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Tailored mobile phone text messages as an adjunct to obesity treatment for adolescents

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Summary

We examined the use of tailored messages sent to the mobile phones of obese adolescents enrolled in a weight management programme, as a means of increasing adherence. The feasibility study was conducted in three phases: (1) a library of 90 messages was developed about five weight-related behaviours; (2) a computer application was developed to tailor these messages to participants' characteristics; the SMS messages (text and images) were sent to mobile phones daily; (3) a three-month trial of the intervention was performed with 20 adolescents. Semi-structured interviews were conducted to assess the participants' perceptions of the intervention and the participants', providers' and computer consultants' reports about technology performance. These interviews revealed that participants were enthusiastic about the intervention and most found the messages to be personally relevant. The favourite messages were meal suggestions and recipe ideas. The computer tailoring application performed faultlessly and messages were delivered on schedule and in the desired sequence. Computerized tailored text messaging is a feasible adjunct to multidisciplinary obesity treatment and is acceptable to adolescents as an enjoyable means of improving their adherence to healthy lifestyle practices.

Introduction

The dramatic increase in the prevalence of childhood obesity since the 1970s has made it a significant public health concern.^{1–5} The American Academy of Pediatrics recommends multidisciplinary treatment when primary care efforts to treat obesity in adolescents have failed.⁶ However, multidisciplinary weight management programmes typically achieve only modest success and are hampered by poor treatment adherence, high attrition rates and low reach.^{7,8} It is probable that interim contact between office visits is required to stimulate patient engagement and reinforce the messages provided during the clinic sessions, thereby increasing adherence and decreasing attrition.

The use of tailored SMS (short message service) messages, tailored to participants' characteristics and sent regularly to their mobile phones, is a promising means of achieving interim contact. The use of individually tailored information has been shown to be an effective means of promoting health-related behaviour change in adults.^{9–12} Among adolescents with diabetes, text messages improved self-reported adherence to treatment plans in the short term.¹³ However, the use of tailored text messages as an adjunct to in-person multidisciplinary weight management among adolescents has not been fully explored.

The objective of the present study was to test the feasibility and acceptability of a computerized system to send tailored messages to the mobile phones of obese adolescents enrolled in the Michigan Pediatric Outpatient Weight Evaluation and Reduction (MPOWER) programme. We hypothesized that the ubiquitous use of mobile phones and text messaging among adolescents^{13–15} would make this an acceptable mode of interacting with adolescents outside the clinic setting.

Methods

Our feasibility and acceptability study was accomplished in three phases: (1) creation of a message and image library; (2) tailoring and computerized message delivery; (3) implementation of the intervention.

Creation of message and image library

A total of 90 tailored and targeted text messages were developed. These messages focused on five evidenced-based topics: breakfast consumption, increased consumption of fruits and vegetables, decreased consumption of sweetened beverages, decreased consumption of fast food and decreased 'screen time' (i.e. time spent watching television, using computers for non-educational purposes or playing sedentary video games). We utilized gain-frame messages (messages focusing on how patients could benefit from a certain action) rather than loss-frame messages (those focusing on the negative outcomes), as previous work has shown that gain-frame messages are more effective.¹⁶ Furthermore, since the message source (the source from whom the participant perceives the message originates) is associated with behaviour change in adults,¹⁷ we created messages that appeared to originate from the MPOWER team rather than from the Health System in general.

We incorporated strategies adopted from motivational interviewing,¹⁸ with many of the messages consisting of open-ended questions for the participants to ponder and create their own solutions rather than being given a suggested course of action. For example, an adolescent who had indicated that he eats fast food daily and that his father is supportive of his weight loss efforts might receive the following reflective message: 'Hi DJ, you said your parents want you to lose weight, and your dad will support you. How can he help? How can you work together to cut back on fast food?' rather than 'Hi DJ, you said your parents want you to lose weight, and your dad will support you. Maybe you could ask him to cook dinner for you instead of buying fast food'.

In addition to text messages, a library of images was created, containing 60 pictures in six categories: family life, food and beverages, sports, peers, fashion and outdoor settings. The pictures were from diverse populations and appealed to both males and females. As part of their initial questionnaire, study participants selected two images from each category that they wished to receive periodically with their text messages.

Tailoring and computerized message delivery

Messages were tailored to participants' self-report of the five target behaviours at baseline, along with other characteristics such as values, food preferences, motivations, sources of support and goals. Baseline data were obtained from an online questionnaire completed by all participants upon enrolment into the study. For example, a participant who reported skipping breakfast might receive the message: People who skip breakfast are more like to snack and overeat at lunch. Eating breakfast means your energy is steadier through the day and you'll eat better. Generally, one who reported eating breakfast daily might receive the message: You eat breakfast every day. That's really smart. It means you're less likely to overeat later, especially at lunch. Keep up this great habit!

A computer application was developed to automatically send text and images from the message library to participants' mobile phones each day during the 90-day study period. The messages were limited to 160 characters (including spaces) and were created as emails and then converted into SMS format via a text message gateway provided by the mobile service provider. The computer application was programmed to send the messages in a pre-determined order from day 1 to day 90 at 16:00 each day. The messages cycled through the five topics, changing topics every 18 days. In addition, messages containing images were sent weekly. Participants were also sent reminders about exercise classes three times each week on the days prior to the MPOWER exercise sessions.

Implementation of intervention

A three-month feasibility and acceptability trial of the intervention was conducted with 20 participants recruited from adolescents enrolled in the MPOWER programme. Information about the project and letters of invitation were provided at the conclusion of MPOWER group sessions on two occasions. After obtaining assent from adolescents and informed consent from their parents, participants completed the online enrolment questionnaire and were provided with a mobile phone if requested. Within 48 hours participants began receiving daily messages as described above. Participants received a \$20 gift card as an incentive for every month they were in the study.

Data collection and analysis

Participants completed brief surveys at monthly intervals and participated in a semi-structured interview at the end of the study to explore their perceptions of the intervention. The main outcomes of interest were technology performance and the participants' perceptions of message relevance, preference and helpfulness. Feedback regarding the feasibility of the intervention was also obtained from the MPOWER clinical team (including the social worker, registered dietitian, psychologist and exercise physiologist). In addition, the staff members who developed the intervention provided feedback on its feasibility and kept an electronic log of the messages as they were sent to the participants. The study was approved by the appropriate ethics committee.

Results

All adolescents who were informed about the research project wished to enrol in the study. One parent declined to consent, citing problems with her child using her phone responsibly. Over three-quarters of the adolescents who signed up for the study already owned a phone and wished to use their phone for the study.

The 20 participants had a mean age of 14 years (range 12–18); 85% were female, and 54% were Medicaid beneficiaries. Of the 20, 77% were Caucasian, 8% were African-American

and 15% were other races. All participants had a body mass index (BMI) greater than the 95th percentile for age and sex (their mean BMI was 38 kg/m²).

Feasibility

(1) Creation of message and image library. The creation of short messages containing pertinent weight-related information for adolescents proved to be feasible. Selecting images for the library was difficult due to a limited number of stock pictures incorporating people of diverse sizes. We chose many pictures without people; (2) Tailoring and computerized message delivery. There were no problems with the computer tailoring application. Messages were all delivered on schedule and in the desired sequence. Initially, messages containing images were not received by all phones. This problem was resolved by allowing 20 seconds between the transmission of each message; (3) Implementation of intervention. The providers in the MPOWER programme reported no negative effects on programme administration. There were no reports of increased numbers of phone calls or other contacts with the team members. The providers noted that participants spoke positively about being in the study.

Once the system had been developed and implemented, it required little programmer time to maintain it. All functions were automated. Once the online enrolment questionnaire was completed and submitted, it automatically triggered the messages to start within 48 hours and to end 90 days later. The programmers spent approximately 5 min each day, checking to ensure that messages were delivered appropriately.

Acceptability

(1) Participants' perceptions regarding message delivery and type. All participants reported receiving messages regularly. They thought that daily messages were sufficient and frequently noted that receiving the messages after school worked well. One participant suggested that messages about breakfast should be sent in the morning. In general, participants liked the messages and could recall the topics they addressed. A few participants thought that the intervention could be improved by having a greater variety of messages. The most popular messages were the recipe ideas/meal suggestions, followed by testimonials and messages including pictures; (2) Personal relevance. In general, most people found the messages relevant to them personally. Beyond the fact that the messages addressed weight-related issues and all the adolescents were engaged in weight loss efforts, some participants indicated that the messages contained information pertinent specifically to them; (3) Perceived helpfulness of messages. Participants reported that the messages helped them to remember to make healthy choices and kept them focused on weight management. One participant who desired a greater variety of messages noted that the messages served as a reminder.

Discussion

The treatment of obesity is challenging and weight management programmes struggle to help patients adhere to treatment plans. Finding cost-effective ways to enhance the treatment of obesity is important. The present study is one of the first to explore the feasibility and acceptability of using a computer application to send tailored text messages to the mobile phones of adolescents enrolled in a multidisciplinary weight management programme as a means of improving treatment adherence. The results suggest that adolescents enrolled in a weight management programme welcomed the weight-related text messages. Almost all parents supported the idea of their children receiving the text messages.

The adolescents generally believed that the messages were relevant to them, and many noted that the messages seemed to take into account their specific information. This effect of tailoring on personal relevance has previously been shown to increase the likelihood of behaviour change. The ability to provide individually tailored messages offers a means to increase relevance without significantly increasing provider time and ultimately cost.

Participants' preferences regarding message type, frequency and timing were fairly consistent between respondents. Recipes and testimonials were the most popular types of messages. Many adolescents noted that they liked to try the suggested recipes and they liked to know what worked for others. Picture messages were also popular. Some thought that the messages began to sound similar over time, thus highlighting the need to be creative in the development of messages in order to sustain patient interest. In general the adolescents appreciated receiving the messages in the late afternoon, so that they did not interrupt their classes. The study design did not allow them to receive messages more than once per day, but most felt that the frequency was adequate.

From the perspective of the multidisciplinary team, implementation of the messaging intervention caused little disruption to the performance of the MPOWER programme. Once developed, the technology worked very well. The system could easily be enhanced to allow for deeper tailoring and more interactive messages. We did not explore the effect of the text messages on adherence or change in BMI. However, many of the participants noted that receiving the messages helped them remember that they were attempting to adopt healthy lifestyle habits. This may be a step towards improved adherence and ultimately weight loss.

The present study was a small feasibility and acceptability study and participants received messages for 90 days. Whether the positive perceptions would be sustained over a longer period is unknown. Further studies are required to explore our findings in a larger population and to assess the effect of tailored text messages on attrition, adherence and changes in BMI.

Conclusion

Computerized tailored text messaging is a feasible adjunct to multidisciplinary obesity treatment. Adolescents perceived the intervention as an enjoyable means of improving their adherence to healthy lifestyle practices. Further work is required to evaluate the effect of the tailored text messages intervention on weight loss and the possibility of adapting the technology for use in the treatment of other chronic conditions.

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