Use of Text Messaging Services to Promote Health Behaviors in Children

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ABSTRACT

Objective: To examine adherence to, satisfaction with, and preliminary efficacy of mobile phone short message service (SMS) to promote health behaviors in school-aged children.

Methods: A total of 49 children (aged 8–10 years) were randomized by school classes into a monitoring vs no-monitoring group. All children participated in 2 educational group sessions that focused on health behaviors: the advantages of increasing fruit and vegetable consumption and physical activity, and decreasing screen time. The monitoring group also reported daily behavior using SMS and received supportive feedback for 8 weeks.

Results: Children submitted 61% of the required SMS, which indicated good adherence to the intervention. A number of children (95%) reported being satisfied with the program. Analyses of covariance indicated increase in fruit and vegetable consumption (χ^2 [2] = 7.27; $P < .05$) and a decrease in screen time (χ^2 [2] = 6.79; $P < .05$).

Conclusions and Implications: The current SMS intervention was a useful tool to monitor and promote health behaviors in children.

Key Words: Health behavior, eating behavior, exercise, text messaging (*J Nutr Educ Behav*. 2015;47:75-80.)

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INTRODUCTION

The rise in childhood obesity has been drastic over the past decades and is one of the most serious public health challenges of the 21st century.[1] According to the International Association for the Study of Obesity, over 200 million school-aged children are overweight, which makes this generation the first predicted to have a shorter lifespan than their parents.[2] Childhood obesity is mainly associated with unhealthy diets and low physical activity. Health promotion and intervention programs for childhood obesity need to support and facilitate an increase in physical activity and healthier diets.

The use of new information and communication technologies has shown promising results in promoting health behaviors,[3] preventing childhood obesity,[4] and maintaining weight loss in overweight children.[5] For example, the short message service (SMS) has proven to be useful in promoting health behaviors in children.[6] In fact, SMS has been acceptable for providing support, effecting behavior change, and/or maintaining treatment gains in diabetes,[7] asthma,[8] smoking cessation,[9] depressive symptoms,[10] bulimia nervosa,[11] and childhood obesity.[12]

Children prefer novel devices, and technology-enhanced systems showed positive effects on participants' adherence rates.[6] Furthermore, SMS has several advantages such as accessibility at any time, fast and instant information, guidance and advice without major effort (after messages are created), and low costs.[13] The use of Internet and mobile phones has increased in the past 2 decades; according to Cardoso et al,[14] 84.2% of children aged 9–12 years in Portugal own a mobile phone and 88% use it to type messages.

Bauer et al[15] developed an Internet-based computer program used in previous research to provide support and promote behavior change via SMS. Methods from social cognitive theory and behavioral models were considered and used in developing the program. Self-monitoring and immediate feedback based on specific goals are important elements in behavioral theory. The idea that health behavior will change with specific goals when positive reinforcement is provided is based on social cognitive theory.[16]

Shapiro et al[6] used an adopted version of the program developed by Bauer et al[15] and showed that text messaging might be a useful tool for self-monitoring sugar-sweetened beverages, physical activity, and screen time. Children monitored target behaviors via SMS with feedback or via paper diaries, or participated in a no-monitoring condition. In the current study, the researchers

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adapted this program to promote health behaviors (eg, fruit and vegetable consumption, physical activity, screen time) in children. Compared with the study by Shapiro et al, children were randomized by classes into SMS monitoring vs no monitoring.[6] The intervention consisted of an interaction between participants and provider via SMS. Participants sent text messages at regular intervals and received supportive feedback messages based on their entries.

The current pilot study aimed to explore participants' adherence to and satisfaction with the SMS-based monitoring and feedback system. A secondary aim of the pilot study was to explore the preliminary efficacy of the program to promote health behaviors. To test this aim, researchers hypothesized that the intervention group would report increased fruit and vegetable consumption and physical activity and decreased screen time.

METHODS

Children from the fourth grade were recruited from an elementary school in Braga, Portugal. By tossing a coin, the children of 2 school classes were assigned to either a monitoring (intervention: n = 22) or control (n = 27) condition. Children (n = 49) between the ages of 8 and 10 years (mean, 9.6 years; SD, 0.4 years) were included in the study regardless of weight or ethnicity. The intervention with the SMS-based monitoring and feedback system took place over 8 weeks.

Instruments

Participants in both groups completed a self-report health behavior questionnaire at the beginning of the first educational group session (baseline), after 8 weeks of monitoring (postintervention), and at 4 weeks' follow-up in class. The researchers measured usual intake of fruits and vegetables using questions of a paper-based food frequency questionnaire based on the Health Behaviour in School-Aged Children Study.[17] Children were asked, "How many times a week do you usually eat/drink …" followed by a list of food and beverage items including *fruits* and *vegetables*. Options were *never*, *less than once a week*, *once a week*, *2–4 d/wk*, *5–6 d/wk*, *once every day*, and *several times every day*. The food frequency questionnaire showed good reliability and validity.[18] Daily physical activity and screen time were measured using 2 questions from the Family Eating and Activity Habits Questionnaire[19]: "How many hours per day on average did you participate in activities such as fast walking, swimming, ball games?"; "How many minutes did you spend in front of the screen (eg, television, computer, video games)?" The Family Eating and Activity Habits Questionnaire showed good reliability and validity.[19] These questions were used to explore preliminary efficacy. All questionnaires were translated from English into Portuguese and back-translated by the authors. Items were carefully checked by native speakers and changed or edited when necessary.

Height and weight were assessed (baseline) without shoes using a digital scale and a stadiometer. Body mass index (kg/m^2) for age was calculated for children according to the International Obesity Task Force using SD scores (z-scores) as recommended by Cole.[2,20]

Children in the intervention group received a pedometer (Silva Pedometer Plus, Silva AB, Bromma, Sweden, 2007) to monitor their steps per day accurately.

In addition, children from the intervention group completed a satisfaction questionnaire with 8 questions (eg, "How much fun did you have doing this program?"; response options were *No fun at all*, *No fun*, *Neither … nor*, *Fun*, and *Lots of fun*) after the intervention to explore children's overall satisfaction with specific components of the program (eg, appropriateness of feedback messages).

Procedure

Parents and children received information sheets with necessary details on the planned program (ie, use of mobile phones and pedometers for the intervention group), including informed consent. If parents agreed to their child's participation, they were invited to participate in 1 educational session for parents, were informed about the importance of health behaviors, and were given detailed information about the program. All children participated in 2 60-minute educational sessions presented in a group format and facilitated by 2 trained psychologists. The only material that differed between the intervention and control groups was presented in session 2, which included detailed information about and training with the SMS program. Session 1 focused on increasing physical activity, decreasing screen time, and the risks of sedentary behavior. Session 2 focused on a healthy diet in general and the importance of the consumption of fruits and vegetables specifically.

Children from the intervention group were asked to monitor their fruit and vegetable consumption, physical activity, and screen time daily. Regarding fruit and vegetable consumption, specific serving sizes were discussed and children were asked to report the exact amount of daily fruit and vegetable intake. Children were instructed to report data in a standard format via SMS. Specific questions to obtain this information included "How many fruits and vegetables did you eat today?" "How many steps did you achieve with the pedometer today?" and "How many minutes did you spend in front of the screen today?" To create normative values for the 3 behaviors, the authors used previous research to define 5 portions of fruits and vegetables, healthy amounts of physical activity at 10,000 steps/d, and < 60 min/d screen time. Recommendations for physical activity and sedentary behavior were based on Tudor-Locke et al[21,22] and Shapiro et al,[6] because national recommendations do not exist specifically for Portugal. Recommendations for fruit and vegetable consumption were based on the World Health Organization, which considers an "adequate quantity" as at least 400–500 g/d, which is equivalent to 5 servings of 80 g of fruits and/or vegetables.[23]

Children were asked to use their parent's mobile phones, because parents were to support and help the children throughout the program. Both children and parents became acquainted with the appropriate use of the pedometer and how to transfer the data to the daily SMS to submit the SMS together. All costs for mobile