Sedentary behaviour interventions in young people: a meta-analysis

Biddle SJ, O'Connell S, Braithwaite RE

CRD summary
The review found that interventions produced small but significant reduction in sedentary behaviour in children and adolescents. However, lack of quality assessment, poor reporting of study design and intervention components, and possibly inappropriate pooling of heterogeneous studies mean that the authors' conclusions are unlikely to be reliable.

Authors' objectives
To ascertain, through a meta-analytic review, whether interventions targeted at reducing sedentary behaviours in young people were successful.

Searching
ERIC, MEDLINE, PsycINFO, SPORTDiscus and The Cochrane Library databases were searched up to 2010; search terms were reported. Relevant review papers were searched. Relevant reference lists were handsearched for additional studies.

Study selection
Studies that included an intervention to reduce sedentary behaviour in children or adolescents (up to 18 years old) were eligible for inclusion. Studies had to include sedentary behaviour as an outcome measure, and use descriptive and/or inferential statistics to calculate effect sizes. Included studies had to be published in English in peer-reviewed journal.

Included studies were conducted in Australia, Canada, France, UK and USA. Participants' age ranged from three to 15 years. Most interventions involved education or counselling. The interventions were delivered weekly, bi-weekly, monthly or other. Duration of the interventions ranged from zero to four months to more than 12 months. Most of the interventions focused on a combination of sedentary behaviour, physical activity and/or nutrition. The review authors classified the interventions by type (education, community, clinical and counselling) but did not report further details of the interventions.

Two reviewers were involved in study selection.

Assessment of study quality
There was no formal quality assessment. However, the authors acknowledged that the process evaluations were lacking.

Data extraction
Effect sizes (Hedges'g) were used to express the differential changes across the intervention and control groups. A coding system was used to demonstrate agreement.

Data were extracted by one reviewer and a random sample of half of the completed studies were drawn and extracted independently by the second reviewer. Agreement rates and inter-rater reliability coefficients were then calculated. Any discrepancies were discussed and resolved by the third reviewer.

Methods of synthesis
Studies were pooled to generate an overall effect size (Hedges' g; standardised mean difference). A random-effects model was used and effect sizes of below 0.50 were rated as small, 0.50 to 0.79 as moderate and above 0.79 as large. When means and Standard Deviations (SDs) were not provided in studies, estimates of effect sizes were calculated using F, t, r or p-values. Q statistics, T² and I² were used to examine the degree of heterogeneity. I² value of 25% was considered as low, 50% as moderate and 75% as high heterogeneity. Publication bias was assessed with a funnel plot, the trim and fill procedure and fail safe N calculation. Subgroup analyses were performed to calculate effect sizes for different intervention types, design (theory-based or not), duration, frequency of delivery and whether there was follow-up.

Results of the review
Seventeen studies were included in the review (4,976 participants; range 10 to 1,295). Follow-up was done in five studies but the length of the follow-up was not reported in the review. Symmetrical funnel plot indicated no evidence of significant publication bias.

Small but statistically significant reductions in sedentary behaviour were observed in the intervention groups (g=-0.192, 95% confidence interval (CI) -0.303 to -0.082, p=0.001) with significant heterogeneity across the results (Q=43.48, p<0.001; Ι²=63.21%). In particular, community based interventions with a combination of objective and self report measures showed a larger effect. Results of other subgroup analyses were reported.

Due to the heterogeneity, sensitivity analysis was conducted and found two studies to be outliers. Once "one study removed" procedure was performed, both studies were retained as results indicated small changes in the overall effect size (g=-0.163) while still remaining within the 95% confidence interval.

**Authors' conclusions**
Interventions to reduce sedentary behaviour were shown to be successful, but effects were small.

**CRD commentary**
The review question was clear. There were no stated inclusion criteria for study design. All studies had a control group, but it was unclear whether they were randomised or not. Together with the lack of formal validity assessment, this made it difficult to assess the strength of the evidence base underlying the authors' conclusions. Appropriate electronic databases were searched for relevant studies, but there was a risk of language bias as only published studies that were in English were included in the review. The authors used funnel plots which showed low risks of publication bias. Two reviewers were involved in the process of study selection, data coding and extraction, which helped to minimise reviewer bias and error.

Statistical pooling of the effect sizes of different intervention type, design, intervention time and length of delivery may not have been appropriate. The inclusion of studies that combined children with adolescents raised questions about the appropriateness of pooling. Components of interventions and control of the studies were not reported which made it difficult to judge whether, for example, community interventions were similar to each other or not.

Statistically significant effects were found in the main analysis and some subgroup analyses, but the clinical significance of the pooled results was uncertain. Overall, weaknesses in conduct and reporting of the review mean that the authors' conclusions are unlikely to be reliable.

**Implications of the review for practice and research**
**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that future intervention studies should take account of the views of young people and families, should involve process evaluation and assessment of intervention fidelity and have longer follow-up with larger samples.

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