Increasing physical activity: a quantitative synthesis

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Authors' objectives
To estimate the effectiveness of interventions which aim to increase physical activity.

Searching
MEDLINE, Current Contents, PsycINFO, SOCIAL SCISEARCH, ERIC, Dissertation Abstracts and bibliographies were searched. Experts were also contacted and their suggested search terms included.

Study selection
Study designs of evaluations included in the review
Case studies or cohorts with no control group; studies with non-equivalent control groups; studies with multiple baselines; experimental studies with matched or randomised control groups.

Specific interventions included in the review
A variety of interventions were employed in the primary studies. These include: behavioural modification (e.g. behavioural contracts, stimulus control reinforcement), cognitive-behavioural interventions (self-monitoring, self-reinforcement, decision-making or acquisition of coping skills), health education (educational programmes, mass media campaigns), health risk appraisal (assessment based on self-report and/or health/fitness evaluation), exercise prescription, physical education curriculum programmes, and combination programmes. These were carried out in a range of settings: home, school, community, worksite and in a healthcare environment (e.g. hospital or group homes).

Participants included in the review
A range of participants were included in the primary studies. With reference to age, these are grouped into 4 categories (youth, adult, older and combined). The health status of participants also varied. The study results are grouped in the following categories: obese, with coronary heart disease (CHD) or high risk, developmentally disabled, physically disabled, and healthy.

Outcomes assessed in the review
The outcomes varied among the studies, and included a variety of physical activity measures, such as self-report (questionnaires about physical activity), attendance at exercise classes or observation of frequency of specific activities. Physiological surrogates were also recorded, such as spirometry, time on treadmill until exhaustion, resting heart rate, submaximal exercise heart rate and run time. Muscular strength or endurance was also used as an outcome in some studies.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
The studies were analysed separately according to study design (i.e. randomised studies were analysed separately from non-experimental studies). Other indicators of study quality were not recorded. The authors do not state how the papers were assessed for quality, or how many of the authors performed the quality assessment.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction. The data were expressed as Pearson correlation coefficient $r$ statistics which allows effects to be calculated from diverse statistical presentations including frequencies, percentages, graphs, t-tests and chi square tests. Fisher's $z$
transformation of r was then used to adjust for the npn-normal distribution of r to protect against small sampling bias in estimates of the population.

**Methods of synthesis**

How were the studies combined?
The studies were combined using meta-analysis: effect sizes from the primary studies were expressed as "r" statistics. Mean weighted and unweighted effect sizes were calculated. Effect sizes were interpreted as follows: r=0.00 equates to a binomial effect size of zero, reflecting a 50% chance for success in the absence of interventions. An r of 0.20 is equal to an increase in success from 50% to 60%. An r of 0.40 indicates an increase to 70%.

How were differences between studies investigated?
A series of sensitivity analyses were carried out.

**Results of the review**

A total of 127 studies (approximately 131,156 people) were included.

Overall mean effect size: r=0.34 (95%CI:0.26,0.42), or 0.75 (95%CI:0.70,0.79) (unweighted).

The corresponding binomial effect represented a potential increase in success rates after intervention from 50% to 67% (88% for the weighted analysis). The estimated population value of r was 0.64 (0.76 for the weighted analysis) after adjustment for a reliability of r=0.80 among the measures of physical activity. Effect sizes did not differ between males and females, between age groups or between white or non-white participants. The effect sizes were larger in healthy participants. Behaviour modification approaches produced larger effect sizes than other techniques, and effect sizes were larger in studies using mediated approaches compared to those using face-to-face delivery. Interventions in community settings and interventions delivered to groups produced larger effect sizes compared to those produced by studies in schools and other settings, or with delivery to individuals, the family or an individual within a group. Effects were larger when physical activity was not supervised compared to a supervised physical activity programme. Effect sizes were unrelated to the number of weeks the intervention or the follow-up period lasted. Effect sizes varied according to the mode of physical activity. Effects for active leisure time were larger when contrasted with exercise programmes prescribing strength, aerobic exercise or aerobic exercise combined with other fitness activities. Effect sizes did not vary with frequency or duration, although studies that reported on activities carried out at low intensity had larger effect sizes that those carried out at high intensities. Effect sizes from studies using an objective measure of attendance or direct observance were larger than those using self-report or surrogate measures of physical activity.

**Authors' conclusions**
Interventions for increasing physical activity have a moderately large effect.

**CRD commentary**
Overall this is a thorough review. However, the overall effect size may be inflated as there is no detailed assessment of the quality of the primary studies, apart from grouping according to study design. However, the impact of lower methodological quality is examined, and shows that the effect sizes found in the pre or quasi-experimental studies were larger than in the randomised controlled trials. The overall reported significant effect may also be difficult to interpret clinically, because such a variety of outcomes were used in the primary studies. However, the review does suggest that a variety of behavioural, educational and other strategies may result in increases in physical activity, and suggests that controlled experiments are required to confirm the review's findings.

**Bibliographic details**
Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.