Systematic review of text-messaging interventions to promote healthy behaviors in pediatric and adolescent populations: implications for clinical practice and research

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CRD summary
The authors concluded that text messaging should be considered in conjunction with clinic care as a mode to target a variety of health behaviours, but more research was needed to inform clinical practice. Given the limitations of the study trials and some limitations of the systematic review, the reliability of the results are unknown.

Authors’ objectives
To assess the efficacy of text messaging as a tool to deliver health behaviour programmes to paediatric and adolescent populations.

Searching
PubMed was searched for studies in English published in peer reviewed journals between 2004 and May 2011; search terms were reported. A manual search of references in articles was also undertaken.

Study selection
Eligible were randomised controlled trials (RCTs) and quasi-experimental studies that evaluated text messaging based interventions to impact health behaviour in paediatric and adolescents (18 years or younger) and their parents. The trials also had to report outcome data before and after the intervention. Specific control or comparison interventions were not defined by the study authors.

Disease management studies targeted medication adherence in liver transplant patients; physical activity, blood glucose monitoring and HbA1c in Type I patients with diabetes. Health promotion studies aimed to increase physical activity and/or decrease screen time and sweetened beverage intake. Interventions included automated delivery of tailored text messaging, and/or daily or weekly reminders (to perform a particular behaviour) or motivational texts, or text support/feedback. Along with text messaging, some studies included other co-interventions such as wearing a pedometer, use of a paper diary or psycho-educational group sessions. The number of intervention sessions or clinic visits varied between one and four. Comparison groups included usual care, email reminders, or self-monitor by paper diary. Mean age of study participants ranged from 8.7 to 18.2 years across studies. The percentage of females ranged from 44% to 70% across studies. Interventions ranged from two to 52 weeks. Outcomes were measured using various methods such as serum drug levels, rejection and self-report adherence.

Two reviewers selected studies for inclusion.

Assessment of study quality
Quality criteria were based on a modified version the Downs and Black assessment. Criteria assessed included: study design, allocation concealment, blinding, retention greater than 80%, similarly between groups at baseline, missing data, power calculation, validated measures, intention-to-treat analysis, and selective reporting. The number of quality indicators met was calculated as a percentage for each study.

Two reviewers independently assessed study validity, with any discrepancies resolved through discussion.

Data extraction
Study details were extracted and presented in a table, and in the text. Two reviewers independently performed the data extraction, with any discrepancies resolved through discussion.

Methods of synthesis
The studies were presented in a narrative synthesis.

Results of the review
Seven studies (published in eight papers) were included in the review, with at least 378 participants (study information on one of the included RCTs was not reported): six RCTs, including one cross-over RCT (at least 338 participants) and one quasi-experimental study (40 participants). Sample sizes ranged from 36 to 128. Quality scores ranged from 50% to 92%. Attrition levels ranged between 0 and 47% and only two studies were powered to detect differences between groups.

Overall, five studies reported significant differences. One RCT reported significantly more blood glucose monitoring for a text messaging group compared with an email group (p=0.02). Another RCT reported that glycaemic control was significantly better with intensive insulin therapy plus text-messages compared with conventional therapy, or conventional insulin therapy plus text-messages (p=0.001). A quasi-experimental study reported that there was significantly less liver rejection after the text messaging intervention compared with before the intervention (p=0.02). One RCT reported higher retention rates with text messaging (72%) compared with a paper diary (39%) or a control group (50%); statistical tests were not reported. Another RCT reported significant increases in energy expenditure (statistical tests were not reported).

One RCT reported that pedometers and weekly texts did not increase physical activity in children with Type I diabetes, and the cross-over RCT demonstrated positive trends in glycaemic control with text messaging compared with a paper diary control (statistical tests were not reported).

**Authors' conclusions**
Text messaging should be considered in conjunction with clinic care as a mode to target a variety of health behaviours, but more research was needed to inform clinical practice.

**CRD commentary**
The review question and inclusion criteria were clear, but the control comparisons were only broadly defined. The authors searched several databases, but non-English and unpublished studies were not sought, which introduced potential language and publication biases. It appeared that two reviewers were involved in the systematic review process which reduced the potential for reviewer error and bias. Quality assessment was undertaken and reported in the discussion. The methods used to assess quality may be incomplete, for example it did not appear that the method or randomisation was evaluated, which was an important key criterion for assessing RCTs. In addition, an overall quality score percentage may not be the most appropriate method to summarise quality.

The studies were appropriately summarised in a narrative synthesis given the diversity of the included trials. Data on one of the included studies was not presented in detail and did not appear that all of the results, and/or statistical comparisons were reported for many of the included trials. As the authors acknowledge, some of the results may be confounded by other factors unrelated to mobile phone use.

Given the limitations of the study trials (such as small sample sizes, quality of reporting, statistical power) and some limitations of the systematic review, the reliability of the results are unknown.

**Implications of the review for practice and research**
**Practice:** The authors did not state definite clinical implications, but did suggest that interventions that used mobile phones may have been a more favourable adjunct to clinical care compared with traditional methods for paediatric and adolescent populations.

**Research:** The authors stated that more rigorous, theory-based intervention research with mobile technology was warranted in paediatric and adolescent populations. Further research was needed to assess the optimal dose and how to sustain results over the long term. Cost outcomes should also be measured.

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