Feasibility and preliminary effects of a peer-led motivationally-embellished workplace walking intervention: A pilot cluster randomized trial (the START Trial)

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Abstract

Walking interventions can be effective in increasing physical activity amongst physically inactive employees. However, despite their promising potential regarding sustainability and scalability, peer-led workplace walking interventions have not been tested. We evaluated a peer-led workplace group walking intervention designed to engage physically inactive employees. A 16-week pilot cluster randomized controlled trial consisted of enhanced (5 worksites; *n*=50 participants) and minimal treatment (3 worksites; *n*=47) conditions. All participants were provided with a Fitbit Zip and information on health benefits of walking. Enhanced treatment participants had access to a mobile phone app incorporating behavior change techniques, were trained on principles of autonomous motivation, and had a peer leader trained in a motivationally supportive communication style. Feasibility assessments included recruitment and drop-out rates, assessment completion rates, training acceptability (walkers and peer leaders), and intervention acceptability (walkers only). Outcomes assessed included movement-related behaviors (assessed via activPAL devices), cardio-metabolic risk factors, motivation to walk, and well-being, and these measures were taken at baseline and post-intervention. The results supported intervention feasibility. Preliminary efficacy evidence was mixed. Markers of cardio-metabolic risk improved in the enhanced treatment only. Autonomous motivation increased in both conditions. There were no changes in step counts, standing, and sitting time, or well-being. Further fine tuning is needed before a definitive RCT.

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Keywords: peer leader, motivational training, self-determination theory, physical activity

Workplaces are widely considered suitable settings for physical activity (PA) promotion, as they capture large and diverse segments of the population, and offer an opportunity for structured group-based interventions. Syntheses of research studies examining the effects of workplace PA interventions on PA behavior change suggest inconclusive or small effects. [1] Small effects may be due to interventions typically attracting employees who are already active.[2] Evidence shows that walking interventions (individual or group walks) are more effective than other types of workplace interventions (e.g., targeting general lifestyle change) at increasing PA[3], in particular *group*-based walking. [4]

Although a recent review found that theory-based health interventions are not always more effective than those that are non-theory based, there is support for the use of some theories, including Self-Determination Theory (SDT), in promoting diet and PA behavior.[5] SDT distinguishes between autonomous (e.g. enjoyment, personal value) and controlled (e.g., guilt and pressure) types of motivation. Research employing SDT shows that autonomous motivation is central to sustained PA engagement, health and well-being. [6,7] In SDT-informed interventions, agents in position of authority (e.g., healthcare professionals) are trained to use communication styles that support basic psychological needs (autonomy, competence, relatedness), as the satisfaction of those promotes autonomous motivation in others (e.g., patients). [7] In the exercise domain, fitness professionals have been trained in the utilization of need supportive (and need thwarting) strategies to optimize self-determined motivation in exercise class participants. [8]

It is currently unknown whether individuals not in a position of authority can be trained to use such a motivationally supportive style, and whether such training can produce similar positive effects on behavioral, cognitive, and affective outcomes. Peer led interventions have shown promise for PA promotion. [9] Peers can act as role models and serve as credible messengers for delivering PA interventions. [9] Training peers to promote PA using a motivationally supportive communication style could have a considerable public health impact by expanding the capacity of health promotion efforts, which are constrained by availability of professionals and resources.

Besides training peer leaders, it is also important to empower employees taking part in a walking intervention with self-regulation skills to sustain regular walking post-intervention. As part of their behaviour change taxonomy, Michie and colleagues identified 93 discrete behaviour change techniques (BCTs) that can be used to design interventions, many of which are relevant to self-regulation. [10] In terms of the promotion of walking specifically, a systematic review showed that self-monitoring and intention formation techniques were particularly promising BCTs. [11] Another systematic review on the effectiveness of BCTs in PA interventions targeting physically inactive adults suggested that a number of BCTs, such as ‘behavior practice/rehearsal’ and ‘demonstration of the behavior’ were associated with post-intervention effects on PA. [12]

To address several limitations of previous research, we evaluated (against a minimal treatment comparator) a SDT-based, peer-led, workplace group walking intervention, designed to engage physically inactive employees. We used the UK Medical Research Council guidelines to inform the design and evaluation of our intervention. [13] We hypothesized that the intervention would be feasible; i.e., that we could recruit the required number of peer leaders and walkers (H1), have drop-out rates <20%; H2), and that at least 90% of participants who did not drop out would complete baseline and post-intervention assessments (H3). We also expected high acceptability ratings of the training and the intervention, by peer leaders and walkers (H4). Further, we hypothesized that enhanced treatment participants would exhibit greater increases in self-determined motivation for walking (H5), steps per day, and minutes standing per day, and greater reductions in minutes spent sitting per day (H6), cardio-metabolic risk factors (H7), and report higher work-related and general well-being (H8).

Methods

Participants

Only employees with the following characteristics were eligible to take part in the study: a) reported a minimum of 50% of their work time spent sitting; b) were at least 18 years old; c) were able to communicate well in English; d) had no chronic illness or health problems which would prevent them from walking; e) could walk continuously on a flat surface at a light-to-moderate pace for 15 minutes; f) took part in less than 150 minutes of moderate intensity physical activity per week; g) were willing to download and use the mobile phone application developed for the project.

Ninety-seven office workers (82.50% female) aged 21-66 (M=44.40; SD=10.29) from eight different organizations in the Metropolitan Area of Perth, Western Australia took part. Pilot studies are not powered to detect significant differences. [14] There are various sample size calculations available for such studies; Viechtbauer and colleagues showed that 59 participants are needed to detect 'problems' with a probability of p=.05 with a 95% confidence level. [15] Arian and colleagues' review found a median sample size of 76 participants in the included pilot studies. [14]

The organizations included a mix of government departments, emergency services, hospitals, mining, and private corporate businesses. Most participants described themselves as Australian (54.70%) or European (25.60%), with the remaining participants identifying as Asian (10.80%), African (2.70%) or American (1.80%). The participants worked in a range of occupations, including managers and administrators (25.60%), professionals and associate professionals (38.30%), and clerical workers (36.10%). On average, participants were classified as overweight (BMI M=29.23; SD=6.11; range: 19.54-50.08) at baseline.

Measures

Most assessments were taken at baseline and post-intervention. Feasibility was assessed at either time point (depending on the nature of the measure), and control variables were assessed at baseline only.

Feasibility measures. To assess feasibility we used recommendations of reviews of feasibility studies by Arian et al. [14] and Eldrige et al. [16] Specifically, to estimate recruitment, we compared the projected sample size (*n*=60 walkers) [15] with the actual sample size, with the difference reported in percentages. Drop-out rates were estimated by calculating the participants who dropped out for any reason, reporting this rate as a percentage of the total sample of participants recruited. Further, we calculated the percentage of participants (excluding drop-outs) who completed post-intervention measures to assess the degree to which assessment procedures ran smoothly.

Training acceptability was assessed in both peer leaders and walkers at the end of the training using a scale previously developed by Hancox et al. [17] For the peer leaders, 10 items (e.g., and "I feel confident to use the strategies I have been taught in the workshops") were included. Items were rated using a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) (α=.91). Training acceptability in the walkers was measured via a 9-item questionnaire, which was an adaptation of the questionnaire for the peer leaders, and which was distributed immediately post-intervention (α=.90). Intervention acceptability was assessed in the walkers immediately post-intervention using a similar scale but referring to the "program" as opposed to the "workshop" (α=.94).

Control variables. Age, gender, ethnicity, highest level of education, number of existing health conditions, job type, and work type (full- versus part-time), served as covariates in the analyses. All these variables have been associated with different levels of PA; a review of such literature is beyond the scope of this paper.

Steps, standing, and sitting. ActivPAL micro devices were used to assess movement-related behaviors. Participants' activPAL data were screened to identify periods of non-wear, using the PAL technology *14 hour waking day* proprietary algorithm, allowing for 10 hours of non-wear each day. Participants were included in analysis if they had 4 days of valid data recorded (including 1 weekend day) at baseline and/or post-intervention. Data for daily steps and standing were analyzed using the standard PAL analysis proprietary algorithms. [18] A validated, automated algorithm in STATA (StataCorp LP) used the activPAL event files to isolate waking hours from "sleeping" (time in bed), prolonged non-wear periods and invalid data. [19] Heatmaps of the included and excluded data were created and visually checked and output was used to estimate daily sitting time (in hours). For each valid day (i.e., ≥ 14 waking hours wear), the number of steps, and time spent standing were computed. These data were used to calculate daily averages for each participant (e.g., steps/day = total number of steps across all valid days ÷ number of valid days).

Cardio-metabolic risk factors. Waist circumference and waist-to-height ratio were estimated to represent cardio-metabolic risk factors. First, height was measured to the nearest mm using a SECA stadiometer. Waist circumference was measured to the nearest mm by placing a tape measure around each participant's mid-section. The anatomical location was defined as the half-way point between the inferior margin of the last rib and iliac crest. The measurement was recorded in centimeters before repeating the measurement a second time. If the first two measures differed by ≥5 mm, a third measure was taken. Waist-to-height ratio was calculated by dividing waist circumference by height.

Motivation to walk. The Behavioural Regulation for Walking Questionnaire is a 23-item questionnaire based on the SDT framework. [20] It assesses six different motivation regulations for walking: amotivation (lack of motivation; e.g., "I don't see why I should have to walk""), external regulation (extrinsic motivation due to external pressure or rewards; e.g., "I walk because other people say I should"), introjected regulation (extrinsic motivation based on internal pressure or contingent self-worth; e.g., "I feel guilty when I don't go walking")), identified regulation (extrinsic motivation based on personal value of the behavior; "I value the benefits of walking"), integrated regulation (extrinsic motivation reflecting full internalization of a behavior into one's value system: e.g., "I consider walking to be part of my identity"), and intrinsic motivation (motivation based on enjoyment and personal interest; e.g., "I walk because it's fun"). Items are rated using a scale ranging from 0 (*not true for me*) to 4 (*very true for me*). We observed acceptable internal reliability coefficients ($\alpha > .70$) for all scales at both time points, with the exception of introjected regulation at baseline ($\alpha = .60$).

Well-being. Affective well-being at work was measured using the IWP (Institute of Work Psychology) Multi-Affect indicator. [21] This 16-item scale uses a 7-point scale ranging from never (*0% of the time*) to always (*100% of the time*). The scale was developed using the circumplex model of affect, whereby four quadrants of affective states are represented along two dimensions (valence and activation). Thus, the scale allows for the measurement of activated negative affect (e.g., "anxiety"), activated positive affect (e.g., "enthusiasm"), low activation negative affect (e.g., "depression"), and low activation positive affect (e.g., "comfort"), with each subscale including four items. Support for adequate psychometric properties of the scale scores has been reported previously.[17] In the present study, internal reliability coefficients for each quadrant of affect ranged from $\alpha = .83$ (baseline comfort) to .92 (post-intervention anxiety).

General psychological well-being was assessed via the World Health Organisation Well-Being Index (WHO-5 Well-Being Index). [22] This scale consists of five items rated on a 6-point scale ranging from 0 (*all of the time*) to 5 (*at no time*). We reversed all scores so that higher scores indicated greater well-being. A percentage score ranging from 1-100% was calculated by multiplying the raw score by 4. Support for the usefulness of the measure as an appropriate outcome measure in clinical trials was shown in a systematic review. [23] The scale was internally reliable (baseline: $\alpha = .86$; post: $\alpha = .91$).

Experimental Design

Enhanced treatment. Participants were assigned peer leaders at a ratio of approximately 1 peer leader to 4-5 walkers. The peer leaders were trained via two face-to-face workshops designed to teach them how to communicate with their walkers in motivationally supportive ways to optimize walkers' autonomous motivation. The first 2-hour workshop took place the week before the start of the group walking phase. In this workshop, in addition to practical tips about leading walks, the peer leaders were introduced to concepts of controlled versus self-determined motivation, and principles underpinning effective need supportive communication strategies. They also practiced applying their newly acquired knowledge via case studies. Specifically, the peer leaders were asked to reflect on ways in which they could help walkers with different types of motivation feel connected, confident and in control of their walking. To contextualize and apply these principles in the intervention, the peer leaders were provided with a training manual with weekly goals. For example, in week 1 their goal was to get to know the walkers, and help them to feel at ease and feel like a valued member of the walk group. During the workshop, examples of ways in which they could reach these goals were discussed and further examples were provided in the manual. The second workshop was delivered 2 weeks later and was intended as a booster session to build on the training received in the first workshop. The second workshop also offered an opportunity for the discussion and resolution of challenges associated with the implementation of motivation strategies in-between the two workshops.

Participants ('walkers') also received motivation training (e.g. how to build autonomous motivation) and training in the use of BCTs, as part of a 1-hour long, face-to-face workshop the week before the start of the group walk phase. In the workshop, the walkers were introduced to the concept of controlled versus self-determined motivation and were asked to reflect on their current reasons for signing up to the intervention. Strategies that could help them develop self-determined reasons were discussed, and specific BCTs (e.g., SMART goal setting and self-monitoring) were introduced. Further, walkers were provided with a training manual in which specific BCTs (e.g., goal setting principles, implementation intention plans) were further described and suggestions to facilitate their implementation were offered. In addition, they received access to a mobile app (the START app), available for iOS only (those with Android devices were able to borrow iPads from the research team). The results of the app evaluation are reported in a separate manuscript.

The app integrated SDT principles of motivation-supportive communication (e.g., offering positive feedback, facilitating choice, acknowledging negative emotions) alongside 17 purposefully chosen behavior change techniques (BCTs), which they were encouraged to use. Table 1 illustrates how each app feature aligns with the behavior change taxonomy (v1) proposed by Michie and colleagues. [10] Finally, the walkers received a Fitbit Zip device to facilitate self-monitoring (which they could retain after the end of the intervention).

Walkers were also advised to aim for a step count goal, for the days they had planned to walk, that was 3000 steps (i.e., equivalent to a 30 minute moderate intensity walk) [24] greater than their average baseline steps/day. To this end, Fitbit Zip devices were provided at baseline to help the participants identify their baseline step count. For the first six weeks of the intervention, the walkers were encouraged to join 30-minute peer led lunchtime walks twice per week. To facilitate development of self-regulated walking habits, the frequency of peer-led walks was reduced to once per week from weeks 7-10 and walkers were actively encouraged to self-organize their own walks 3 times per week. For the last 6 weeks of the intervention, there were no peer-led group walks and participants were encouraged to engage in five self-organized walks per week.

Minimal treatment. Participants were provided with a Fitbit Zip in week 1, and were advised to accumulate 7500 steps per day (akin to guidelines for health proposed by Tudor-Locke et al.) [25] for 16 weeks. The participants attended a brief (20 minutes) talk on the benefits of walking for health and were given a leaflet describing the benefits of walking for health. Participants were not assigned any peer leaders, did not receive access to the app, and were not given any advice as to how to achieve their fixed step count goal. Figure 1 presents participant flow.

Randomization. A pilot cluster randomized controlled design was employed in which eight worksites were randomly assigned to an enhanced treatment or a minimal treatment condition. Due to potential risk of contamination between two pairs of worksites (two adjacent hospital sites and two adjacent emergency services sites), these were grouped for randomization, to ensure the worksites of each pair were assigned to the same treatment condition. The other worksites were treated as their own individual group for randomization purposes. Randomization of the treatment was undertaken with a Uniform (0,1) distribution, with 0.5 as the threshold for assignment. The randomization resulted in five worksites (n=50 participants) assigned to the enhanced treatment and three worksites (n=47 participants) assigned to the minimal treatment control group. The trial was registered with the Australian and New Zealand Clinical Trials Registry (ACTRN12618000807257).

Procedures

Ethical approval was provided by Curtin University's Human Research Ethics Committee (HRE2017-0732). Written informed consent was obtained from all individual participants.

We compiled a list of Western Australia's largest employers to identify suitable organizations for recruitment and used organization websites to identify representatives from these organizations (e.g., members of organization wellness committees, health and wellbeing specialists, human resource consultants). These representatives were contacted via email or phone. A total of 66 organisations were contacted, of which 8 (12%) were eligible and agreed for us to recruit employees. Interested parties were emailed promotional material including flyers, documents outlining eligibility criteria, a program timeline, and a link to the trial website. They were invited to forward this information to employees. Five of these organizations invited researchers to give a 15-minute face-to-face overview of the program to employees.

Interested participants were forwarded a link to an online screening questionnaire to determine participant eligibility. The short version of the IPAQ self-administered questionnaire was used to assess eligibility for participation. [26] The assessment determined current (over the past 4 weeks) level and intensity of PA, categorized as "Low", "Moderate", and "High" , as suggested by Craig et al. Participants in the "Low" category were invited to participate (*n*=75). Those in the "High" category (*n*=20) were excluded from participation as a walker and were invited to take part as peer leaders. Given self-report bias (over-reporting) associated with scores of PA questionnaires, [27] individuals in the moderate category (*n*=31) were re-screened by the project manager over the phone using the 7-day PA recall semi-structured interview. [28] As a result of this process, some participants (*n*=22) were re-categorized as "Low" in terms of current PA and were invited to participate in the study. During this process, participants were also screened for medical issues that could have prevented them from taking part safely (in which case they were asked to consult with their doctor), and were asked if they planned to be away from their worksite for three or more weeks during the intervention phase of the trial. None of the participants were excluded for such reasons.

Following screening, eligible participants were invited to complete assessments at baseline and week 17. The questionnaire assessments were based on an online questionnaire, preceded by a detailed information sheet, which was distributed to the interested and eligible participants via email. Participants were required to indicate their consent to participate before they completed the baseline questionnaire. None of the participants refused consent. Measurement sessions were organized for each worksite at baseline and follow-up. Participants were allocated a time slot during which they had their measurements taken.

With regard to the PA assessments, at baseline all participants were provided with an activPAL micro3 device to wear for 7 days during baseline (week 0) and follow-up (week 17). Participants were instructed (verbally and in writing) to place the device against the skin on the front of the right thigh halfway between the kneecap and pelvis. The devices were initialized prior to begin recording. We started recording data the day after the measurement session. At baseline participants were also each given a Fitbit Zip activity tracker and participants were explicitly told not to change their usual PA behaviors until the start of the intervention. They were also advised that their step count data would be visible to the research team as they synced the device. They were asked to wear the device on their hip (attached to their trouser or skirt rim) for the duration of the intervention, including baseline and follow-up weeks (i.e. a total of 18 weeks), with the exception of when they went to bed, or when they were bathing/swimming.

Statistical Analyses

A small number of outliers, the exact number of which varied per analysis, were removed using the Mahalanobis distance criterion. Linear mixed modelling analyses with random intercepts and fixed slopes, accounting for time and worksite clustering, were conducted to test the hypotheses. We used the full information maximum likelihood estimation method to treat missing data, as it is superior to other alternatives (e.g., last observation carried forward or complete case analysis). [29] For each dependent variable, the predictors were its baseline score, a treatment group variable (with enhanced treatment coded as 0 and minimal treatment coded as 1, hence the intercept represents the baseline score for the enhanced treatment; see Tables 2-5), a dummy variable called "post" comparing the pre and post intervention score for enhanced treatment, a group x post interaction (showing the mean pre-post difference between conditions), and a number of demographic variables listed in Tables 3-6. Age was grand-mean centered. For interaction effects we calculated effect sizes based on the formula provided by Feingold. [30]

Results

Descriptive Statistics

The unadjusted means and effect sizes for each of the outcomes at baseline and post-intervention are presented in Table 2. The direction of change was generally similar between the two conditions, and largely in the expected direction. Waist circumference and waist-to-height ratio decreased, and general psychological well-being increased, in enhanced treatment participants, with changes in the minimal treatment condition being in the opposite direction.

Feasibility

In relation to the projected recruitment rate (*n*=60 walkers), we over-recruited by 61.67%. The dropout rate was low at 11.34%. All (100%) of the participants who signed informed consent completed all baseline assessments. Of the retained participants, 91.86% completed post-intervention assessments, suggesting that the assessment procedures ran smoothly. Training acceptability in both peer leaders (*M*=5.59; *SD*=.88) and walkers [enhanced treatment: *M*= 5.43 (*SD* = .90); minimal treatment: *M* = 5.77 (*SD*=.82) out of a possible maximum score of 7)] was rated high, substantially above the mid-point of the scales. A similar result was found for the acceptability of the intervention as a whole by the walkers [(enhanced treatment: *M* = 5.73 (*SD*=1.04); minimal treatment: *M* = 5.72 (*SD*=1.26)].

Effects on Motivation for Walking

The results of the analyses for motivation for walking are presented in Table 3. As expected, there was a significant increase in the three autonomous forms of motivation (identified, integrated, and intrinsic motivation) for the treatment condition, with no increases in controlled motivation (external, introjected) and amotivation. However, we saw a similar pattern of change for the control group, which was unexpected. The time × condition interactions (labelled "mean pre-post difference between conditions") were non-significant for all the motivation outcomes (Cohen's d = .01-.09).

Effects on Steps Per Day, Minutes of Standing and Hours of Sitting

Table 4 illustrates results for all movement-related outcomes. Although changes were non-significant, steps increased in both conditions, with greater changes in the enhanced treatment group. Similar changes were observed for standing. Sitting time decreased in the enhanced treatment, while it increased slightly in the minimal treatment condition. None of the time × condition interaction effects were significant (Cohen's d = .04 - .12).

Effects on Cardio-Metabolic Risk Factors

The results pertaining to changes in cardio-metabolic risk factors (waist circumference and waist-to-height ratio) are presented in Table 5. The results revealed significant time × condition interaction effects (Cohen's d=.10-.16). Specifically, increases in both outcomes were observed in the minimal treatment group, with decreases evident in the enhanced treatment condition.

Effects on Well-Being

Table 6 presents the results for the well-being outcomes. In regards to work-related well-being, none of the main effects nor any of the interaction effects were significant (time ×

condition: Cohen's d range = .03 - .07). A similar pattern was observed for the WHO5 well-being outcome (time × condition: Cohen's d=.16), although the pattern of change in the means indicated that well-being increased in the enhanced treatment condition while it decreased in the minimal treatment group.

Discussion

The aim of this pilot study was to test the feasibility and preliminary effects of a motivationally-embellished workplace peer led walking intervention on motivation for walking, movement-related behaviors, cardio-metabolic health, and psychological well-being in physically inactive employees. The results showed that the intervention was highly feasible, thus supporting H1-H4. Specifically, we demonstrated strong feasibility of recruitment, retention, and assessment procedures, and documented high levels of acceptability of the training and the intervention as a whole. These results support the potential of this pilot to be scaled up and tested in a future definite RCT.

We expected self-determined motivation of participants in the enhanced treatment would increase more than self-determined motivation of participants in the minimal treatment (H5). However, our results did not support this hypothesis. In fact, we identified increases of medium effect size in all types of self-determined motivation, which means that participants across *both* conditions internalized their motivation over time. This was found despite the lack of SDT content in the minimal treatment condition. Similar findings were reported in a SDT-based intervention examining the effects of need supportive exercise referral consultations on self-determined motivation in individuals undergoing exercise referral schemes. [30] In our study, participants in the minimal treatment group were given information about the health benefits of walking, a set goal, and a Fitbit to approximate 'usual' treatment. Further, the Fitbit app has BCT features (e.g., goal setting), which the participants might have utilized. Participants had the choice of when, where and with whom to walk, and were told about the health benefits of walking, which could have helped them to internalize their motivation. These decisions, which were needed in order to create an acceptable and pragmatic comparison condition, could have supported the psychological needs and self-determined motivation of the participants in that condition. The lack of effects for controlled motivation and amotivation in both groups are not surprising, given that SDT interventions are more effective in increasing autonomous motivation than decreasing controlled motivation and amotivation. [31]

We found no support for H6. Specifically, there were no significant changes in step counts per day, as measured via ActivPAL devices. This finding is likely due to the rather high baseline step count scores in participants across both conditions, which meant that participants might have had less room for improvement. These baseline scores were much higher than expected given we thoroughly screened participants prior to study enrolment to ensure that they were insufficiently physically active. It is possible that the high baseline values for step counts could be explained by the simultaneous provision of Fitbit Zip and ActivPal devices to the participants in both treatment conditions prior to the start of the intervention. The Fitbits were given in order for the participants in the enhanced treatment condition to establish a personalized step count goal. Although the participants in both conditions were strongly encouraged *not* to change their behavior prior to the start of the intervention (i.e., at the point when they received the activity tracker), the high baseline scores strongly implies the presence of reactivity, as a result of receiving the activity tracker. Indeed, this suggestion may have merit given recent similar findings with adults and young people. [32,33]

It is noteworthy that the baseline step counts in the minimal treatment were substantially higher than those in the enhanced treatment, although this gap was reduced at the follow-up. It is not clear why such group differences existed at baseline but might be due to the cluster (as opposed to individual) randomization used, and the fairly small number of clusters (i.e., organizations) in this study. Future research in this area should conduct audits of PA opportunities in and around the organizations before similar interventions are implemented and stratify organizations that have very different opportunities.

Increases in standing and reductions in sitting from baseline to post intervention were significant in the enhanced treatment condition. Although there were no significant differences group x time interactions, comparative changes in the minimal treatment group were substantially smaller (and in fact, sitting time slightly increased in that condition). The reduction by 30 minutes per day (adjusted analyses) in sitting in the enhanced treatment condition exceeds results reported in a meta-analysis examining the effects of PA interventions on sitting. [34] Further, this result is identical to results reported in a meta-analysis examining the effect of interventions aimed at reducing leisure time sitting time in adults. [35] Importantly, it has recently been argued that reductions of 30 minutes of sitting per day may be clinically meaningful. [36]

The intervention was successful in reducing cardio-metabolic risk, thus supporting H7. The result pertaining to reductions in waist circumference is commensurate with the findings of recent quasi-experimental trials and extend such research by using a controlled design. [37] These results are important given waist circumference and waist-to-height ratios are critical predictors of cardiovascular disease and type II diabetes. [38,39] Although the changes in step counts were not significant, supplementary analyses in the experimental group showed that within-person changes in step counts were associated with changes in waist circumference (β= -.0007; $p< .05$) and waist-to-height ratio (β= -.0000038; $p< .05$). As an example, a 1,000 increase in step counts was associated with a 0.7 cm decrease in waist circumference.

There were no group or group x time effects on work-related and general well-being (H8). These findings were unexpected in light of results of previous workplace PA trials. [40] It is possible that factors other than PA could have impacted both types of well-being. For example, several participants reported relocating offices during the trial, which may have impacted travel time, daily routine, and social experiences. Work-related well-being in particular may show stronger associations with PA if assessed using a dynamic design in which the time period between behavior and assessment of well-being are proximally closer. In future research, an ecological momentary assessment method could be used to examine (changes in) work-related well-being (affect) pre and post walks, and comparing walking and non-walking days. [41]

Some limitations of the present study are important to consider in the interpretations of the results. First, the study was a pilot, and hence not powered to detect significant effects for most outcomes. As such, any significant or non-significant findings we found should be interpreted with caution. Second, the fact that participants received Fitbit activity trackers at baseline may have artificially inflated baseline step counts, despite instructing participants not to change their usual behavior at this point. Given that the aim of this pilot was to test procedures and measures before a future definitive trial, the timing of distribution will be changed before a future trial and ActivPAL will be given to participants at least 2-3 weeks before they receive the Fitbits. Further, the unintended increases in autonomous motivation in the minimal treatment condition might necessitate some changes in the future, for example, by not giving this group a Fitbit zip or any general advice as to how they can engage in individual or group walks. In future studies, it would be beneficial to construct and present an a priori logic model to specify exactly how the intervention would be expected to lead to the various outcomes, with a view to informing future definitive trials. Further, it would be useful in future studies to measure additional markers of cardio-metabolic health, such as blood pressure levels of plasma total cholesterol, HDL, triglycerides and HbA1C, for a more comprehensive assessment of cardio-metabolic risk.

Notwithstanding these limitations, the study makes a significant contribution to the literature in a number of ways. Notably, the intervention included motivation training of both peer leaders and walk participants, which has not previously been evaluated in this context. Additionally, the rigorous statistical analysis is a strength of the study. Our analysis adjusted each participant's baselines score and has the advantage of being unaffected by baseline differences between the two groups. [42]

Conclusions

We showed that it was feasible to reach and exceed our recruitment targets, implement the training and the wider intervention procedures in ways that were acceptable to participants, and keep the vast majority of the participants engaged with the assessments of the study. Preliminary efficacy results showed that participation in the enhanced treatment condition resulted in reductions in waist circumference and waist-to-height ratio, which were not evident in the minimal treatment condition. Such changes were partly due to within-person increases in step counts, although between group differences in step counts (plus standing and sitting) did not differ between groups. We also found no improvements in well-being indicators. Hence, evidence for the preliminary efficacy of the intervention was mixed, which is not surprising for a pilot study. Nevertheless, we learned important lessons regarding procedures, which will be taken into account in the development of a future definitive RCT.

Ethical approval: All procedures in the study were in accordance with the ethical standards of the Institution and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Disclosure: The authors declare that they have no conflicts of interest

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Data availability: The data that support the findings of this study are available from the corresponding author (first author), upon reasonable request.

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Table 1. *Static and Dynamic START App Features and Corresponding BCTs*

Content	App feature	BCT
Static	Setting and adjusting goals, advice on overcoming anticipated barriers, information about planning activities	Goal setting behavior (1.1) Problem solving (1.2) Action planning (1.4)
	Information on the benefits of walking, injury prevention, frequently asked questions, and tips for making walks more interesting	Instruction on how to perform the behavior (4.1) Information about health consequences (5.1)
Dynamic	Encouragement to set and adjust goals	Goal setting behavior (1.1)
	Self-monitoring tools including request to enter daily step count and record structured walking activities	Self-monitoring of behavior (2.3)
	Weekly graph displaying progress towards goal	Feedback on behavior (2.2)
	Feedback on progress on achieving step goal delivered via messages using need-supportive communication (SDT)	Discrepancy between current behavior goal (1.6) Feedback on behavior (2.2)
	Request to set and adjust goals in light of progress	Review behavioral goals (1.5) Discrepancy between current behavior and goal (1.6)
	Plan weekly walks (when, where, with whom)	Action planning (1.4)
	Reminder messages linked to self-set plans using need-supportive communication (SDT)	Prompts/cues (7.1) Social reward (10.4)
	Request to rate feelings following structured walks, mid-walk motivational messages based on need-supportive communication (SDT)	Social support (practical) (3.2) Social support (emotional) (3.3) Monitoring of emotional consequences (5.4)
	Working with group members to achieve a team goal challenge (selected by the team). To achieve this, we pooled total step count for group members and displayed progress of mileage towards a well-known destination, based on group size and fitness level (e.g., walk from Perth to the Melbourne Cricket Ground)	Social support unspecified (3.1) Goal setting outcome (1.3) Graded tasks (8.7)

Note. Static app features refer to content that does not change, and dynamic app features refer to content that is provided in response to the user's actions.

Table 2. *Means (Unadjusted) by Treatment Condition at Baseline and Post-Intervention*

Variable	Minimal treatment			Enhanced treatment		
	Baseline *M (SD)*	Post *M (SD)*	Cohen's *d*	Baseline *M (SD)*	Post *M (SD)*	Cohen's *d*
Amotivation	.36 (.69)	.27 (.72)	.14	.31 (.65)	.20 (.41)	.16
External regulation	.54 (.73)	.53 (.88)	.01	.45 (.74)	.47 (.78)	.04
Introjected regulation	1.47 (.75)	1.94 (1.16)	.39	1.34 (1.06)	1.63 (.96)	.32
Identified regulation	2.76 (.95)	3.02 (.82)	.42	2.58 (.96)	2.91 (.71)	.56
Integrated regulation	1.89 (1.19)	2.27 (1.17)	.47	1.64 (1.04)	2.00 (1.25)	.42
Intrinsic motivation	2.53 (1.22)	2.95 (1.02)	.57	2.51 (.96)	3.04 (.69)	.80
Steps per day	9159.01 (2455.44)	9269.75 (2616.13)	.05	8313.36 (2185.64)	8821.67 (2584.01)	.22
Standing (mins/day)	261.92 (89.40)	269.12 (92.60)	.10	249.71 (72.63)	277.85 (91.86)	.34
Sitting (hrs/day)	9.84 (1.47)	9.92 (1.41)	.08	9.79 (1.18)	9.43 (1.99)	.33
Waist circumference (cm)	96.16 (16.55)	98.47 (15.84)	.45	95.21 (13.92)	94.06 (13.81)	.09
Waist-to-height ratio	.575 (.09)	.589 (.08)	.42	.573 (.08)	.566 (.08)	.36
Anxiety	5.36 (1.25)	5.10 (1.37)	.22	5.37 (1.14)	5.28 (1.26)	.06
Enthusiasm	3.32 (1.34)	3.31 (1.32)	.01	3.53 (1.27)	3.31 (1.35)	.24
Depression	5.95 (1.21)	5.65 (1.39)	.22	6.19 (1.01)	5.95 (1.12)	.19
Comfort	3.52 (1.33)	3.55 (1.36)	.03	3.62 (1.18)	3.66 (1.21)	.05
Well-being (WHO5)	54.61 (18.46)	51.06 (21.51)	.17	55.18 (18.97)	58.63 (20.80)	.17

Table 3. *Adjusted Effects of the Intervention on Motivation for Walking*

	Beta (SE)	*p*	95% CI
Amotivation			
Age	-.01 (.01)	.010	-.03, -.003
Gender (1=male; 2=female)	-.14 (.14)	.33	-.43, .15
Number of health issues	.39 (.11)	.001	.18, .61
Education [a]			
Secondary/high school	-.03 (.23)	.91	-.47, .42
TAFE	.30 (.21)	.15	-.11, .71
Diploma	-.03 (.22)	.89	-.47, .41
Bachelor degree	-.10 (.16)	.53	-.42, .22
Ethnicity [b]			
European	.16 (.13)	.24	-.11, .42
Asian	-.05 (.17)	.75	-.38, .28
Other	-.15 (.26)	.56	-.68, .37
Job type [c]			
Professionals	-.32 (.15)	.04	-.62, -.02
Clerical	-.01 (.15)	.95	-.32, .30
Full or part-time (1=full-time; 2=part-time)	-.13 (.13)	.34	-.40, .14
Intercept	.33 (.23)	.15	-.12, .79
Mean pre-to-post difference in enhanced treatment	-.14 (.12)	.24	-.37, .09
Mean difference between conditions at baseline	.13 (.13)	.33	-.13, .39
Mean pre-post difference between conditions	.07 (.16)	.68	-.25, .38
External regulation			
Age	-.01 (.01)	.47	-.02, .01
Gender (1=male; 2=female)	.04 (.22)	.86	-.41, .49
Number of health issues	.31 (.17)	.07	-.03, .65
Education [a]			
Secondary/high school	-.23 (.35)	.51	-.93, .47
TAFE	.06 (.32)	.85	-.59, .71
Diploma	-.01 (.34)	.97	-.70, .68
Bachelor degree	.05 (.25)	.85	-.45, .55
Ethnicity [b]			
European	-.11 (.20)	.61	-.51, .30
Asian	-.27 (.26)	.31	-.78, .25
Other	-.37 (.41)	.37	-1.18, .44
Job type [c]			
Professionals	-.18 (.24)	.45	-.65, .29
Clerical	-.06 (.24)	.79	-.54, .41
Full or part-time (1=full-time; 2=part-time)	-.41 (.21)	.06	-.83, .02
Intercept	.57 (.35)	.11	-.13, 1.27
Mean pre-to-post difference in enhanced treatment	-.001 (.12)	.99	-.24, .24
Mean difference between conditions at baseline	.07 (.18)	.70	-.29, .43
Mean pre-post difference between conditions	.01 (.16)	.94	-.31, .34
Introjected regulation			
Age	.0002 (.01)	.99	-.02, .02
Gender (1=male; 2=female)	.28 (.26)	.29	-.24, .80
Number of health issues	-.06 (.20)	.78	-.46, .35
Education[a]			
Secondary/high school	-.35 (.41)	.39	-1.18, .47
TAFE	.37 (.38)	.33	-.38, 1.13
Diploma	.41 (.41)	.32	-.40, 1.21
Bachelor degree	.04 (.30)	.90	-.55, .63
Ethnicity[b]			
European	.20 (.24)	.40	-.28, .68
Asian	.37 (.31)	.24	-.24, .97
Other	-.13 (.48)	.79	-1.09, .83
Job type[c]			
Professionals	.05 (.28)	.86	-.50, .60

Clerical	.05 (.28)	.85	-.51, .61
Full or part-time (1=full-time; 2=part-time)	-.19 (.25)	.43	-.69, .30
Intercept	.97 (.42)	.02	.14, 1.80
Mean pre-to-post difference in enhanced treatment	.30 (.19)	.11	-.07, .68
Mean difference between conditions at baseline	.12 (.23)	.60	-.33, .58
Mean pre-post difference between conditions	.22 (.25)	.39	-.29, .73
Identified regulation			
Age	.01 (.01)	.19	-.01, .03
Gender (1=male; 2=female)	.19 (.23)	.41	-.27, .65
Number of health issues	-.39 (.18)	.03	-.75, -.04
Education[a]			
Secondary/high school	.16 (.36)	.66	-.56, .88
TAFE	.05 (.34)	.88	-.62, .72
Diploma	.18 (.36)	.61	-.53, .89
Bachelor degree	.40 (.26)	.13	-.12, .92
Ethnicity[b]			
European	-.19 (.21)	.38	-.61, .23
Asian	.19 (.27)	.49	-.35, .72
Other	.28 (.42)	.51	-.55, 1.11
Job type[c]			
Professionals	.36 (.24)	.15	-.13, .84
Clerical	-.09 (.25)	.71	-.58, .40
Full or part-time (1=full-time; 2=part-time)	.56 (.22)	.01	.12, .99
Intercept	2.23 (.36)	<.001	1.51, 2.95
Mean pre-to-post difference in enhanced treatment	.44 (.11)	<.001	.23, .65
Mean difference between conditions at baseline	.12 (.18)	.51	-.24, .49
Mean pre-post difference between conditions	-.17 (.14)	.23	-.46, .11
Integrated regulation			
Age	.03 (.01)	.03	.002, .05
Gender (1=male; 2=female)	.47 (.30)	.13	-.14, 1.08
Number of health issues	-.38 (.23)	.11	-.84, .09
Education[a]			
Secondary/high school	-.67 (.48)	.17	-1.62, .28
TAFE	-.45 (.44)	.32	-1.33, .43
Diploma	-.39 (.47)	.41	-1.32, .54
Bachelor degree	-.06 (.34)	.87	-.74, .63
Ethnicity[b]			
European	-.50 (.28)	.08	-1.05, .05
Asian	.06 (.35)	.88	-.65, .76
Other	.80 (.55)	.15	-.30, 1.89
Job type[c]			
Professionals	.45 (.32)	.17	-.19, 1.09
Clerical	.32 (.32)	.32	-.32, .97
Full or part-time (1=full-time; 2=part-time)	.62 (.29)	.03	.05, 1.20
Intercept	1.44 (.47)	.003	.50, 2.38
Mean pre-to-post difference in enhanced treatment	.49 (.15)	.001	.20, .78
Mean difference between conditions at baseline	.18 (.24)	.46	-.30, .67
Mean pre-post difference between conditions	-.10 (.20)	.63	-.49, .29
Intrinsic motivation			
Age	.01 (.01)	.17	-.01, .03
Gender (1=male; 2=female)	.32 (.25)	.21	-.18, .83
Number of health issues	-.54 (.19)	.007	-.92, -.15
Education [a]			
Secondary/high school	.23 (.40)	.57	-.56, 1.01
TAFE	-.05 (.37)	.90	-.78, .68
Diploma	-.02 (.39)	.97	-.79, .76
Bachelor degree	.32 (.28)	.27	-.25, .89
Ethnicity[b]			
European	-.37 (.23)	.11	-.83, .09
Asian	.22 (.29)	.46	-.37, .80

Other	.62 (.46)	.18	-.29, 1.53
Job type[c]			
Professionals	.40 (.27)	.14	-.13, .93
Clerical	-.06 (.27)	.82	-.60, .47
Full or part-time (1=full-time; 2=part-time)	.76 (.24)	.002	.28, 1.24
Intercept	2.13 (.39)	<.001	1.35, 2.92
Mean pre-to-post difference in enhanced treatment	.60 (.12)	<.001	.35, .85
Mean difference between conditions at baseline	-.03 (.20)	.87	-.44, .37
Mean pre-post difference between conditions	-.18 (.17)	.29	-.51, .16

Notes: [a]reference group is participants with a postgraduate University degree; [b]reference group is participants who are Australian; [c]reference group is managers; Intercept is the mean of the enhanced treatment condition at baseline.

Table 4. *Adjusted Effects of the Intervention on Steps Per Day, Minutes of Standing and Hours of Sitting Per Day*

	Beta (SE)	*p*	95% CI
Steps per day			
Age	-33.27 (31.04)	.29	-95.17, 28.63
Gender (1=male; 2=female)	588.25 (735.81)	.43	-882.68, 2059.19
Number of health issues	-1133.62 (556.11)	.05	-2245.02, -22.21
Education[a]			
Secondary/high school	-840.05 (1077.71)	.44	-2994.26, 1314.16
TAFE	-1524.15 (1073.40)	.16	-3669.78, 621.48
Diploma	-836.40 (1075.79)	.44	-2986.26, 1313.46
Bachelor degree	-649.57 (789.25)	.41	-2227.66, 928.52
Ethnicity[b]			
European	-591.59 (670.79)	.38	-1932.05, 748.87
Asian	-331.52 (825.30)	.69	-1980.78, 1317.75
Other	-1187.76 (1106.46)	.29	-3397.95, 1022.44
Job type[c]			
Professionals	623.00 (725.39)	.39	-826.84, 2072.85
Clerical	401.21 (748.96)	.59	-1094.65, 1897.08
Full or part-time (1=full-time; 2=part-time)	1098.95 (677.65)	.11	-254.56, 2452.46
Intercept	8701.11 (1106.38)	<.001	6492.09, 10910.13
Mean pre-to-post difference in enhanced treatment	381.99 (429.55)	.38	-474.47, 1238.45
Mean difference between conditions at baseline	858.55 (595.56)	.15	-324.06, 2041.16
Mean pre-post difference between conditions	-600.49 (585.48)	.31	-1768.19, 567.21
Standing (minutes per day)			
Age	.32 (.95)	.74	-1.58, 2.22
Gender (1=male; 2=female)	27.87 (22.64)	.22	-17.42, 73.15
Number of health issues	-32.77 (17.12)	.06	-67.00, 1.47
Education[a]			
Secondary/high school	-35.12 (33.26)	.30	-101.65, 31.40
TAFE	10.20 (33.14)	.76	-56.06, 76.47
Diploma	27.27 (33.17)	.41	-39.05, 93.59
Bachelor degree	2.78 (24.43)	.91	-46.08, 51.64
Ethnicity[b]			
European	-20.07 (20.64)	.34	-61.35, 21.21
Asian	92.54 (25.39)	.001	41.76, 143.32
Other	-16.60 (34.01)	.63	-84.58, 51.38
Job type[c]			
Professionals	-6.91 (22.31)	.76	-51.54, 37.72
Clerical	12.51 (23.01)	.59	-33.48, 58.51
Full or part-time (1=full-time; 2=part-time)	15.14 (20.94)	.47	-26.71, 56.99
Intercept	229.82 (34.06)	<.001	161.77, 297.86
Mean pre-to-post difference in enhanced treatment	29.66 (12.51)	.02	4.69, 52.62
Mean difference between conditions at baseline	9.76 (18.11)	.59	-26.23, 45.76
Mean pre-post difference between conditions	-26.00 (17.13)	.13	-60.19, 8.19
Sitting (hours per day)			
Age	.01 (.02)	.48	-.02, .05
Gender (1=male; 2=female)	-.64 (.45)	.16	-1.54, .25
Number of health issues	.47 (.34)	.17	-.21, 1.15
Education[a]			
Secondary/high school	.69 (.66)	.30	-.63, 2.01
TAFE	.31 (.66)	.64	-1.01, 1.63
Diploma	.07 (.66)	.91	-1.24, 1.38
Bachelor degree	.33 (.49)	.50	-.64, 1.30
Ethnicity[b]			
European	.52 (.41)	.21	-.30, 1.34
Asian	-.62 (.51)	.23	-1.63, .39
Other	-.31 (.67)	.65	-1.65, 1.04
Job type[c]			

Professionals	.16 (.44)	.72	-.72, 1.05
Clerical	-.29 (.46)	.53	-1.20, .62
Full or part-time (1=full-time; 2=part-time)	-.13 (.43)	.75	-.99, .72
Intercept	10.05 (.67)	<.001	8.70, 11.39
Mean pre-to-post difference in enhanced treatment	-.50 (.24)	.04	-.98, -.02
Mean difference between conditions at baseline	-.17 (.36)	.65	-.88, .55
Mean pre-post difference between conditions	.58 (.33)	.09	-.09, 1.24

Notes: [a]reference group is participants with a postgraduate University degree; [b]reference group is participants who are Australian; [c]reference group is managers; Intercept is the mean of the enhanced treatment condition at baseline.

Table 5. *Adjusted Effects of the Intervention on Cardio-Metabolic Risk Factors*

	Beta (SE)	*p*	95%CI
Waist circumference			
Age	.41 (.16)	.01	.10, .72
Gender (1=male; 2=female)	-11.35 (4.01)	.006	-19.35, -3.35
Number of health issues	2.97 (3.14)	.35	-3.29, 9.22
Education[a]			
Secondary/high school	13.33 (6.41)	.04	.55, 26.11
TAFE	11.62 (5.98)	.06	-.31, 23.54
Diploma	14.48 (6.27)	.02	1.98, 26.98
Bachelor degree	5.01 (4.65)	.29	-4.27, 14.29
Ethnicity[b]			
European	5.14 (3.73)	.17	-2.29, 12.57
Asian	-.24 (4.79)	.96	-9.79, 9.31
Other	6.13 (6.65)	.36	-7.13, 19.39
Job type[c]			
Professionals	3.53 (4.31)	.42	-5.06, 12.13
Clerical	.73 (4.34)	.87	-7.92, 9.37
Full or part-time (1=full-time; 2=part-time)	-7.62 (3.92)	.06	-15.44, .21
Intercept	94.95 (6.21)	<.001	82.56, 107.34
Mean pre-to-post difference in enhanced treatment	-1.49 (.82)	.07	-3.13, .15
Mean difference between conditions at baseline	.03 (3.07)	.99	-6.09, 6.15
Mean pre-post difference between conditions	4.07 (1.11)	<.001	1.87, 6.28
Waist-to-height ratio			
Age	.002 (.001)	.007	.001, .004
Gender (1=male; 2=female)	-.02 (.02)	.44	-.06, .03
Number of health issues	.02 (.02)	.29	-.02, .05
Education[a]			
Secondary/high school	.08 (.03)	.03	.01, .15
TAFE	.06 (.03)	.05	-.001, .13
Diploma	.08 (.03)	.02	.01, .15
Bachelor degree	.02 (.03)	.40	-.03, .07
Ethnicity[b]			
European	.04 (.02)	.05	.001, .08
Asian	.03 (.03)	.24	-.02, .08
Other	.04 (.04)	.24	-.03, .12
Job type[c]			
Professionals	.02 (.02)	.39	-.03, .07
Clerical	.01 (.02)	.63	-.04, .06
Full or part-time (1=full-time; 2=part-time)	-.04 (.02)	.07	-.08, .003
Intercept	.52 (.03)	<.001	.46, .59
Mean pre-to-post difference in enhanced treatment	-.01 (.005)	.08	-.02, .001
Mean difference between conditions at baseline	-.002 (.02)	.89	-.04, .03
Mean pre-post difference between conditions	.02 (.01)	<.001	.01, .04

Notes: [a]reference group is participants with a postgraduate University degree; [b]reference group is participants who are Australian; [c]reference group is managers; Intercept is the mean of the enhanced treatment condition at baseline.

Table 6. *Adjusted Effects of the Intervention on Psychological Well-Being*

	Beta (SE)	*p*	95%CI
Anxiety			
Age	.01 (.01)	.65	-.02, .03
Gender (1=male; 2=female)	.06 (.31)	.85	-.55, .67
Number of health issues	-.73 (.24)	.003	-1.21, -.26
Education[a]			
Secondary/high school	.46 (.49)	.35	-.51, 1.43
TAFE	-.09 (.46)	.85	-1.00, .82
Diploma	-.02 (.48)	.97	-.97, .94
Bachelor degree	.06 (.36)	.86	-.65, .77
Ethnicity[b]			
European	-.50 (.29)	.08	-1.08, .07
Asian	-.71 (.36)	.05	-1.44, .01
Other	-.43 (.51)	.40	-1.44, .58
Job type[c]			
Professionals	-.17 (.33)	.61	-.82, .48
Clerical	-.31 (.33)	.35	-.97, .35
Full or part-time (1=full-time; 2=part-time)	-.19 (.30)	.53	-.78, .40
Intercept	6.00 (.49)	<.001	5.04, 6.97
Mean pre-to-post difference in enhanced treatment	-.07 (.23)	.75	-.53, .38
Mean difference between conditions at baseline	-.07 (.27)	.80	-.60, .46
Mean pre-post difference between conditions	-.20 (.31)	.52	-.82, .42
Enthusiasm			
Age	.01 (.01)	.64	-.02, .03
Gender (1=male; 2=female)	.43 (.36)	.24	-.29, 1.15
Number of health issues	-.29 (.28)	.32	-.85, .28
Education[a]			
Secondary/high school	.08 (.58)	.89	-1.07, 1.23
TAFE	.82 (.54)	.13	-.25, 1.90
Diploma	-.02 (.57)	.97	-1.15, 1.11
Bachelor degree	-.24 (.42)	.58	-1.07, .60
Ethnicity[b]			
European	.03 (.34)	.93	-.64, .70
Asian	.79 (.43)	.07	-.07, 1.65
Other	.93 (.60)	.13	-.27, 2.13
Job type[c]			
Professionals	-.31 (.39)	.43	-1.08, .46
Clerical	-.60 (.39)	.13	-1.38, .18
Full or part-time (1=full-time; 2=part-time)	.002 (.35)	.996	-.70, .71
Intercept	3.35 (.57)	<.001	2.22, 4.48
Mean pre-to-post difference in enhanced treatment	-.22 (.19)	.25	-.72, .45
Mean difference between conditions at baseline	-.13 (.29)	.66	-.72, .45
Mean pre-post difference between conditions	.21 (.25)	.39	-.28, .71
Depression			
Age	.0001 (.01)	.997	-.02, .02
Gender (1=male; 2=female)	.48 (.28)	.09	-.08, 1.05
Number of health issues	-.69 (.22)	.003	-1.12, -.25
Education[a]			
Secondary/high school	.25 (.45)	.59	-.65, 1.15
TAFE	.16 (.42)	.71	-.68, 1.00
Diploma	-.33 (.44)	.46	-1.21, .56
Bachelor degree	.11 (.33)	.75	-.55, .76
Ethnicity[b]			
European	-.31 (.27)	.25	-.84, .22
Asian	-.11 (.34)	.75	-.78, .56
Other	-.06 (.47)	.89	-1.00, .88
Job type[c]			
Professionals	-.06 (.30)	.84	-.66, .54

Clerical	-.46 (.31)	.14	-1.07, .15
Full or part-time (1=full-time; 2=part-time)	.19 (.28)	.50	-.36, .74
Intercept	6.27 (.45)	<.001	5.37, 7.17
Mean pre-to-post difference in enhanced treatment	-.21 (.24)	.39	-.68, .27
Mean difference between conditions at baseline	-.30 (.26)	.24	-.81, .21
Mean pre-post difference between conditions	-.14 (.32)	.67	-.77, .50
Comfort			
Age	.01 (.01)	.58	-.02, .04
Gender (1=male; 2=female)	-.01 (.37)	.98	-.75, .73
Number of health issues	-.23 (.29)	.44	-.80, .35
Education[a]			
Secondary/high school	-.16 (.59)	.78	-1.34, 1.01
TAFE	.49 (.55)	.37	-.61, 1.59
Diploma	-.37 (.58)	.52	-1.52, .78
Bachelor degree	-.16 (.43)	.70	-1.02, .69
Ethnicity[b]			
European	-.04 (.34)	.90	-.73, .64
Asian	-.08 (.44)	.85	-.96, .79
Other	.64 (.61)	.30	-.59, 1.86
Job type[c]			
Professionals	-.15 (.40)	.71	-.93, .64
Clerical	.02 (.40)	.96	-.78, .83
Full or part-time (1=full-time; 2=part-time)	-.09 (.36)	.81	-.81, .63
Intercept	3.81 (.58)	<.001	2.66, 4.97
Mean pre-to-post difference in enhanced treatment	.13 (.18)	-.49	-.23, .48
Mean difference between conditions at baseline	-.07 (.30)	.80	-.67, .52
Mean pre-post difference between conditions	-.09 (.24)	.70	-.57, .38
Psychological well-being (WHO-5)			
Age	.34 (.19)	.08	-.04, .72
Gender (1=male; 2=female)	6.84 (4.93)	.17	-2.98, 16.67
Number of health issues	-14.61 (3.83)	<.001	-22.25, -6.98
Education[a]			
Secondary/high school	5.58 (7.87)	.48	-10.10, 21.27
TAFE	5.17 (7.29)	.48	-9.37, 19.71
Diploma	-.88 (7.72)	.91	-16.27, 14.51
Bachelor degree	2.24 (5.65)	.69	-9.03, 13.51
Ethnicity[b]			
European	-3.75 (4.61)	.42	-12.93, 5.42
Asian	-4.23 (5.81)	.47	-15.83, 7.36
Other	1.33 (8.44)	.88	-15.47, 18.13
Job type[c]			
Professionals	-.36 (5.27)	.95	-10.87, 10.15
Clerical	-1.57 (5.38)	.77	-12.29, 9.14
Full or part-time (1=full-time; 2=part-time)	-2.11 (4.74)	.66	-11.56, 7.34
Intercept	56.32 (7.81)	<.001	40.78, 71.85
Mean pre-to-post difference in enhanced treatment	4.36 (3.39)	.20	-2.39, 11.10
Mean difference between conditions at baseline	-1.54 (4.29)	.72	-10.05, 6.96
Mean pre-post difference between conditions	-7.91 (4.59)	.09	-17.05, 1.23

Notes: [a]reference group is participants with a postgraduate University degree; [b]reference group is participants who are Australian; [c]reference group is managers; Intercept is the mean of the enhanced treatment condition at baseline.

Figure 1. *Flowchart of study participants*