are appropriate.

It is acknowledged that there is perhaps not the need to address change-from-based for body weight when no significant differences at baseline were observed, and that this is a subtle replication of part of the analysis of mean values. The decision to do so here was led by the nature of the variables: it was felt that magnitudes of change in body weight and fat mass would be of interest to the reader, and presenting these values directly, with analysis and in a visual manner in figures adds value to the Results section, and allows direct comparison between the groups with regard to the ability to promote weight-loss. A sentence has been added to the Statistical Analysis subsection to briefly justify this: “For variables where magnitude of change over time is of likely of specific interest (body weight and fat mass), change-from-baseline data was also presented and analysed”. (Lines 252-253).

For these reasons, preference is to retain this data in the manuscript for body weight, and fat mass (all are used to classify overweight and obesity, and are risk factors of cardiovascular disease). However, at request of the reviewer and/or editor, this analysis can be removed.

Reviewer 2:

This paper examines the effectiveness of a point-based approach to physical activity in order to improve body composition. The authors should be commended for a very interesting exercise program; however, I have several questions across all facets of the study

Specific Comments:

Abstract

Lns 28-32 - I realize there are always word limitations to abstract but might the authors consider some rationale for the points-based program here rather than information about the WHO? Just a thought.

The opening sentence has been changed to reflect the rationale for the PBPA intervention. This now reads: “Physical activity (PA) interventions for the promotion of weight-management may benefit from increased choice and flexibility in activity to overcome commonly-perceived barriers to PA.”

Ln 54 - "overweigh" should be "overweight"
Thank you for this spot. This has been corrected.

Keywords

- Physical activity should not be a key word as it is in the title
- Sedentary as a keyword?

Thank you for this observation and recommendation. Sedentary behaviour and inactivity are of course different constructs: physical inactivity is not meeting PA recommendations, while sedentary is spending large periods of the day sitting and expending less than 1.5 METs. The study recruited inactive women, yet sedentary time was an outcome measure of interest, so both are of interest. As such, “Physical activity” has been removed and “inactivity” and “sedentary” have been included.

Introduction

- Nicely written introduction, however, this section would greatly benefit from more detail with how the points-based physical activity program was developed?

- Clearly there is a need for PA interventions that people will participate in and continue to participate in. The authors bring up that lack of time and motivation are key barriers to PA but do not discuss how the PAPB addresses this or how the PAPB was designed to be more effective than the PresEx. This is a key section that is missing from the introduction in my opinion and I am left wondering why and how the PAPB was developed.

Effort has been made to amend the Background section so as to provide a clearer rationale for the development of the PBPA condition: an approach that focussed on physical activity rather than exercise and allowed for choice and flexibility in accumulating weekly physical activity. The rationale was that such an approach would facilitate the incorporation of activity into a perceived busy daily schedule (overcoming the barrier of perceived lack of time), would promote autonomy, which has been shown to increase intrinsic motivation for physical activity, and would overcome a disliking of, or lack of self-efficacy for, exercise. The paragraph now reads as follows:

“Recent investigation would suggest two prominent perceived barriers to adoption and maintenance of PA among women: perceived lack of time [17] and lack of motivation [18, 19]. Consequently, it would seem desirable to develop time-efficient PA interventions that are compatible with every-day life [7], and do not require the structuring of exercise into perceived busy daily routines. It may also prove preferable for interventions to afford the exerciser choice
and flexibility with regards to the manner in which PA is accumulated. Increased perceptions of autonomy, which can be achieved through offering greater choice and flexibility, is proven to increase intrinsic motivation and promote the uptake of, and adherence to PA behaviour [20, 21]. In addition, greater choice and flexibility, with the focus being on physical activity rather than structured exercise, may help overcome barriers of lack of enjoyment of, and low self-efficacy for exercise [22], the latter being particularly relevant for those who are overweight or obese [23, 24]. Previous research comparing structured exercise with lifestyle PA programmes, has reported comparable favourable changes in physical activity and weight loss [25]. Still, research exploring intervention approaches that facilitate perceptions of autonomy and foster intrinsic motivation, may further enhance the effectiveness of PA programmes.” (Lines 102-115).

Methods

Lns 157-163 - What were these two modes of exercise? Why only two? Seems a little unfavorable to only identify one or two modes of exercise for the PresEx vs the table of different activities for the PAPB?

It is acknowledged that the description of this condition is a little unclear and perhaps misleading. The participants were not restricted to selecting just two modes of exercise, but were encouraged to identify a structured exercise programme that they would be able to routinely complete. Through discussion of exercise preference, perceived capability and feasibility (based on time, access to facilities and cost), all participants identified one or two modes of exercise, or exercise activities that they thought could make up this structured programme.

The relevant section of the Method has been revised to provide a more detailed and accurate depiction of the structured exercise condition:

“Through discussion with a member of the research team, considering exercise preference, perceived ability and feasibility (based on time, access to facilities and cost), participant identified a structured routine for completing 5 x 30 minutes of exercise each week to which they felt they would be able to adhere. All identified one or two modes of exercise to form their routine.” (Lines 161-164)

Lns 156-173 - Much more detail is also required on the PAPB in this section.

Lns 162-166 - This table of activities for the PAPB should be provided. It is extremely important to understand the viability of this training protocol. The text mentions Appendix 1 but nothing was provided? I only have 1 supplementary file and that is the CONSORT checklist.
Apologies for this apparent oversight with our submission; Appendix 1 has now been included. It is important that we communicate that choice of activity was not limited to those listed in the table. Participants could, in effect, undertake any activity. If the activity was not listed in the table, they were asked to email us to obtain a points score, which we could calculate from the Ainsworth et al. (2011) paper. Detail of this, along with a list of those activities for which points scores were requested, has been added to the Method. It is hoped that the additions made to this section provide much clearer detail regarding the PBPA condition. This paragraph now reads:

“Those in the PBPA condition were provided with a table of different activities, each with a points score allocated per ten-minutes of activity (see Appendix 1). Points values were derived from METs scores [36], and adjusted for the MET score of 1.5 for sedentary behaviour. (Points score per 10 minutes of activity = MET score for that activity - 1.5. For example, the MET score for mowing the lawn is 5.5 METs; so the points score for mowing the lawn = 5.5 – 1.5 = 4 points). Participants were instructed to accumulate 30 points per week, equating to 5 x 30 minutes of brisk walking. This enabled the PBPA and StructEx conditions to be matched for MET-assigned PA-related energy expenditure. It was made explicitly clear to participants in both groups that activities should be of \( \geq 10 \) minutes duration to contribute to their weekly points total, and these activities had to be additional to regular PA behaviour. In addition to the table of activities provided, participants in PBPA were asked what other forms of activity they may be interested in undertaking and points scores were provided for these activities. It was made clear to participants that they were not restricted to the activities in the table and those discussed at this preliminary visit; if they performed any additional type of activity, they were instructed to contact a member of the research team to receive a points score for that activity. Activities for which points scores were requested included chopping wood (4.5 points), painting and wallpapering (1.5), moving furniture (4.5), shopping (0.8) and bowling (1.5).” (Lines 167-182).

Ln 170-173 - What was said to the participants when contacted that encouraged adherence?

A brief description has been added to the manuscript. Participants were asked of their adherence to the condition in which they were in. If target points/minutes were being achieved, positive reinforcement was offered. If not, then they were encouraged to persevere, reminding them of the typical benefits of being more active for health and general well-being. The following has been outlined in the manuscript:

“Participants were asked of their adherence to the condition in which they were in. If target points/minutes were being achieved, positive reinforcement was offered. If not, then they were encouraged to persevere, reminding them of the typical benefits of being more active for health and general well-being. No contact was made during weeks 12 to 24, other than to arrange study visits.” (Lines 184-188).
What was the reliability of the DXA device? I imagine it was calibrated each day before data collection. This process and the CVs of the phantom scan should be provided.

Yes: calibration and quality control checks were conducted in the morning of each trial visit, before measures were obtained. This has been added to the manuscript (line 215). I am afraid that specific CVs for the phantom scan can not be provided.

Was this activity diary an open book that participants wrote down everything they did each day? Some more details on how the participants were instructed to fill this out should be included.

Yes, this was a hard-copy diary. Further detail of the instructions given to participants have now been provided in the Method section:

“Self-report PA was recorded by participants using a hard-copy activity diary. PA points and minutes of exercise were recorded by those in PBPA and StructEx, respectively, with weekly totals calculated for monitoring. Participants were encouraged to add each entry into the diary as soon after completing the exercise or activity as possible, clearly stating the type of activity or exercise, the duration and the points score for the activity, where relevant. Entries were checked for clarity and calculations checked for accuracy by a member of the research team at each visit to the laboratory.” (Lines 227-232)

Were the participants instructed to wear this all day, for 10 h per day, or provided any details on wearing this?

Greater detail of the process and the instructions provided to participants has been included in the Method section:

“Participants were instructed to wear the accelerometer on their right hip, during all waking hours for three consecutive days. Data was analysed form participants who provided a full three days of valid data (valid day = ≥10 hours wear-time).” (Lines 238-240).

Were any other instructions provided to participants with regards to their 3-day food record? Most people are not familiar with doing this so instruction on how to measure or quantify the food they are eating is necessary.

More detail has been added to the “Measures” subsection of the Methods section:
“Prior to the collection of data, participants were provided with weighing scales and instructed how to accurately complete the diary. They were also provided with an example of a highly-detailed recording of intake. Participants were asked to avoid recording on days when it was expected that eating behaviour would be atypical. The completed food diaries were inspected upon collection from the participants and any foods or weights that were lacking detail or clarity were question to help obtain necessary additional information.” (Lines 242-247).

It is also stated in the “Pre-testing session” subsection that “participants were given verbal instructions on how to accurately complete the weighed three-day food-diary.”

Lns 224-226 - Should probably mention that only those participants that wore the accelerometer for 10+ h could be included in analysis.

This has now been included in the manuscript (“Participants were instructed to wear the accelerometer on their right hip, during all waking hours for three consecutive days. Data was analysed form participants who provided a full three days of valid data (valid day = ≥10 hours wear-time” lines 238-240) and also included in footnote of Table 2.

Lns 219-229 - How were effect sizes calculated and how the "strength" of that effect size was qualified (strong, moderate, weak) should be included here.

Additional information has been included. The power calculation identified a “sample of between 33 to 54 to detect a medium-large effect (f = 0.35-0.45, power=0.8, α=0.05).” This range in effect size was informed by the data of previous studies, as outlined in the manuscript.

Ln 200 - Shouldn't "standiometer" be "stadiometer"?

Yes. Thank you for highlighting this error. This is now corrected.

Results

Lns 237-246 - Based on the table, body weight was not different at baseline so why was change from baseline analyzed in addition to comparison of means? I can understand why using change from baseline was important where baseline values were significantly different but in this case, it seems redundant. Also, shouldn't all variables begin with the interaction effect? That is the most important statistic.
It is acknowledged that there is perhaps not the need to address change-from-based for body weight when no significant differences at baseline were observed, and that this is a subtle replication of part of the analysis of mean values. The decision to do so here was led by the nature of the variables: it was felt that magnitudes of change in body weight and fat mass would be of interest to the reader, and presenting these values directly, with analysis and in a visual manner in figures adds value to the Results section, and allows direct comparison between the groups with regard to the ability to promote weight-loss. A sentence has been added to the Statistical Analysis subsection to briefly justify this. (“For variables where magnitude of change over time is of likely of specific interest (body weight and fat mass), change-from-baseline data was also presented and analysed.” (Lines 252-253)).

For these reasons, preference is to retain this data in the manuscript for body weight, and fat mass (all are used to classify overweight and obesity, and are risk factors of cardiovascular disease). However, at request of the reviewer and/or editor, this analysis can be removed.

It is agreed that the reporting of the outcomes of analysis of variance should begin with the interaction effect. Upon checking this, it does appear that this is the case for all variables.

Lns 247-252 - Table 1 illustrates none of these differences?

Due to the differences at baseline, the data analysis was conducted on the change-from-baseline data. Hence, these described differences are illustrated on Figure 2b.

Ln 250 - Why is this Figure 2b when it is introduced before Figure 2a? Further, isn't this data in Figure 3a and 3b not 2a and 2b?

Ln 255 - Change from baseline data is not in Figure 1, that is the Consort Diagram.

Yes, it is now seen that there are errors in the numbering of figures. These have now been corrected.

Lns 258-262- Similar to my comment above, why analyze change from baseline data if there was no significant difference at baseline?

Lns 263-267 - Same as above here. This redundancy just increases the length of the results section making it more difficult to maneuver through.

It is acknowledged that the addition of change-from-baseline analysis is not warranted for WBLM. This analysis and corresponding figures have been removed.
Lns 279-280 - Why only present the self-reported PA minutes for PresEx and PAPN? What about the CONT groups? Did all individuals complete the activity diary sufficiently? Further, there must have been a great amount of variability in that 25 min more activity in the PAPB was not significant. Can that authors elaborate on this? Likely suggests that some were extremely active and some were not so active but this is of interest as the body composition results as discussed in the discussion section seem to suggest the improvements in body composition in the PAPB group were due to the activity. Further, some indication of the minutes for each of these % should be in the table or in the text.

Minutes of exercise or points were not collected for those in the control group. This self-report data was used to assess adherence to the intervention, so was not deemed of relevance for the control group. The objectively measured PA was used to determine the amount of PA undertaken, and as such, that data was collected for all three groups.

With regards to the accuracy of data collected, the limitations of self-report data are acknowledged:

“Further, adherence to the PBPA and StructEx conditions, and dietary intake were measured using self-report methods. It is acknowledged that such approaches can result in misreporting and inaccuracy of data. However, preference was for free-living measures and the assessment of the effectiveness, rather than efficacy, of the interventions. Self-reported PA data was also supported with data on objectively measured PA at baseline and week 24.” (Lines 472-476).

Standard deviations for minutes of exercise (172±72 minutes) and PA points (39.1±9.3) are provided in the Results. The Discussion section also states how, “Upon examination of individual self-report values, only two participants in PBPA reported failing to average 30 or more points per week over the 24 week whereas 6 participants failed to achieve an average of 150 minutes per week in StructEx.”. (Lines 402-405). Undoubtedly, there was some variability in adherence, with some exceeding the target and some falling short. It is seem as a positive of the PBPPA condition that fewer failed to achieve the points target than failed to achieve the target minutes of exercise, and variance seems smaller in the PBPA condition.

Attempts were made to investigate relationships between amount of activity (minutes or points) and changes in anthropometry and body composition. No relationships were observed. This data is not presented, in order to avoid excessive data presentation and to streamline the findings of the study.

The minutes of activity, as measured by accelerometry have been added to Table 2. Thank you for this suggestion.
How reliable are these data? The CONT group had just over half the participants complete the 3 days while the two PA groups were between 70-80% completion rate.

The reliability of self-reported food intake data is critiqued in the Discussion sections:

“Further, adherence to the PBPA and StructEx conditions, and dietary intake were measured using self-report methods. It is acknowledged that such approaches can result in misreporting and inaccuracy of data. However, preference was for free-living measures and the assessment of the effectiveness, rather than efficacy, of the interventions…..Despite the long-held appreciation of the limitations of food diaries [65, 66], this approach is still commonly-used in weight-management research [8, 11, 28, 31, 32]. Recently proposed electronic dietary intake assessment approaches, utilizing technology to allow ecological momentary analysis [67] have shown promise [68], and warrant consideration for use in future research.” (Lines 472-475 and 480-484).

With regards to compliance to the food diaries, this was greater than was presented in the original manuscript. The initial analyses conducted and presented in the original submission was done so with an incomplete set of our data. The number of participants with valid dietary intake data was 13, 16 and 18 for CONT, StructEx and PBPA, respectively. Hence, the number of samples are higher for the control and StructEx groups. The analysis has been re-run and the data has been updated in the text and in Table 3. While values and statistics have changes a little, there is no change to statistical significance for any variables. Hence the “message” remains unchanged.

The values for the PAPB don't line up. The PAPB group decreased their energy intake 445 kcal but when you add up the reductions in all 3 macronutrients you get 470.6 kcal (31.6 from PRO, 171 from FAT, and 268 from CHO). There is also an issue with the PresEx group as the overall change in energy intake is a 30 kcal reduction but CHO intake didn't change, FAT actually went up 27.9 kcal and PRO went down 29.2 kcal which equates to very little actual change in energy intake. The values for energy intake are much closer to the macronutrient changes for CON (226 vs 227.1 kcal).

This is a very astute observation. We thank you greatly for taking the time to scrutinise our data and highlighting this. Upon revisiting these analyses, we highlighted the errors in data analysis explained in the previous point. There are still some small discrepancies between the energy values presented and energy calculated based on the caloric content of carbohydrate, fat and protein. This is likely due to the energy contribution from soluble fibre, from different fat sources and, of course, from alcohol.
- Interesting that there was very little change in PRO intake on a per kg basis across groups. Seems both PA groups decreased PRO intake slightly (~0.08 g/kg).

- Though the "decrease" of 500 kcal is not significant, the focus seems to be on the significant reduction in fat intake though there is an almost significant reduction in CHO (P=0.058) that doesn't seem to be addressed in the discussion. The PAPB group decreased fat intake ~19 g (171) and decreased CHO intake 67 g (268 kcal) which is actually more calories than the fat decrease, and therefore potentially more important to the improvements in body composition than the fat change. The PAPB also slightly decreased PRO intake 7.9 g (31.6 kcal). How do the authors interpret this? Overall it looks like the PAPB group was more engaged in both diet and exercise than the PresEx group and that could be affecting the results and interpretation.

This, again, is an astute observation and interpretation. Greater acknowledgement of the reduction in intake of CHO has been made and discussed in this section of the Discussion:

“This difference appears driven by the significantly lower fat intake (171 kcal) and a trend for a lower carbohydrate intake (268 kcal) in PBPA. It has been claimed that an energy deficit of greater than 500kcal•day-1 is required for successful weight-loss [44, 57, 58], so it is likely that the observed reduction in energy intake contributed considerably to the weight loss achieved in PBPA, with changes in PA behaviour having a much smaller role.” (Lines 430-435)

The Discussion now more strongly presents the notion of a “spill-over” effect in the PBPA condition, with additional context and rationale for this interpretation in lines 446-455:

“Interestingly, a recent study by Beer et al. [64] observed a greater energy intake, driven by a high prevalence of “unhealthy” food choices, after an acute bout of exercise when participants had no choice over the mode, intensity, duration and time of commencement of the exercise, compared with participants who had choice over these factors. This was despite no difference in subjective appetite ratings. The authors propose that choice resulted in a greater perception of autonomy with regards to their PA engagement, and that this may have also resulted in greater perceived self-regulation in another health-related context (i.e., diet), facilitating the selection of healthier food choices. It is possible that the same mechanism underpinned healthier food choices for participants in PBPA, compared with those in StructEx. As such, a points-based approach to PA, while having small, positive effects on activity and sedentarism, may infer meaningful and beneficial effects on other health behaviors, such as diet.”
Discussion

Overall I find the results of this study valuable as this appears to be a viable PA intervention, however with that said I feel that the data is a bit over-interpreted in the discussion and several sections should be "toned down". While the data appears to demonstrate the participants in the PAPB group improved body composition, this is not clearly accounted for by PA alone. Further, one could argue that the participants in the PAPB group made more lifestyle changes over the course of the study vs the PresEx. This could certainly be because the PAPB was a more viable intervention for them but I'm not sure the data presented can expressly say that. I want to reiterate that the data is very interesting but caution some of the interpretations.

We are very much in agreement that the change in body composition cannot be explained by the increase in light activity and decrease in sedentary time alone. This is now explicitly stated in the Discussion:

“Nonetheless, differences in PA between the three groups do not completely reflect the changes in body composition and anthropometry. The decrease in sedentary time and an apparent increase in light activity alone cannot explain the reduction in body weight and fat mass seen in the PBPA group, and neither do differences in sedentary time, light activity and MVPA explain the differences between PBPA and StructEx in particular at 24 weeks….. It has been claimed that an energy deficit of greater than 500kcal•day-1 is required for successful weight-loss [36, 48, 49], so it is likely that the observed reduction in energy intake contributed considerably to the weight loss achieved in PBPA, with changes in PA behaviour having a much smaller role.” (Lines 421-425 and 432-435).

We agree that it appears that those in the PBPA have adopted other healthier lifestyle behaviours, such as a change to their eating behaviour that has resulting in a reduced CHO, fat and energy intake. We think this is a very interesting finding and could be a particular benefit of a point-based PA approach. Efforts have been made to make this perspective clearer in the Discussion section.

We have tried to avoid over-interpreting our data. In attempt to further curb our interpretation, limitations to the study have been further highlighted, with a consideration of how these may impact upon the validity of the findings:

“Further, adherence to the PBPA and StructEx conditions, and dietary intake were measured using self-report methods. It is acknowledged that such approaches can result in misreporting and inaccuracy of data. However, preference was for free-living measures and the assessment of the effectiveness, rather than efficacy, of the interventions. Self-reported PA data was also supported with data on objectively measured PA at baseline and week 24. However, we acknowledge that compliance with accelerometer protocols was low (33%), and as such, firm
conclusions regarding the role of interventions tested herein, cannot be drawn on the basis of this data. Still, results provide an initial indication of the relative efficacy of these interventions for promoting engagement in light, moderate and vigorous PA, and reducing sedentary time. Despite the long-held appreciation of the limitations of food diaries [65, 66], this approach is still commonly-used in weight-management research [8, 11, 28, 31, 32]. Recently proposed electronic dietary intake assessment approaches, utilizing technology to allow ecological momentary analysis [67] have shown promise [68], and warrant consideration for use in future research.” (Lines 472-484).

And:

“Nonetheless, it was not successful at maintaining lean mass during weight-loss. This may be because the PBPA condition did not elicit an increase in MVPA, which may be considered a limitation of adopting such an approach to a PA programme.” (Lines 486-489).

The wording of the conclusion has been altered slightly, and we feel this presents an accurate and fair interpretation of the study findings:

“Findings suggest that a point-based approach to PA accumulation is an effective strategy for inducing modest but meaningful reductions in bodyweight and body fat in inactive women who are overweight and obese. This is likely a result of modest reductions in sedentary time, increases in light activity and of inducing a spill-over effect of altered eating behaviour and reduced energy intake. Consequently, a points-based system may prove a worthwhile consideration for healthcare professionals when administering exercise and PA strategies to tackle inactivity, sedentarism, and overweight and obesity.” (Lines 500-505).

Lns 371-318 - How do the changes per week relate to this shorter duration study? The greater magnitude change in a 24 week study compared to a 12 week study is potentially due to the longer duration.

The rate of change is included (Line 382) and this is comparable to the studies cited, as a rate, irrespective of duration of the intervention. There is a slight danger with assessing and comparing rates of change of body weight when interventions are of different length, due to commonly observed diminishing return over time, plateau in weight-loss and compensatory weight-regain after initial weight-loss. As such, we did not want to over-analyse and compare rates of weight-loss beyond stating our observed rate of weight-loss and briefly comparing this to the broader existing body of literature.

Lns 310-334 - Should there not be a mention of the dietary data early on in the discussion as that may have played an equal or even greater part in the body composition improvement?
Attempts were made to rearrange the ordering of the Discussion section. However, after much playing around, the authors felt that the flow of the piece was disrupted when trying to discuss the dietary intake data earlier. We feel that the current structure progresses the “story” of our findings in the most effective manner. That said, at the explicit request of the expert reviewer and/or editor, this can be re-attempted.

Lns 349-353 - While this data is certainly hard to interpret based on low subject compliance, the PBPA group certainly appear to have increased their light PA time (~4%), slightly increased their MVPA (~1%), and decreased their sedentary time (~4%) basically replacing sedentary time with light PA. The PresEx group appeared to have increased their MVPA (~3%) by slightly decreasing their light PA (~1%) and their sedentary time (~2%) so they basically replaced some light PA and sedentary time with MVPA. If a 4% reduction in sedentary time is ~42 min, then a 2% reduction in sedentary time is ~21 min and still a potentially important amount of time. When taken in the context of the body composition data it appears to suggest that more light PA is better than MVPA which is of course a bit difficult to understand. However, in light of the dietary intake data where the PAPB group decreased energy intake vs no change in the PresEx, I believe this suggests that the body composition changes in the PAPB vs the PresEx group is due to the additional reduction in energy intake, not solely the exercise (or even more likely due to the dietary changes rather than the exercise). This appears even more founded when the PresEx group maintained their body composition vs the CONT group. There is also nothing about the low subject compliance on the objective measures of PA.

The low subject compliance has been acknowledged more explicitly in the Discussion section:

“Self-reported PA data was also supported with data on objectively measured PA at baseline and week 24. However, we acknowledge that compliance with accelerometer protocols was low (33%), and as such, firm conclusions regarding the role of interventions tested herein, cannot be drawn on the basis of this data. Still, results provide an initial indication of the relative efficacy of these interventions for promoting engagement in light, moderate and vigorous PA, and reducing sedentary time.” (Lines 475-450).

The addition of minutes of activity to Table 2 also sheds further light on the percentage changes in sedentary behaviour, light and moderate activity and allows for clearer interpretation. As explained in relation to an earlier comment, we have tried to emphasise the likely role of alterations in diet in the observed changes in body composition and body weight. We agree that it appears that those in the PBPA have adopted other healthier lifestyle behaviours, such as a change to their eating behaviour that has resulting in a reduced CHO, fat and energy intake. We think this is a very interesting finding and could be a particular benefit of a point-based PA approach. Efforts have been made to make this perspective clearer in the Discussion section.
The role of light activity and reductions in sedentary time in promoting broader health benefits, beyond weight loss and weight maintenance, has also been emphasised and the Healy et al., (2015) paper has been cited to strengthen this point further. While the reduction in sedentary time and increase in light activity likely played a small role in promoting weight loss and changes in body composition, we do feel that other health benefits of these changes in PA behaviour are still important and should be acknowledged. The following has been added:

“The health enhancing effects of light PA are becoming increasingly well documented [49-52], while sedentary behaviour has been identified as an independent risk factor for CVD [53-55]. For example, replacing sedentary behaviour with light physical activity is reported to result in improvements in cardio-metabolic health (e.g., favourable changes in fasting plasma glucose, triglycerides and cholesterol [56]. This adds further support to the efficacy of utilising a PBPA approach to encourage PA behaviour change in order to improve broader health outcomes among middle-aged women.” (Lines 415-420).

Lns 368-375 - This might want to be revised based on my comments to the nutrition data in the results.

This paragraph now starts as follows:

“Nonetheless, differences in PA between the three groups do not completely reflect the changes in body composition and anthropometry. The decrease in sedentary time and an apparent increase in light activity alone cannot explain the reduction in body weight and fat mass seen in the PBPA group, and neither do differences in sedentary time, light activity and MVPA explain the differences between PBPA and StructEx in particular at 24 weeks.” (Lines 421-425).

The final sentence of the paragraph now reads:

“It has been claimed that an energy deficit of greater than 500kcal•day-1 is required for successful weight-loss [36, 48, 49], so it is likely that the observed reduction in energy intake contributed considerably to the weight loss achieved in PBPA, with changes in PA behaviour having a much smaller role.” (Lines 432-435)

We hope this is viewed as a more accurate interpretation of our data, with a stronger acknowledgement of the important role of changes in food intake in driving the observed changes in body composition and body weight.

Lns 382-386 - This information is more evidence that a stronger rationale for the PBPA in the introduction is needed.
It is hoped that the additional information in the Background section provides a clearer context and theoretical underpinning for this interpretation. The addition of the findings of the Beer et al., (2017) study also provides a stronger rationale for this interpretation (Lines 449-458).

Lns 393-394 - Why not in following limitations section? I would also argue that a study focusing on just females is not a limitation. As women are often underrepresented in exercise physiology research, that is actually a strength of this study and only "limits" its generalizability to men.

It is agreed that the focus on just women can be viewed not as a limitation, and therefore reference to this has been removed.

References

Reference 26 has "Chief" spelled "Cheif".

Thank you for highlighting this. This has now been corrected.

Table 1

Difficult to compare data... perhaps this could be organized by group rather than y time? Lots of data in here. Why was body fat % omitted?

All three tables have been reorganised for easy of interpreting the data. It is agreed that this is a better format. Thank you for this suggestion.

The decision was made to include total body fat mass and omit body fat percentage in an attempt to streamline data and the relevant “message”. Fat mass was opted for over body fat percentage, as this is independent of any changes in lean mass. At the request of the expert reviewer and/or the editor, body fat percentage can be added.

Table 2

Perhaps the minutes associated with these % could be added.

The minutes of activity have been added to the table. Thank you for this recommendation. Statistical analyses have not been conducted on this data, however, as valid wear time must be controlled for when assessing differences and changes in accelerometer-measured PA behaviour. Hence, percentage wear rather than absolute minutes is used for analyses.