A loyalty scheme to encourage physical activity in office workers: a cluster RCT

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Scientific summary

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Background

Increasing physical activity levels in the workplace could have physical and mental health benefits for employees and provide potential economic benefits for employers through reduced absenteeism and increased productivity. Current evidence to support the effectiveness of such interventions is mixed, with previous meta-analyses of workplace physical activity interventions showing small, positive, short-term effects on levels of physical activity but little long-term effectiveness. Furthermore, there is scant evidence on the cost-effectiveness of such interventions. Financial and non-financial incentives are increasingly used to promote healthy lifestyles, but we know little about whether they offer effective or sustainable means to promote physical activity in workplace settings.

Aims and objectives

We conducted a cluster randomised controlled trial in a workplace setting of an incentives-based intervention for promoting physical activity, based on the concept of a 'loyalty card', to deliver the following objectives:

1. To investigate the effectiveness of the intervention to increase employees' physical activity levels.
2. To investigate if any change in physical activity behaviour is maintained over time.
3. To conduct cost-effectiveness, cost–utility and cost–benefit analyses of the intervention.
4. To investigate how the intervention has an impact on other health behaviours and outcomes.
5. To investigate wider work-related effects, including sickness absenteeism and work presenteeism.
6. To investigate the mediators of (1) uptake and use of the loyalty card, (2) initiation and (3) maintenance of behaviour change.
7. To conduct a parallel qualitative study to identify the reasons for intervention effects, how and why it worked for participants, and to explore possible mediators of behaviour change.
8. To conduct a discrete choice experiment to investigate the effective levels of incentive for such interventions.
9. To conduct a behavioural economic field experiment on intertemporal and risk preferences to investigate the relationship between physical activity behavioural change, discounting and financial incentives.

Methods

The study is a cluster randomised controlled trial, with a parallel qualitative process evaluation and cost-effectiveness analysis. Trial procedures and protocol have been previously reported and are summarised below. A protocol variation, to limit follow-up to 12 months, was approved by the National Institute for Health Research.

The intervention (6 months' duration)

The intervention, known as the Physical Activity Loyalty scheme, is based on similar concepts to high-street loyalty cards whereby 'points' are rewarded for repeated behaviour. This 6-month intervention comprised financial incentives for physical activity undertaken during the working day. Physical activity was recorded remotely through sensors in the workplace neighbourhood. Participants had access to an intervention website that offered tools for planning, goal-setting and feedback on physical activity, and redemption of earned points. Those assigned to the waiting list control group were offered the opportunity to participate in the intervention after the 12-month follow-up period.

Sample

Participants were healthy adults working in office-based occupations in public sector organisations in Lisburn and Belfast city centres, Northern Ireland. To be eligible, participants had to be based at the worksite for at least 4 hours per day on 3 days per week, have a current contract lasting the duration of the study and have no recent history of conditions that would restrict their ability to take part in physical activity. Clusters were defined as the smallest organisational unit, for example specific buildings or departments participating in the trial. Of the 1209 participants assessed for eligibility, 853 participants from 37 clusters were randomised into two groups ($n = 457$, intervention group; $n = 396$, control group). Furthermore, 71 participants were lost to follow-up from either being uncontactable or having moved workplaces, and 154 participants withdrew during trial follow-up. After omitting those participants who did not supply valid pedometer data (primary outcome measure), pedometer data for the primary outcome at 6 months was analysed for 485 participants (intervention group, $n = 249$; control group, $n = 236$).

Outcomes and measures

The primary outcome was physical activity behaviour change at 6 months (mean number of steps per day). Pedometer data were considered valid if the participant provided ≥ 250 steps per day for ≥ 3 days at each data collection period. Participants completed the Global Physical Activity Questionnaire to elucidate the context of the physical activity undertaken.

Secondary outcomes included measures of health and well-being using the Short Form Questionnaire-8 items questionnaire, quality-of-life EuroQol-5 Dimensions, five-level version and the Warwick–Edinburgh Mental Wellbeing Scale.

Work-related impacts, including absenteeism and presenteeism, were measured using the World Health Organization's Health Work Performance Questionnaire. Putative mediators of behaviour change initiation and maintenance were measured at baseline, 4 weeks and 6 months. A range of variables for use in the economic evaluation were measured and, in subsets of participants, variables used in contingent valuation and economic experiments were measured.

Data collection and analyses

Data were collected (1) at baseline, including demographic characteristics, physical activity behaviour, health and well-being, work-related impacts, behavioural mediators and moderators, double-bound dichotomous choices and a discrete choice experiment questionnaire; (2) at 4 weeks (putative mediators); (3) at 6 months, including physical activity behaviour, behavioural mediators, health and well-being and work-related impacts; and (4) at 12 months (physical activity behaviour). All self-report measures were collected online via Qualtrics (Qualtrics, Provo, UT, USA). Outcomes were compared between groups using analysis of covariance, adjusting for baseline values, randomisation stratum and season, with standard errors corrected for clustering. Indirect effects of hypothesised mediators on 6- and 12-month physical activity behaviours were examined using the structural equation modelling-based product-of-coefficients approach with confidence intervals formed using the bias-corrected bootstrap procedure.

Process evaluation

A qualitative process evaluation was conducted alongside the trial in order to provide in-depth qualitative data on both the implementation and the outcomes of the intervention. Focus groups were conducted to solicit participants' views of the Physical Activity Loyalty scheme post intervention (6 months post baseline). Semistructured interviews and focus groups were also undertaken with employers and retailers (that offered retail vouchers as incentives) and, again, with participants at 12 months post intervention to describe facets of, and reasons for, any maintained behaviour change. All qualitative data were analysed using a thematic framework.

Health economics

The primary economic evaluation took the form of a within-trial cost–utility analysis that adopted a public sector perspective. Costs included the intervention costs (apportioned per participant) and health-care resource use. Health outcomes were expressed in terms of quality-adjusted life-years accrued over the 6-month follow-up period in the cost–utility analysis.

The primary analysis used an incremental cost-effectiveness ratio estimated by dividing the adjusted difference in mean costs between groups by the adjusted difference in mean quality-adjusted life-years between groups. Incremental cost-effectiveness ratio estimates were compared with a £20,000–30,000 per quality-adjusted life-year threshold applied by the National Institute for Health and Care Excellence. A supplementary cost–benefit analysis was undertaken from an employer's perspective by using a 'net cost model', incorporating not only the intervention costs but also the avoided costs of absenteeism and productivity loss attributable to sick days. All analyses were undertaken according to the principle of intention to treat.

Behavioural economics

Two stated preference methods were employed to determine the financial incentive level that might stimulate behaviour change, namely (1) contingent valuation, used to measure participants' willingness to accept financial incentives, for increasing their physical activity and (2) a discrete choice experiment that examined the monetary value required for increasing different types and levels of physical activity.

Results (intention-to-treat analysis)

Primary outcomes: immediate post intervention (6 months post baseline)

At 6 months post intervention, mean number of steps per day was significantly lower for the intervention group compared with the control group [6990 steps (standard deviation 3078 steps) vs. 7576 steps (standard deviation 3345 steps), respectively; mean difference of –336 steps, 95% confidence interval –612 to –60 steps; $p = 0.02$] after adjustment for baseline values, randomisation stratum and season, and correction for cluster effects. There was also a significant difference between the intervention group compared with the control group for minutes per week of self-reported work-related physical activity (mean difference of –33.3 minutes, 95% confidence interval –65.44 to –1.24 minutes; $p = 0.04$) but not for minutes per week of self-reported moderate to vigorous physical activity (mean difference of 4.12 minutes, 95% confidence interval –47.07 to 55.31 minutes; $p = 0.88$).

Effects at 12 months post baseline

There was a non-significant difference between the intervention and control groups in steps per day [7790 steps (standard deviation 3462 steps) vs. 8203 steps (standard deviation 3401 steps), with an adjusted mean difference of –570 steps (95% confidence interval –1267 to 127 steps); $p = 0.11$] after adjustment for baseline values, randomisation stratum and season, and correction for cluster effects. There were also non-significant differences between groups for minutes per week of self-reported work-related physical activity (mean difference of 7.0 minutes, 95% confidence interval –12.6 to 26.6 minutes; $p = 0.48$) and minutes per week of self-reported moderate to vigorous physical activity (mean difference of 77.0 minutes, 95% confidence interval –7.9 to 162.0 minutes; $p = 0.08$).

Secondary outcomes

There was a significant difference between groups for the WEMWBS in favour of the intervention group (adjusted mean difference = 1.34, 95% confidence interval 0.48 to 2.20; $p < 0.01$), but not for the other secondary outcomes.

Sensitivity analysis

Given the loss to follow-up and missing mean number of steps per day data, a further analysis was carried out following imputation by chained equations. In this case, the difference in the mean number of steps per day was –526 steps (95% confidence interval –948 to –104 steps; $p = 0.02$), in the same direction as the primary analysis.

Process evaluation

Feedback from participants on the PAL scheme was positive. A number of themes emerged from the focus group discussions on the benefits participants received from their participation in the intervention. Benefits identified by participants included increased levels of physical activity, health benefits, social benefits and increased productivity. Participants highlighted how the intervention had instigated changes in their usual routine, leading to increased physical activity across the working day. However, barriers to and facilitators of the PAL scheme were also identified with regard to work demands, time and the weather.

Cost-effectiveness analysis

The intervention was £25.85 (95% confidence interval –£29.89 to £81.60) more costly per participant than no intervention (control group), but had no effect on quality-adjusted life-years (incremental quality-adjusted life-year = –0.0000891, 95% confidence interval –0.008 to 0.008). The bootstrapped cost and quality-adjusted life-year pairs spread over the four quadrants of the cost-effectiveness plane indicated large uncertainty, especially surrounding the effect on quality-adjusted life-years. Overall, the findings of the study suggest that the scheme was not cost-effective. In the intervention group, a cost–benefit analysis demonstrated fewer hours absent from work through sickness (2.97 hours over a 4-week period; $p = 0.62$). Pro rata, this equates to 17.82 hours for the 6-month intervention period and could result in savings ranging from £66 to £735 per participant, on average, depending on the wage rate employed at current intervention costs (£55.68 per paticipant). The estimated cost saving is associated with great uncertainty. Owing to the statistically insignificant effect of absenteeism, the probability that the PAL scheme is cost saving (net cost < £0) for employers ranged from 57% to 64%.

Behavioural economics

On average, participants' willingness to accept financial incentives were £1.38 (95% confidence interval £1.16 to £1.61) for increasing physical activity by an additional 30 minutes per week and £2.80 (95% confidence interval £2.32 to £3.27) for increasing physical activity by an additional 60 minutes per week. The average money required by participants for increasing walking or cycling to and from places, moderate intensity recreational physical activity and vigorous intensity recreational physical activity was £2.88 per hour (95% confidence interval £2.33 to £3.43), £1.02 per hour (95% confidence interval £0.68 to £1.37) and £3.29 per hour (95% confidence interval £2.72 to £3.86), respectively. The minimum monetary incentives necessary for increasing physical activity (i.e. 60 minutes of moderate physical activity) differed significantly for inactive participants (£3.24, 95% confidence interval £2.30 to £4.17) and active participants (£0.92, 95% confidence interval £0.15 to £1.68) at baseline, with inactive participants requiring significantly more monetary incentive.

Mediation analysis

Random-effects regression analyses showed that there were significant increases at 4 weeks post baseline in intentions ($b = 0.29$; $p = 0.02$), identified regulation ($b = 0.14$; $p = 0.01$), integrated regulation ($b = 0.23$; $p < 0.01$), intrinsic motivation ($b = 0.18$; $p < 0.01$) and social norms ($b = 0.23$; $p < 0.01$) for intervention participants compared with control participants. In these analyses, b represents the coefficient for group assignment (i.e. intervention vs. control group) in random-effects regressions. None of the changes in these variables was significantly related to 6-month changes in the mean number of steps per day, controlling for group assignment.

However, there were significant and positive indirect effects of group assignment on change in the mean number of steps per day at 6 months through changes in several of the mediators of maintenance (measured at baseline and 6 months). At 6 months, there were significant increases in identified regulation ($b = 0.11$; $p = 0.02$), integrated regulation ($b = 0.26$; $p < 0.01$), intrinsic motivation ($b = 0.17$; $p < 0.01$) and habit ($b = 0.48$; $p < 0.01$) for intervention participants compared with control participants. In these analyses, b represents the coefficient for group assignment (i.e. intervention vs. control group) in random-effects regressions. These changes were shown in random-effects regression analyses to be related to changes in the number of pedometer steps per day at 6 months, controlling for group assignment.

Conclusions

The trial demonstrated that assignment to the intervention group resulted in a small but significant decline in the primary outcome (i.e. mean pedometer-measured steps per day at 6 months) relative to baseline, compared with the waiting list control group. Self-reported minutes per week of workplace physical activity also declined (compared with the waiting list control group), but there was no significant change for total moderate to vigorous physical activity. At 12 months, those in the intervention group still had a lower mean step per day total than the control group, but the difference was not significant.

Feedback on the scheme was generally positive from participants, retailers and employers. In addition to the marginal, although statistically discernible, from zero gain in mental well-being for participants, the scheme had wider benefits for the employer in terms of productivity, as well as enabling networks and partnerships to be built between businesses and retailers in relation to the rewards element of the scheme.

Although the results of the trial showed that the intervention was not likely to be cost-effective from an NHS perspective over the 6-month time horizon, they also highlighted that the intervention group used fewer health-care resources compared with the control group; however, this difference was not statistically significant. In addition, there was a net cost saving for employers from intervention participants, arising because of reduced absenteeism and ranging from £66 to £735 (depending on the wage rate employed). Therefore, although the decline in absenteeism hours was not statistically significant it was arguably economically significant. Hence, from this perspective and valuing absenteeism using a human capital approach, the intervention could be deemed to be cost beneficial.

Although assignment to the intervention group led to increases in some putative mediators of initiation, these increases were not related to physical activity behaviour change at 6 months. Two potential reasons for this were (1) changes in mediators of initiation did not induce change in physical activity behaviour and (2) changes in mediators of initiation were not carried through to physical activity behaviour change at 6 months.

Although the primary outcomes are not positive in relation to increased and maintained physical activity, there were some positive aspects that merit further attention and that should be examined in future physical activity intervention studies, such as the use of self-regulation techniques with social and environmental prompts to promote habit formation as new physical activity behaviours become more automatic. Monitoring of behavioural outcomes is an additional self-regulation technique that should be explored, as it can potentially encourage participants to focus on their satisfaction with behaviour change.

Trial registration

This trial is registered as ISRCTN17975376.

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