

Effectiveness of interventions using feedback on objectively measured physical activity – a meta-analysis

H.E.M. Braakhuis MSc^{1,2}, M.A.M. Berger PhD², J.B.J. Bussmann PT, PhD¹

1. Department of Rehabilitation Medicine, Erasmus MC University Medical Center, Rotterdam, The Netherlands.
2. Faculty of Health, Nutrition and Sport, The Hague University of Applied Sciences, The Hague, The Netherlands.

Background

Wearable monitors that provide objective feedback on physical activity (PA) are popular in interventions in patient groups and healthy populations. How objective feedback is used and integrated in those interventions varies widely. To date, effectiveness of objective PA feedback and which determinants of interventions contribute to the effect is not systematically studied.

Aims

- To determine the effect of interventions including feedback on objectively measured physical activity
- To explore potential determinants of the effect of these interventions:
 - Population
 - Concurrent PA promoting strategies
 - Characteristics of objective feedback

Method

- Literature search: PubMed, Embase and Cochrane library
- Inclusion criteria:
 - RCTs after 2007
 - Intervention aimed at improving PA
 - Differences between intervention arms was feedback on objectively measured PA
 - Concurrent intervention strategies were only related to PA
 - Objective PA was an outcome measure
- Data extraction: random-effects model with standardized mean difference (SMD)
- Determinants: population, concurrent PA-promoting strategies, feedback characteristics

Literature search
N = 1633

38 full tekst
articles

15 studies
included

Results

- The overall effect was in favor of the intervention groups (SMD = 0.31, 95% CI 0.07 - 0.55, p = 0.01, I² = 86%)
- Measurement devices were pedometers (n = 6), accelerometers (n = 9)
- HJ-109E Step-O-meter (Omron Healthcare UK Ltd) was most frequently used
- Subgroup analyses were based on most common combination of determinants (table 1, graph 1)



Table 1 – Subgroup analysis

Determinant	Subgroup	N	SMD
Population	Clinical	5	0.23 (1)
	Healthy	12	0.34 (2)
Concurrent PA promoting strategies	Behavioral change techniques	6	0.68 (1)
	Specific goal setting		
	Verbal spoken feedback		
	No other behavioral change techniques	10	0.02 (2)
Feedback frequency	(Online) education	1	1.17 (3)
	Behavioral change techniques		
	No specific goal-setting	2	0.67 (1)
Feedback parameter	Daily	6	0.43 (2)
	Ongoing – own choice	5	-0.10 (3)
	1 – 3x p/week	4	0.37 (4)
	< 1x p/week – 1 x p/month	6	0.37 (1)
Feedback parameter	Only stepcount	6	0.32 (2)
	Stepcount + other parameter	5	0.37 (3)
	Other parameter than stepcount		

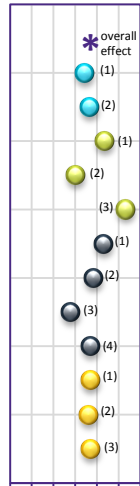


Figure 1 – Standardized mean difference (SMD) of subgroup analysis

Conclusions & implications

- Interventions including objective PA-feedback are effective in improving PA
- Concurrent non-PA feedback strategies potentially influence the effect
- Daily feedback is preferred, no specific feedback parameter is recommended
- More research is needed to understand the pathway of the influence of concurrent PA promoting strategies next to objective feedback