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Improving Family Communication: Using Smartphones to Encourage Nicaraguan Adolescents to Think, Feel, and Take Positive Action

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Abstract

Introduction: TeenSmart International harnesses the power and flexibility of technology to empower youth to take personal responsibility for their health and lifestyle choices. Access to the Internet via mobile phones is often cheaper than paying to connect to a wired broadband service, and in rural areas, mobile networks may be the only means of accessing the Internet. This study assessed the feasibility, acceptability, and impact of "cues to action" or brief motivating cell phone text messages to improve adolescent family communication and relationships. **Method:** A quasi-experimental design using a voluntary sample of 100 Nicaraguan youth at high risk for poor family communication participated. Pre- and posttest quantitative measures using Student *t* statistical analysis, a focus group, and a participant testimony provided the evaluation evidence. **Results:** Findings suggest that there are economic and motivational barriers to the use of text messages, but when barriers are eliminated, the behavioral results are positive. Youth who received two weekly text messages over a 6-month period demonstrated statistically significant improvements in family communication perceptions, attitudes, and behaviors, strengthening their family communications and relationships. **Conclusion:** Brief and personalized text messaging "cues to action" may be a cost-effective intervention to improve adolescent healthy lifestyle behaviors.

Keywords

adolescent health, health promotion, health behavior, education, technology

It is clear whenever you look around: Cell phones and Smartphones are taking over the world. Adolescence provides a window of opportunity to influence the development of lifelong habits for healthy living, and smart phones may be an effective method to do so. This article presents findings from a small natural field study in Nicaragua that used text messaging via smart phones to encourage positive family (parents, guardians, and siblings) communication among adolescents.

The number of mobile phone users throughout the world has been steadily growing over the past 10 years. There are more cell phone subscriptions than population in Central America—54 million subscriptions for 45 million people—and mobile Internet usage has almost tripled in the past 2 years (Wikipedia, 2014). Studies show that people spend almost 90% of their time online on their cell phone using mobile apps as opposed to a general Web browser (Smart Insights, 2016). Text messaging has become the number one form of communication for teens throughout the world. Approximately 75% of 12- to 17-year-olds now own cell phones in the United States (Lenhart, Ling, Campbell, & Purcell, 2010). For people in developing countries, accessing the Internet via mobile phones is often cheaper than paying to connect to a wired broadband service, and in rural areas mobile networks may be the only means of accessing the Internet.

The use of text messaging to improve health knowledge, build skills, and motivate healthy lifestyle behaviors is growing both within the United States and throughout the world (Buhi, et. al, 2013; Cole-Lewis & Kershaw, 2010; Déglise, Suggs, & Odermatt, 2012a, 2012b; Fjeldsoe, Marshall, & Miller, 2009; Free, et. al, 2013). For example, text messaging is being used to improve adolescent sexual health (Dobkin et al., 2007; Gold et al., 2010; Hou, Hurwitz, Kavanagh, Fortin, & Goldberg, 2010), prevent and/or reduce smoking (Rodgers et al., 2005), and improve exercise and physical activity (Buchholz, Wilbur, Ingram, & Fogg, 2013). Text messaging is also being used for

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antiretroviral therapy (Finitsis, Pellowski, & Johnson, 2014) and treat long-term illnesses such as diabetes (Franklin, Waller, Pagliari, & Greene, 2006), asthma (Strandbygaard, Thomsen, & Backer, 2010), mental health (Furber et al., 2011), and alcohol abuse and depression (Agyapong, Milnes, McLoughlin, & Farren, 2013). It has been demonstrated that text message reminders can improve adherence to medication and attendance at clinical appointments (Geraghty, Glynn, Amin, & Kinsella, 2007). In Nicaragua, the second poorest country in the Americas, where over 45% of its population live in rural areas and where distance is reported as the strongest barrier to access to health care services (AMOS, 2015), the use of text messaging may be useful for improving access to health care information and health services.

Six common risk behaviors contribute to 75% of the costs of illness and death among adolescents in Latin America and the United States. These behaviors are: self-inflicted or accidental injuries (accidents, violence, suicide, bullying); tobacco, alcohol, and drug use; risky sexual behaviors that lead to sexually transmitted diseases and teen pregnancy; lack of physical exercise; and poor nutritional habits (Johnson, Hayes, Brown, Hoo, & Ethier, 2014; World Health Organization, 2014). The financial and social costs associated with these behaviors, not only during adolescence but also later in life as adults, are staggering for governments and society (Cawley & Ruhm, 2011).

Risky health behaviors are widespread and are the result of myriad personal, family, social, and community factors. For example, in neighboring Costa Rica, accidents are the number one cause of death in young people, alcohol intake is behind 50% of accidents and 30% of homicides, 16% of male and 13% of female youngsters 13 to 15 years old smoke, 54% of health expenditures have to do with smoking, more than 30% of pregnancies are from underage women, and obesity is a growing threat, with approximately 28% of women over 20 being overweight (Costa Rica Ministry of Health, 2014).

These risk behaviors—all theoretically preventable—are often clustered together and persist into adulthood. While widespread among the general adolescent population of Central America, economically disadvantaged youth are particularly hard-hit. In Nicaragua, over one quarter of the population are adolescents ages 10 to 19 years old, and of those 46% are from rural communities. In Nicaragua, where 70% of the population live in poverty, issues of poverty, low levels of education, and limited access to health information, health insurance, and health services aggravate these risk behaviors. Investments in programs to prevent high-risk behaviors in the early stages of an adolescent's development and promote personal leadership in later stages provide human and economic benefits far exceeding the costs.

TeenSmart International (www.teensmart.org), founded in 2004, is a not-for-profit located in Central America that harnesses the flexibility and power of technology to provide free public use online (www.jovensalud.net) health promotion information, education, coaching, and referral services targeted to youth 10 to 24 years of age. Its mission is to prevent and or reduce six risky behaviors and promote personal leadership. TeenSmart works hand in hand with public, private, and civil society organizations, such as schools, churches, libraries, and community-based organizations to reach as many youth as possible.

TeenSmart's online services for youth at www.jovensalud.net operate on the premise that youth have the power to choose their responses in risky situations and the capacity to develop healthy lifelong behavioral habits. These online services (see Table 1) empower young people to develop the knowledge, skills, and motivation to live healthier, more effective, and more satisfying lives. Over 38,000 youth have registered online; approximately 1,000 complete an online course annually, and on average 300 to 500 youth seek virtual coaching weekly. Currently, 20% of TeenSmart's users access JovenSalud.net via their mobile phones, 3% by tablet, and 77% by computer.

The health belief model (HBM) is one of the most widely used theories in health behavior research (Glanz, Rimer, & Lewis, 2002; Tarkang & Zotor, 2015; Taylor et al., 2007). It suggests that people's beliefs about a health problem, perceived benefits of action and barriers to action, and self-efficacy are key to predicting health-promoting behaviors. According to Glanz, Rimer, and Viswanath (2008), in this model for behavior change to succeed, people must feel threatened by their current behavioral patterns and believe that change of a specific kind will result in a valued outcome at an acceptable cost. They also must feel competent to overcome perceived barriers to take action. A stimulus or "cue to action" must also be present in order to trigger the health-promoting behavior. Cues to action are one component of the HBM that often is not identified clearly in research (Glanz et al., 2008). In this research, the cue to action are the text messages.

Consistent with the health belief model and building on the concept of self-efficacy, the Joven Salud/TeenSmart educational materials and methods combine cutting-edge scientific health promotion information with life skills training and practice. These materials and methods are developed through constant evidence-based evaluation and work with teenagers and young adults in community and school settings. An online evaluation system permits continuous monitoring of use and satisfaction and tracks teens' knowledge, attitudes, and health behaviors to ensure evidence-based improvement of best practices.

Many of the most influential protective mechanisms to prevent adolescent risk taking are within the family, including parental involvement, positive parenting, family support, and parent–adolescent communication (Prado, Pantin, & Szapocznik, 2007). Family is especially important among Hispanic youth as an integral component of the culture. In 2015, CLARO, one of the largest private sector telecommunication services in Central America, partnered with TeenSmart in Nicaragua to explore the feasibility, acceptability, and impact of using cell phone text messaging "cues to action" to empower behavior change in youth focusing on improving family communication and relationships.

Table 1. Online Services Available at www.jovensalud.net.

1. *How Healthy are You?* Brief interactive questionnaires (health, risk, and resilience profiles) that allow adolescents to identify specific risk and protective factors in their lives. Individual and aggregated results are available immediately. Aggregate reports allow institutions and communities to diagnose and monitor the impact of their programs and activities.
2. *Virtual Consultation:* Interactive professional consultation and referral email (cell phone service in development) service that allows adolescents an opportunity to ask health questions and receive answers confidentially and anonymously. The goal is to encourage youth to take personal leadership for their lives.
3. *Health Topics Encyclopedia*: Brief and factual health information (videos, texts, etc.) of interest to young people and other carefully selected adolescent health-related Internet links.
4. *Community Health Resource Directory:* Names, addresses, telephone numbers, e-mail addresses, and websites of organizations and institutions that deliver health services or support to young people.
5. *Information Bulletin, Chats and Forums*: Informative and interactive space for communicating events, promoting information and discussion on topics of special interest to adolescents.
6. *Inform Yourself/Help Yourself: Interactive E-Learning Courses:* The 14-module course "Smart Choices! Smart Life!" is the foundation of the interactive courses. It focuses directly on prevention of six risk behaviors and the development of personal leadership and life skills. Other courses emphasize specific areas such as violence prevention, sexually transmitted infections and teen pregnancy prevention, or alcohol and drug use, and all promote personal leadership and life skills.

Purpose

The broad aim of this article is to share the experience and findings of this natural field pilot intervention study that used "cues to action" or brief motivating text messages designed to improve family communication and relationships among a voluntary sample of adolescents at high risk for poor family communication. The specific objectives were to assess feasibility (use), acceptability (satisfaction), and the impact of text messages to improve parent, guardian, and sibling relationships and communication.

Method

The setting for this field study in Nicaragua was youth who voluntarily register and use the confidential online health promotion services of www.jovensalud.net. These free public use services are used by Spanish speaking youth throughout Central America but primarily in Nicaragua and Costa Rica and are strictly confidential for the participants. Individual findings are never shared, but aggregated data are used for continuous evaluation and service improvements.

A sample of 100 Nicaraguan youth was selected from the online database of more than 2,000 Nicaraguan youth who voluntarily registered for the online services of www.jovensalud.net in 2015. Online registered users of www.jovensalud.net meeting the selection criteria below were contacted by telephone, and each youth provided verbal consent to participate in this institutional review board approved study. The selection criteria for participation included (a) being 10 to 24 years old, (b) being registered online at www.jovensalud.net for health promotion services, (c) reporting having a Smartphone with a working CLARO cell phone number, (d) scoring at highest risk on an online routine admission survey for poor family relationships and communication, and (e) consenting via telephone to participate in an online pre- and posttest and receive two text messages weekly over a 6-month period.

The evaluation research design was a natural field quasi-experimental exploration among registered youth using the online www.jovensalud.net. services. There was no random sample selection procedure or comparison control group. Additional evaluation information via a focus group and an individual anecdote of one of the participants were used to further inform the acceptability and feasibility of the brief intervention.

The intervention consisted of two weekly text messages or "cues to action" consisting of 130 characters or less sent via cell phone over a 6-month period. The messages were intended to positively influence the youth's thoughts, feelings, and actions to improve family relationships and communication. For example, "Try to listen first to understand the point of view of your parent or sibling. This may be key to resolving a conflict effectively." Or "Ask yourself, what might you do differently today to achieve a more positive family or sibling response? You do not have to make big changes, but try making small changes." The private sector telecommunication company CLARO partnered with TeenSmart and was responsible for sending messages at no cost over the study period.

Three data collection methods were used to assess feasibility, acceptability, and impact: an online pre- and posttest questionnaire, a follow-up focus group, and a personal testimony or anecdote.

Feasibility was assessed comparing the number of youth enrolled initially with the number completing the study, in addition to follow-up calls to explore factors affecting incompletion and/or study desertion. These are important practical considerations when providing natural field interventions.

Acceptability was assessed using a focus group discussion and the testimony of one participant. Two health education professionals who did not have any access to the online data collection process and findings led the focus group. The focus group consisted of eight voluntary participants who completed the study and found it possible to travel to a central location to participate in the group discussion. Participants

Table 2. Indicators and Concepts: Differences in Family Communication Perceptions, Behaviors, and Attitudes.

Indicator	Concept
1. *Perceived Overall Quality of Relationship.* My family relationships are: *very good* (0), *good* (1), *poor* (2), *very poor* (3)	Perception of quality
2. *Confidence in:* I share my problems and doubts frequently with members of my family: *never* (3), *rarely* (2), *frequently* (1), *always* (0)	Confidence in Behavior
3. *Sharing Time Behavior.* I and members of my family make it a habit to do things together: *never* (3), *rarely* (2), *frequently* (1), *always* (0)	Affection Sharing Behavior
4. *Expressed Interest in Family*. I like to spend time with my family: *never* (3), *rarely* (2), *frequently* (1), *always* (0)	Feeling Affection Attitude
5. *Attitude of Interest*. I make an effort to spend time with my family: *never* (3), *rarely* (2), *frequently* (1), *always* (0)	Attitude Sharing Behavior
6. *Listening Behavior*. I make an effort to learn about and understand members of my family: *never* (3), *rarely* (2), *frequently* (1), *always* (0)	Affection Communication Behavior
7. *Interest in Family*. I ask the members of my family (father, mother, guardian, and siblings) how they are and how their day went: *never* (3), *rarely* (2), *frequently* (1), *always* (0)	Expression Communication Behavior
8. *Affective Expressive Behavior*. I express love and affection for my family and/or guardian: *never* (3), *rarely* (2), *frequently* (1), *always* (0)	Affection Expression Behavior
9. *Empathetic Listening Behavior*. When I have a conflict with someone in my family, I try to understand their point of view: *never* (3), *rarely* (2), *frequently* (1), *always* (0)	Listening Communication Attitude
10. *Trusting Communication*. I have confidence to openly express my opinions with my parents and/or guardian: *totally agree* (0), *agree somewhat* (1), *disagree somewhat* (2), *totally disagree* (3)	Trust Communication Attitude
11. *Resonance With Family*. I find it easy to find topics to talk about with my family: *totally agree* (0), *agree somewhat* (1), *disagree somewhat* (2), *totally disagree* (3)	Expression Attitude
12. *Attitude of Concern and Caring*. I am concerned for the well being of my family: *totally agree* (0), *agree somewhat* (1), *disagree somewhat* (2), *totally disagree* (3)	Empathy Affection Attitude
13. *Empathetic Concern and Caring*. I try to understand the feelings and motivations of the members of my family: *never* (3), *rarely* (2), *frequently* (1), *always* (0)	Empathy Communication Behavior

were queried on their opinions about the length, quality, and frequency of the text messages. The focus group's discussion was transcribed and qualitatively analyzed by a research assistant and a statistician for themes and recommendations. A testimony of one of the young people participating is cited below.

Impact or short-term effectiveness was assessed using an online questionnaire to gather pre- and posttest data. Based on research on family communications (Caleja, 2014; Pérez & Manjarrez, 2004; Rivera & Andrade, 2010), the questionnaire was developed by TeenSmart health professionals. It is a Likert-type scale comprising 13 indicators that assesses perceived quality of family communication; attitudes towards parents, guardians, and siblings; and behavioral skills that reflect effective communication and relationship building, such as listening to understand, sharing feelings and emotions, and doing acts of kindness. Table 2 provides the 13 test questions and concepts used to evaluate effectiveness.

Simple descriptive statistics (numbers, percentages) and Student *t* inferential statistic were used to describe and compare pre- and posttest results, respectively, using a confidence interval of $p < .05$. A statistician working with TeenSmart's evaluation department undertook the data analysis.

Results and Discussion

Feasibility (Use)

Of the initial sample of 100 Nicaraguan youth who met the selection criteria, only 42% completed the pre- and posttest measures. The fact that 58% of the youth did not complete the study suggests significant barriers to effective reception of the text messages, despite the fact that all reported having a working cell phone at the initiation of the study. Numerous reasons were given for not completing the study. Twenty participants (20%) reported economic inability to keep their cell phones active or pay for the Internet; 16% reported they were unable

to access the Internet to complete their posttests due to lack of or intermittent Internet connectivity; 19% simply stated they did not complete their posttests, primarily because their posttests coincided with school vacations and they did not take the initiative, and three dropped out early in the study due to lack of interest. These results suggest that although the use of cell phone technology is growing among youth, there still exist significant economic, technological, and human barriers to assure both delivery and evaluation of this type of intervention.

Acceptability (Satisfaction)

The results of the focus group discussion and a personal testimony suggest a high level of satisfaction and promise in using text "cues to action" to promote changes in thinking, feeling, and doing to reducing high-risk behaviors.

Among those who did participate fully, text messaging was an effective means of communication, as cell phone access is more readily available than computer access and is more convenient than receiving e-mails or other computer- or tablet-dependent online coaching and counseling methods. One participant stated,

> One reason I found these messages helpful was that they were short and practical. As a young person I do not like to read a lot . . . and I appreciated that the tips were brief and practical and that acting or thinking differently made a difference in my life.

Participants liked the fact that a cell phone provides a confidential and private way to communicate. According to Castellana, Sanchez-Carbonell, Graner, and Beranuy (2007), a cell phone can be a "protective wall between a parent and a child-as a parent cannot access their son's or daughter's personal content." Use of a cell phone with Internet connectivity can provide young persons the freedom and responsibility to choose the sources and content of information they desire. It also allows them to choose what to share and what to keep confidential. One participant stated,

> I liked participating in this pilot study because the information I received was relevant, and I could go back and read it over as many times as I wanted to and also I was able to share it with others.

Participants also expressed excitement that they not only could put cues into practice, whether simply changing the way they were thinking and feeling, but also were able to do things differently—at a family level as well as with their friends. They frequently shared their "cues to action" with friends as well as family. One participant stated, "The cues to action were great for me, but also I enjoyed sharing them with others. It made me feel as though I was not only helping myself but also helping others." Another stated,

> On some occasions I shared messages with friends, and they liked them and wished that they too could receive them. Thus I would forward messages to my friends to their cell phones. It made me feel good. I even wished at times my parents could receive these practical messages.

Participants reported that putting tips into practice improved their relationships and communication with their parents and siblings. They became more aware of family interactions and family dynamics, as well of their own behavior and how it can affect the family. They grew in their understanding of family values, culture and patterns of behavior, and how their family narratives had influenced their thinking and behavior. One participant stated,

> Getting these messages made me more aware of my family . . . more understanding of the good and the bad things we have lived through together, and how to be more positive and clear about my future family relationships.

Following is the translated testimony of an 18-year-old girl and how these text messages helped her manage conflict more effectively with her siblings.

> I liked the messages a lot. I got them in privacy on my phone that I always carry with me where I can readily read my messages as they arrive. I remember on one occasion when I was feeling very annoyed with my siblings, and I received a message that encouraged me to communicate with an open heart to understand another's point of view or experience. It made me reflect on what was happening in my life and I realized I was at fault by not caring and communicating effectively. So I made a decision to put into practice these tips not only with my parents and siblings, but also with others with whom I worked and played. . . . and slowly but surely, I began to see improvements in all my relationships, but especially with my siblings.

Impact

The impact or outcomes presented in this study can be seen in Table 3 where the data correspond to the 42 young people who completed the pre- and posttest questionnaire. Of these, 22 (52%) were boys and 20 (48%) girls. Seven (17%) of the young people were 10 to 13 years old, 25 (59%) were 14 to 17 years old, and 10 (24%) were 18 to 24 years old. The majority (40 of 42; 99%) were high school students and two were college students. Pre- and posttest data comparisons of 13 indicators of affection, attitude, and behavior related to family communication were assessed. Student t test was used to test statistically significant changes ($p < .05$).

As shown in Table 3, all 13 variables showed positive changes between the pre- and posttest measures, and 11 of the variables demonstrated statistically significant differences. For example, listening skills increased 22% as assessed by the indicator: "When I have a conflict with someone in my family, I try to understand their point of view." The desire to communicate effectively also statistically increased 21% as illustrated by the indicator "I try to understand the feelings and motivations of the members of my family."

Table 3. Pre- and Posttest Differences in Family Communication Perceptions, Behaviors, and Attitudes of the Participants ($n = 42$).

	Pretest average score[a]	Posttest average score[a]	Pre- and posttest differences	*t* Test PV
Perception				
Relation: My family relationships are good or very good.	72.25	85.73	13.48	4.18*
Behaviors				
Listening: When I have a conflict with someone in my family I try to understand their point of view.	62.71	84.93	22.22	5.15*
Interest and concern: I make an effort to better understand the needs of members of my family.	57.15	77.79	20.64	3.97*
Affection: I express love and affection to the members of my family.	65.09	84.14	19.05	4.17*
Sharing: I make an effort to spend time with my family.	61.12	80.17	19.05	3.97*
Empathy: I try to understand the feelings and motivations of the members of my family	66.68	84.93	18.25*	3.58*
Expression: I ask the members of my family (father, mother, guardian, and siblings) how they are and how their day went.	65.09	83.34	18.25*	3.41*
Affection: I and members of my family make it a habit to do things together.	64.30	77.00	12.70*	2.72*
Confidence: I share my problems and doubts frequently with members of my family.	61.92	69.85	7.93	1.42
Attitudes				
Confidence: I have confidence to openly express my opinions with my parents and/or guardian.	63.52	84.14	20.63*	5.71*
Empathy: I am concerned for the well-being of my family members.	73.03	88.90	15.86*	3.75*
Affection: I make an effort to spend time with my family	66.68	80.17	13.50*	2.96*
Expression: I find it easy to find topics to talk about with my parents and/or guardian.	42.04	46.03	3.99	.53

[a]Values calculated on a scale of a total of 100 for the questionnaire.
*$p < .05$.

Greater confidence to communicate effectively also increased by 21% as measured by the indicator "I have the confidence to openly express my opinions to my parents and /or guardian."

Fifty-eight percent of the youth who were originally enrolled in the study did not complete the posttest required to evaluate feasibility, acceptability, and impact. Of these, 36% reported lacking money to renew their cell phone contracts or pay for Internet and/or lacking Internet connectivity due to technological public service problems and 22% were unmotivated. Although access to and use of cell phones are on the rise, there are still significant economic and technology barriers to access and use for many. One important barrier is the purchasing power of young people and the way in which telecommunications companies limit or promote such access. Economic status affects one's consistent access to not only a cell phone but also the Internet and ownership of computers and tablets. Without this hardware the use of text messages cannot be consistently available to youth.

Nineteen percent of the participants reported not making an effort to complete their posttests as they were on semester vacation, while another 3% simply dropped out for lack of interest. Thus, the importance of motivation and engaging relevant messages must be a key ingredient to successfully communicating with youth via Smartphones. This type of intervention may not be of interest to some.

Despite these two significant barriers, there were high levels of satisfaction among the 42% of young people who completed the pilot study. It was encouraging to note that those participants who did complete the study reported high levels of satisfaction and significant behavioral improvements in their family relationships and communication.

In short, differences in behaviors and attitudes evaluated pre- and posttest among those who participated demonstrated that the use of cell phones was effective in improving listening skills and respect, affection, and empathy for family members. Cell phone text messages served as a tool for motivating self-care and self-empowerment. This type of brief intervention may be a cost-effective means to promoting positive family communication among youth at high risk for poor family communications. The importance of presenting short and attractive messaging with relevant information for the specific population was reaffirmed. Text messages supported the desire of young people for autonomy, privacy, and confidentiality. Text messages provided an opportunity for information sharing and simple online coaching. Messages were also shared with family and friends.

This study also provides an example of a public and private alliance to promote healthy lifestyle behaviors. Corporations, not-for-profits, and governmental organizations can work together to motivate and improve outreach to youth via new technologies to promote the health and well-being of youth.

Study Limitations

The conclusions from this natural field evaluation are limited due to the lack of randomization in the selection of the participants and the lack of a control group. One can neither generalize these findings to Nicaraguan adolescents nor conclude that the results of this study are solely due to the text messages. Further research with randomized experimental designs is necessary to generalize the results.

Conclusions

A voluntary sample of youth at highest risk for poor family communication who received two weekly text messages over a period of 6 months demonstrated statistically significant pre and posttest improvements in family communication perceptions, attitudes, and behaviors, strengthening their family communications and relationships. Nonetheless while there are significant economic and human barriers to effectively using it, cell phone technology may provide a cost-effective vehicle for the delivery of brief text messaging interventions to motivate self-care and positive decision making. A next step will be to use a stronger case control research design to test the effectiveness of text messages to prevent and/ or reduce other risky health behaviors such as accidents, violence, suicide, bullying, and tobacco, alcohol, and drug use; prevent and/ or reduce high-risk sexual behaviors leading to teen pregnancy and sexually transmitted infections; as well as promote physical exercise and healthy nutritional habits. Targeting highest at risk groups with personalized and engaging messages may be key to success. Working collaboratively in private and public alliances can make these types of interventions more cost-effective and readily accessible to Central American youth.

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