

Benefits of physical activity interventions combining self-monitoring with other components versus self-monitoring alone: a systematic review and meta-analysis

Tomas Vetrovsky, Charlotte Wahlich, Agnieszka Borowiec, Roman Jurik, Witold Smigielski, Michal Steffl, James Tufano, Wojciech Drygas, Petr Stastny, Lukasz Malek, Tess Harris

Abstract

Background Self-monitoring is a cornerstone of many complex physical activity interventions and is a powerful behaviour change technique leading to substantial physical activity increases. Whether additional intervention components, such as counselling or incentives, yield further benefits over self-monitoring is not known. We aimed to determine whether complex physical activity interventions that combine self-monitoring with other intervention components provide an additional benefit to self-monitoring alone.

Methods In this systematic review and meta-analysis, we searched for randomised controlled trials that compared an intervention using objective self-monitoring with an activity monitor to increase physical activity (active control group) with an intervention comprising precisely the same treatment plus any additional component intended to further increase physical activity (intervention group). An initial search (July 8, 2020) of five databases (PubMed, Scopus, Web of Science, ProQuest, Discus), limited to English language and without publication date restrictions, was complemented by backward and forward citation searches (Nov 10, 2020). The search strings combined terms related to the domain being studied (eg, “physical activity”) AND intervention of interest (eg, “pedometer”) AND terms signalling an active control group (eg, “three arms”). We did summary data meta-analyses using random-effects models, and explored effect moderators using a series of univariate and multivariate meta-regression models. We assessed the risk of bias using the Cochrane Risk of Bias tool and measured heterogeneity using I^2 statistics. This study is registered with PROSPERO, number CRD42020199482.

Findings 65 studies were identified, of which 58 reported data recorded directly after the intervention ended and were included in the post-intervention meta-analysis. 17 of these studies also provided outcome data after a period of follow-up after the intervention ended. Most studies were at low risk of attrition and detection bias; selection and reporting bias varied a lot between studies, but most were at high risk of performance bias due to the difficulties in blinding participants to behavioural interventions. At post-intervention (median 12 weeks [IQR 10–16]), the mean difference between the intervention and active control groups was 947 steps per day (95% CI 613–1282; $I^2=90\%$). At follow-up (median 13 weeks [IQR 10–26]), the mean difference was 439 steps per day (95% CI 180–699; $I^2=47\%$). Interventions up to 3 months ($p=0\cdot038$), having a set goal ($p=0\cdot031$), and with added human counselling ($p=0\cdot0034$), particularly via phone or video calls ($p=0\cdot0070$), were associated with a greater increase in step count than interventions longer than 3 months, without a set goal, and without a counselling component, respectively.

Interpretation Physical activity interventions that combine self-monitoring with other intervention components provide an additional benefit above and beyond self-monitoring alone. As these interventions owe a substantial part of their overall effect to simple self-monitoring, future trials should assess these interventions against active control groups consisting of self-monitoring (instead of control groups assigned to no intervention) to isolate the net effect of additional components.

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Contributors

TV and LM conceived the work. TV did the searches, LM, RJ, TV, TH, and PS screened the records, LM, AB, WS, PS, RJ, and TV extracted the data, CW, TV, PS, and RJ assessed the risk of bias, TV did the statistical analysis, and TV, JT, and TH wrote the Abstract. All authors have seen and approved the final version of the Abstract for publication.

Declaration of interests

We declare no competing interests.

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Faculty of Physical Education and Sport, Charles University, Prague, Czech Republic (T Vetrovsky PhD, R Jurik MSc, M Steffl PhD, J Tufano PhD, P Stastny PhD); Population Health Research Institute, St George's University of London, London, UK (C Wahlich DPsych, Prof T Harris MD); Department of Epidemiology, Cardiovascular Disease Prevention and Health Promotion, National Institute of Cardiology, Warsaw, Poland (A Borowiec PhD, Prof W Drygas MD, Prof L Malek MD); Department of Demography and Social Gerontology, University of Lodz, Lodz, Poland (W Smigielski PhD)

Correspondence to:
Dr Tomas Vetrovsky,
Faculty of Physical Education and Sport, Charles University, 162 52 Prague, Czech Republic
tomas.vetrovsky@gmail.com