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Critically Appraised Articles

Is it possible to improve children's and adolescents' health through mobile telephony?

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English key words: mobile applications, telemedicine, health behavior, health promotion: methods, child, meta-analysis.
Spanish key words: aplicaciones móviles, telemedicina, conductas saludables, promoción de la salud: métodos, niño, metanálisis.

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Is it possible to improve children's and adolescents' health through mobile telephony?

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Original article: Fedele DA, Cushing CC, Fritz A, Amaro CM, Ortega A. Mobile health interventions for improving health outcomes in youth: a meta-analysis. JAMA Pediatr. 2017;171:461-9.

Abstract

Authors' conclusions: mobile health interventions appear to be a viable health behavior change intervention modality for youth. Given the ubiquity of mobile phones, mobile health interventions offer promise in improving public health.

Reviewers' commentary: despite its low validity, this meta-analysis shows a favorable effect of interventions to improve health, through mobile telephony, in children and adolescents.

Key words: mobile applications, telemedicine, health behavior, health promotion: methods, child, meta-analysis.

¿Es posible mejorar la salud de niños y adolescentes a través de la telefonía móvil?

Resumen

Conclusiones de los autores del estudio: las intervenciones sanitarias utilizando telefonía móvil son una modalidad viable de cambio de comportamientos de salud para los jóvenes. Dada la generalización de su uso, pueden ser de ayuda para mejorar la salud pública.

Comentario de los revisores: con las reservas derivadas de su baja validez, este metanálisis muestra un efecto favorable de las intervenciones para mejorar la salud, mediante telefonía móvil, en niños y adolescentes.

Palabras clave: aplicaciones móviles, telemedicina, conductas saludables, promoción de la salud: métodos, niño, metanálisis.

STRUCTURED ABSTRACT

Objective: to determine the effectiveness of health interventions delivered by means of mobile applications to improve health outcomes in youth aged up to 18 years, assess moderating factors that may be critical drivers of the effectiveness of these interventions, and describe the risk of bias of the available medical literature.

Design: systematic review (SR) and meta-analysis.

Data source: the search was carried out on November 30, 2016 in PubMed, CINAHL, Educational Resources Information Center and PsycINFO. The following descriptors were used: "telemedicine", "eHealth", "mobile health", "mHealth", "app" and "mobile application". The search was restricted to children, adolescents and young adults when possible. Only articles in English were included.

Study selection the search produced 11 282 articles. After an initial screening that excluded 9455, the authors evaluated 318 full-text articles. Of these articles, 22 met the inclusion criteria. The included articles had to use quantitative methods to evaluate the use of mobile applications to promote or change health behaviour in youth 18 years or younger. The selection excluded unpublished dissertations or works, and studies that did not include sufficient statistics. After reviewing the references of the selected studies, 14 additional articles were identified. The review finally included a total of 37 studies with 29 822 participants.

Data extraction: two authors and one researcher extracted data separately. Variables that measured health behaviours or associated disease functioning and several moderator variables were standardised. A total of 93 effect sizes were calculated from 37 studies, although these were eventually aggregated at the study level prior to the calculation of the standardised mean difference (Cohen d) for each study. The authors used the Cochrane Collaboration bias tool to assess the risk of bias. A random effects model was used for meta-analysis.

Main results: 53% of participants were female, and the mean age was 11.35 years (40.5% of the studies did not report the mean age of participants, and 37.8% did not report ethnicity data). The risk of bias was high in a significant proportion of the studies. The effect size of health interventions that used mobile technology was significant (n = 37; Cohen d: 0.22; 95% confidence interval [95 CI]: 0.14 to 0.29). The random effects model suggested that providing the mobile health intervention to a caregiver increased the strength of the effect. In studies that involved caregivers in the intervention (n = 16), the Cohen d was 0.28 (95 CI: 0.18 to 0.39) while in studies that did not (n = 21) it was 0.13 (95 CI: 0.02 to 0.25).

Conclusion: mobile health interventions appear to be a viable health behaviour change intervention for youth. Given the ubiquitous use of mobile technology, mobile health interventions could improve public health.

Conflicts of interest: none disclosed.

Funding source: not noted.

COMMENTARY

Justification: in the United States, 73% of adolescents have smart phones, which they use an average of 2.5 hours a day. In Spain, the leading European country in smart phone penetration, 98% of children aged 10 to 14 years use them.[1] There is a growing interest in the multiple mobile applications related to health promotion (mHealth) that are being introduced. An increasing number of studies on their effects are being published. A systematic review analysing the effectiveness of these applications in improving health, as well as in modulator variables and potential biases, is justified.

Validity or scientific rigour: the description of the objectives was very general and vague. The literature search could be a source of bias, as it only included texts in English and excluded grey literature. A funnel plot was not provided, but the potential publication bias was low, with a null result tolerance index of 634. The study inclusion and exclusion criteria were well defined, and there was agreement between reviewers.

The greatest threat to internal validity is the substantial heterogeneity of the included studies in their samples and interventions and, most importantly, the poor quality of many, with 30% of studies without a control group. The Q (106.40; $P < .001$) and I^2 estimators (66.17), indicated a moderate to high heterogeneity in the effect sizes. The results were represented in a forest plot in which most numerical citations of individual studies are not consistent with the reference list at the end of the article.

Clinical relevance: leaving aside the aforementioned concerns regarding validity, the overall effect size was small (Cohen d: 0.22; 95 CI, 0.14 to 0.29) but significant and in support of mHealth interventions improving the knowledge, attitudes or management of diseases in youth up to 18 years of age. This effect is greater if the intervention involves caregivers, especially when it comes to those whose aim is to improve vaccine coverage in younger children.

This small effect is still clinically relevant, given the potential in the prevention of the studied health problems: obesity, sedentary lifestyle, diabetes, improvement in vaccine coverage, smoking, etc. Furthermore, mHealth facilitates the patients and families sharing responsibility. On the other hand, these are low-cost and low-risk interventions.[2,3]

Six of the studies analysed low-income populations, and four found significant positive outcomes. The impact of mHealth in poor countries with a dispersed population and a large mobile phone penetration is probably relevant[5].

Applicability to clinical practice: the widespread use of mobile technology by children, combined by the growing development of mHealth applications that address health problems with a high prevalence and a large disease burden, such as obesity, sedentary lifestyle, asthma, diabetes, low vaccination coverage etc, requires that we take these tools into account in clinical practice. Especially considering their generally low cost and their capacity to motivate and interact with the user. In countries with low resources, the potential interest is even greater. However, studies of greater quality are needed to confirm their effectiveness and the mediator variables.

Conflicts of interest: the authors of the commentary have no conflicts of interest to declare.

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