Use of text messaging and Facebook groups to support the Healthy Children, Strong Families 2 healthy lifestyle intervention for American Indian families

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List of abbreviations: AI, American Indian; HCSF, Healthy Children, Strong Families; HCSF2, Healthy Children, Strong Families 2; SMS, short message service

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Abstract

Background: Few obesity interventions have been developed for American Indian (AI) families despite the disproportionate risk for obesity experienced within AI communities. The emergence of mobile technologies to enhance intervention delivery may particularly benefit AI communities, many of which are hard-to-reach and underserved.

Objective: This study aimed to assess the use and perceptions of text messaging and Facebook to support delivery of the Healthy Children, Strong Families 2 (HCSF2) mailed healthy lifestyle/obesity prevention intervention and discuss lessons learned regarding intervention support via these platforms among AI participants.

Methods: From among AI families with young children (2-5 years old), 450 adult/child dyads were recruited from five rural and urban communities for a year-long intervention. Intervention content was delivered by mail and supported by text messaging and optional Facebook groups. Participants provided feedback on text message and Facebook components post-intervention, and Facebook analytic data were tracked.

Results: Self-report feedback indicated high satisfaction with both text messaging and Facebook, with tangible content (e.g., recipes, physical activity ideas) cited as most useful. Overall, participants reported
higher satisfaction with and perceived efficacy of Facebook content compared to text messaging. Analytic data indicate the optional HCSF2 Facebook groups were joined by 67.8% of adult participants. Among those who joined, 78.4% viewed, 50.8% “liked”, and 22.6% commented on one or more post. Engagement levels differed by urban-rural status, with more urban participants “liking” (p=0.01) and commenting on posts (p=0.01). Of note, nearly 1/3 of participants reported changing phone numbers during the intervention.

Conclusions: This paper demonstrates high satisfaction regarding mobile delivery of HCSF2 intervention support components. Best practices and challenges in utilizing different mobile technologies to promote wellness among AI families are discussed, with particular focus on urban-rural differences. Future mobile-based interventions should consider the context of unstable technology maintenance, especially in low-resource communities. Clinicaltrials.gov ID: NCT01776255

Keywords: American Indian, Facebook, text messaging, health promotion, obesity prevention, communication, social media, family-based intervention

Teaser Text
We examined quantitative and qualitative data to understand use of text messaging and Facebook to support delivery of a mailed healthy lifestyle intervention for American Indian families with young children.

Introduction
American Indian (AI) families experience a disproportionately high prevalence of obesity compared to the general United States (US) population (1). Although estimates vary, recent studies suggest nearly 30% of AI children and 37% of adults have obesity (2, 3). By age 2-5 years, AI children already have a 50% higher overweight and obesity prevalence than US children of the same age (2, 4). Such high overweight and obesity rates may be attributed to an array of complex reasons, including...
poverty, stress, historic trauma, and limited access to healthy foods and physical activity opportunities. However, few obesity interventions have been developed to target AI families (5), and many AI communities remain underserved. The emergence of mobile technologies, such as phones, tablets, and laptops, offers new and promising opportunities to enhance the delivery of health information and health promotion programs, especially in hard-to-reach and underserved communities. Given the limited services and high burden of disease faced by many AI communities, delivery of programming via mobile technologies could be of particular benefit.

Text messaging is the most frequently used method for communicating among Americans under 50 years of age (6), and public health interventionists are increasingly adapting this form of communication as a strategy to improve health outcomes. A recent systematic review found most published text messaging interventions were effective when addressing health outcomes such as diabetes management, weight loss, physical activity, smoking cessation, and medication adherence (7). While text messaging may be an effective health promotion communication tool among the general population, less is known regarding the use of text messaging interventions in AI communities. One recent pilot study found text messaging to be a feasible option for communicating nutrition, physical activity, sleep, and screen time information to AI parents of children age 3-5 years (8). However, the study duration was short (5 weeks) and the sample size was small (n=17), limiting the generalizability of results.

Social media is another popular form of communication, with 72% of Americans reporting current use of at least one social media platform and 69% using Facebook, specifically (9). However, a review of previously published systematic reviews on interactive social media interventions to promote health equity found mixed effects on health outcomes (10). The reviewers concluded more research is needed on the effects of utilizing established social media platforms (i.e., Facebook) on health outcomes among disadvantaged populations (10). Another recent systematic review of mobile health promotion among underserved and minority groups described a small number of studies in which mobile platforms were used successfully to deliver health messaging or recruit participants for health promotion studies.
However, these studies were predominately in urban settings, and AI populations were not represented in any of the included studies (11).

Use of mobile platforms like texting and social media to successfully promote health outcomes may be affected by the surrounding environment, particularly when considering differences in rural and urban environments (12, 13). Rural environments are often under-resourced with limited healthcare facilities. Rural residents experience poorer health outcomes compared to urban residents, and therefore may be especially in need of mobile health interventions (14, 15). At the same time, limited cell reception and slow internet speeds in rural areas may limit the feasibility and acceptance of these technology platforms.

Healthy Children, Strong Families 2 (HCSF2) was a research-based healthy lifestyle/obesity prevention intervention for AI families with preschool age children, nationally tested in five urban and rural communities (16). The mailed intervention expanded upon the initial Healthy Children Strong Families (HCSF) study design (17), which targeted fruit/vegetable intake, sugar intake, physical activity, and screen time, to include additional study targets of stress and sleep and to enhance delivery of the mailed intervention materials via text messaging and Facebook groups. The overall objective of the HCSF2 intervention was to improve weight status and obesity-related health behaviors of adult and child participants. The objective of this current study was to assess the use and perceptions of text messaging and Facebook groups to enhance delivery of the HCSF2 mailed intervention, compare differences in the perceptions and use of these platforms between urban and rural participants, and to discuss lessons learned regarding intervention support via these platforms among AI participants. The comparison of urban and rural participants was of particular interest as we previously demonstrated sociodemographic and behavioral differences among these groups within the HCSF2 study population (18, 19).
**Methods**

**Participants**

The methods and intervention results for the HCSF2 randomized controlled trial have been previously described (16, 17, 20). Briefly, 450 adult/child dyads were recruited from among AI families with young children (2-5 years old) living in five rural and urban communities. The study communities ranged in population density from 3.5-32 people per square mile for the four rural sites (n=240 dyads) and approximately 3,000 people per square mile for the urban site (n=210 dyads), corresponding to total populations of approximately 8,000-19,000 for the rural sites and 560,000 for the urban site. Participants were randomized to either the intervention group (Wellness Journey) or a child-safety focused control group (Safety Journey) after stratifying on child weight status. Inclusion criteria included a working cell phone; of the 502 interested families who were screened for the study, only four were excluded for not having a cell phone or text plan (<1.0%). Data suggest ~80% of the broader AI/AN community had regular access to cell phones around the time of study initiation (21).

**Intervention Delivery**

For one year, participants in the intervention group received monthly mailed packages containing printed parent-focused wellness lessons, activities, and support materials (e.g., measuring cups, jump ropes, exercise DVD, apple corer, recipe book), and children’s materials, including toys, games, and a book addressing one of the six intervention targets: increase fruit/vegetable consumption, decrease added sugar intake, increase physical activity, decrease screen time, manage stress, and improve sleep habits. The mailed materials were intended for use among the entire family.
Text messaging and Facebook group support

As a supplement to the mailed intervention delivery, a social support component of the intervention was delivered through text messages and optional Facebook groups intended for the adult participants. Text messages were sent twice weekly throughout the intervention and addressed the intervention targets. Text message content was timed to align with each monthly lesson. Participants enrolled in the study on a rolling basis and started with Lesson 1 and the corresponding Lesson 1 text messages. Of the 12 monthly lessons, five focused on diet, two on physical activity, one on screen time, one on stress, one on sleep, and two were mixed focus. Text messages were limited in length to 170 characters, including identification of the text as coming from the HCSF2 intervention. Text message content was developed in collaboration with community partners, and the timed delivery was managed by the mobile research and communications technology company TargetMobi (Houston, TX).

Adult participants also were invited to join private/closed, site-specific Facebook groups. Prior focus groups conducted by our group cited fighting and bullying through Facebook as common practices in the study communities, which are primarily small, rural, reservation-based communities (20). Given our awareness of this issue, the Facebook component of the intervention was optional, and the HCSF2 pages were monitored by the central study coordinator and local site coordinators to mitigate any potential misuse. Only those invited to join the private groups were able to view the posts. In addition to protecting participant privacy, we did not allow sharing of content as a measure to prevent cross-contamination of the control group within each community. During the initial in-person study/data collection visit, participants were asked if they were interested in joining the Facebook group. If so, they were added to the group at that time by the local site coordinator so that both the participant and coordinator could verify the request to join was successful. Site coordinators also were continually available to provide assistance, if needed.

The central coordinator posted intervention-supporting information to the Facebook groups that applied broadly to all participating communities (e.g., healthy recipes, sleep tips), while local site
coordinators posted community-specific information (e.g., announcements of local wellness events, community gatherings, local resources). The content posted to each site's Facebook group was almost entirely identical, with local posts constituting ~5% of all content posted. One exception was recipes using traditional ingredients that were specific to that tribe or location; these recipes were submitted by the local site coordinators at the beginning of the intervention and slotted into the delivery schedule.

Facebook posts were made every Monday, Wednesday, and Friday throughout the intervention. Facebook posts addressed the same intervention targets but were delivered in a more random fashion, as people joined the Facebook groups on a rolling basis. While the length of posts varied, the majority were short (50-100 words) and contained a picture. Among the postings to the five site group pages throughout the intervention, the postings were categorized as follows: 45.3% were diet/recipes, 16.2% were physical activity related, 15.8% were miscellaneous, 9.5% addressed stress, 6.0% addressed sleep, 3.1% were TV/screen time related, 2.9% focused on goal-setting, and 1.2% were poll questions. Sample text messages and Facebook posts are listed in Table 1. The content of text messages and Facebook posts was reviewed by local site coordinators to ensure cultural sensitivity and appropriateness.

All protocols were approved by the University of Wisconsin Institutional Review Board and applicable tribal review boards; conduct of the study followed the approved protocols. All participants provided written consent for themselves and the participating child. Moreover, all aspects of the study were overseen by a formal Data Safety Monitoring Committee.

Data Collection

Two types of data were collected: 1) a post-intervention exit survey on experiences with both text messaging and Facebook group during HCSF2 and 2) analytic data on all Facebook activity. For the exit survey, participants were invited to provide feedback at the end of the year-long intervention. The exit survey contained 25 Likert scale and open response questions soliciting participants’ feedback on the overall HCSF2 program, including 12 questions on participants’ experiences with the text messaging and HCSF2 Facebook group. These 12 questions addressed overall satisfaction with the text messages and
Facebook posts, thoughts on the frequency and helpfulness of the texts and posts, and self-reported level of engagement with each. For the analytic data, all Facebook group activity was tracked throughout the intervention to record dates and content of each post along with corresponding views, “likes”, and comments.

**Statistical analysis**

Descriptive statistics were prepared as numbers and percentages for the following categorical outcome variables: (1) variables from self-reported data, including satisfaction with text messages, helpfulness of text messages, frequency of text messages, most helpful text message content, change of cell phone number, viewed Facebook posts, reasons for not viewing Facebook posts, Facebook group engagement, devices used to view Facebook, satisfaction with Facebook posts, helpfulness of Facebook posts, frequency of Facebook posts, most useful Facebook post content; (2) variables from Facebook analytic data, including viewed posts, liked posts, commented on posts, and posted content.

Dichotomous “dummy” variables (coded as 1, 0, or missing) were created for each categorical response level. Differences between urban and rural subgroups were examined for each discreet outcome using Pearson’s chi-squared test statistic, with Fisher’s Exact test for cell counts <5. Missing values were not included in the analysis.

Descriptive statistics were prepared as means and standard deviations for the following count variables: number of Facebook posts viewed, number of likes, number of comments, and number of Facebook posts initiated. All count variables were derived from analytic tracking data. Negative binomial regression with Wald Chi-square test statistic was used to asses urban-rural differences in the mean rates of count outcomes. All analyses were conducted using SAS 9.4 (SAS Institute Inc., Cary, NC, United States of America) with a two-tailed significance level of 0.05.
Results

Post-Intervention Exit Survey

Among the 450 adult HCSF2 participants, 369 completed the exit survey after the year-long intervention regarding participant experience with both text messaging and Facebook groups. Among these respondents, 329 (89.2%) were mothers, 11 (3.0%) were fathers, 22 (6.0%) were grandmothers, 2 (0.5%) were grandfathers, 3 (0.8%) were guardians, and 2 (0.5%) were listed as other caretakers. Adult participant ages ranged from 18-65 years, with a mean age of 31.5±8.3 years.

Texting (Table 2)

Overall, the majority of respondents were either satisfied or very satisfied with the text messages they received. Most found them helpful or very helpful in making healthier lifestyle choices. The vast majority thought the frequency of texts was just right, and the most helpful types of messages were cited as those including tips/health information (66.7%) and recipe or activity ideas (58.3%). Text messaging feedback differed by rural/urban status. Respondents living in urban locations were more likely to be very satisfied with the text messages compared to respondents located in rural areas, although this difference was not significant. Urban respondents also were more likely to find the text messages very helpful than rural respondents (p<0.01).

Notably, a substantial portion of respondents (31.7%) reported changing their cellular phone number during the study period, and urban participants were less likely to have their number change during the study period compared to rural respondents (p=0.02). The research team was made aware of these changes typically via informal conversations between participants and local site coordinators, who often were known to participants. The study team also received periodic reports from TargetMobi regarding undeliverable messages or were promoted to inquire about phone number changes when attempts to reach participants by phone for study visit reminders were unsuccessful.
Facebook (Table 3)

Overall, 64.2% of respondents self-reported viewing a post, 54.7% “liking” a post, 25.2% commenting on post, and 8.7% posting a question to the group, which aligns with the analytic data on actual use. The most common reasons reported for not viewing HCSF2 group posts were not having a Facebook account (33.3%) and not receiving Facebook notifications when content was posted to the group (22.7%), which would depend on the Facebook settings chosen by each participant. Mobile phone was the most commonly cited device used to view Facebook posts, with 40.7% of respondents viewing Facebook exclusively by phone and 18.4% using a combination of phone and computer/tablet to view Facebook posts. The majority of respondents were satisfied or very satisfied with Facebook posts. Most found Facebook posts at least somewhat helpful in making healthier lifestyle choices. Most found the frequency of posting to be just right, with the most useful types of Facebook posts cited as those including recipes/meal ideas (60.7%) and game/physical activity ideas (49.6%). A higher percentage of urban respondents than rural respondents accessed the Facebook group exclusively by phone (p<0.01). Urban residents were slightly more likely to be very satisfied than rural residents with the Facebook posts (p=0.08) and were twice as likely to find them very helpful than rural residents (p=0.03).

Facebook Analytics

Facebook analytics from tracking data are shown in Table 4. The HCSF2 site-specific Facebook groups were joined by 67.8% of all adult HCSF2 participants (305/450). Among those who joined the groups, 78.4% viewed one or more post, with a mean of 91.5±75.8 posts viewed throughout the intervention year out of approximately 150 posts/year. Approximately half “liked” one or more posts. Comments were posted by 22.6% of participants, and original messages were posted to the group by 6.2% of participants. The Facebook groups were joined in similar proportions by urban and rural participants, and similar proportions of urban and rural participants viewed at least one post. Engagement levels differed by urban-rural status, with urban participants more likely to like a post (p=0.01), to post comments (p=0.01) and to post a higher average number of comments than rural participants (p<0.01). Facebook engagement also
differed by topic, with diet-related topics receiving the highest number of views and likes per post (34.5±27.4 views/post, 2.4±2.6 likes/post), followed by physical activity (19.1±16.3 views/post, 1.2±1.6 likes/post), poll questions (17.3±9.5, 0.9±1.7), stress (16.3±13.0, 1.3±1.6), miscellaneous posts (14.7±15.1, 1.0±1.7), sleep (14.1±10.8, 1.0±1.3), screen time (12.6±10.4, 0.6±1.1), and goal-related posts (11.8±9.7, 0.8±1.3); these data align with self-report feedback suggesting diet- and activity-related posts were most useful to participants.

**Discussion**

This paper highlights key findings regarding the use and experiences of providing obesity prevention intervention support to AI families through text messaging and Facebook groups. Specifically, this study describes how these platforms were used as part of a comprehensive home-based obesity prevention program in both rural and urban AI communities. While evidence suggests the use of telehealth has increased access to healthcare among AI populations (22, 23), less is known about the use of mobile technologies in health promotion programs among AI communities. This paper adds to the scant literature regarding use of mobile platforms to deliver or support delivery of health promotion interventions for AI communities.

Text messages and Facebook posts were well-received by AI families participating in the HCSF2 study. Despite the overall high levels of satisfaction and perceived helpfulness of these intervention components, participants needed to have an active phone number and stable internet connection to receive them. Nearly a third of participants reported changing phone numbers during the study period, suggesting inconsistent cellular plan coverage and other communication barriers. This high turnover in cell phone numbers has been reported in other minority groups, with just 38% of male Latino farmworkers maintaining the same phone number in 2012 (the same year HCSF2 was initiated) as they had the prior year (24). A 2017 study found the vast majority of Americans who are homeless to own cell phones; however 55% changed numbers within a three-month period (25). Gonzales et al. explain this phenomena...
of cell phone instability through the lens of technology maintenance, arguing pre-used or lower quality
devices and no-contract plans reduce initial cost barriers to mobile technology access yet contribute to
instability in cell phone communication due to device malfunction and frequent number changes (26). As
mobile and electronic healthcare services proliferate, ability to maintain access to technology becomes an
increasingly critical factor in determining health outcomes. Rural families in our study experienced higher
turnover in cell phone numbers and perceived text messaging to be less satisfactory and helpful than
urban families. Thus, texting may be a more reliable and, therefore, more positively perceived form of
communication among urban but not rural residents. Still, a quarter of urban participants changed their
phone number during the study period, indicating a need for more stable communication pathways,
regardless of urban/rural status.

Facebook may represent a more stable pathway, as people are likely to maintain the same account
regardless of the device used to access the account (e.g., cell phone, community computer, personal
tablet). Overall, participants reported higher satisfaction with and perceived efficacy of the Facebook
content compared to the text messaging component. Engagement with Facebook content also differed by
urban/rural status, with urban participants more likely to view, “like”, comment, and leave questions on
posts. Because Facebook access is potentially more stable than text messaging, other factors may have
contributed to the urban/rural differences observed here. For example, participants living in rural
locations may have been less engaged due to the lack of anonymity as many community members are
known to each other. Although the closed Facebook site was monitored by both the central and local site
coordinators, the risk of being bullied off-line or outside the HCSF2 Facebook page remained.
Participants living in urban areas were recruited from a large urban health center serving AI patients and
were significantly less likely to know each other. Higher urban engagement also could have been
attributed to higher internet and social media access among urban compared to rural participants. Many
rural areas still lack access to high speed internet and may be slower to adapt to certain technology
advancements (27).
Participants found tangible content, such as recipe/meal or physical activity ideas to be most useful, regardless of messaging platform or urban/rural status. Poll questions were less well-received. This finding is in contrast to Edney et al., who described that Facebook posts with simple poll questions generated the highest engagement in a physical activity intervention (28). Lack of anonymity (e.g., the high proportion of participants who knew each other in any given community) may partially explain why Facebook posts containing polls/surveys were less well-received in our study. In addition, the ability to connect with other parents was rarely cited as a most useful aspect of the Facebook group. Social media is, by definition, a platform created to facilitate and enhance interpersonal connections. As such, this finding was unexpected, but may be attributed to the personally identifiable nature of Facebook and tendency for bullying among AI communities, as described above. These differences in the perceived efficacy of Facebook compared to text messaging may assist other groups in decision-making regarding how best to allocate resources for program delivery efforts in similar communities (e.g., the choice between a text messaging or social media campaign or both).

Participants in this study were required to have a mobile phone capable of receiving text messages prior to enrolling in the study. However, access to these messages was disrupted due to the high turnover in phone numbers, especially among rural families. Study coordinators adapted to this limitation by utilizing Facebook Messenger as a backup form of communication when arranging visits and other study logistics with participants. This was found to be a more reliable communication pathway, as most study participants retained their Facebook user name throughout various phone number changes (16). A study of Facebook use for a healthy lifestyle program among first-time parents also reported the utility of Facebook for administrative purposes (e.g., study reminders) and reported similar levels of engagement and perceived usefulness of Facebook for program delivery (28).

Future studies might consider using other mobile platforms, such as a dynamic study webpage where participants can choose what name is displayed or messaging platforms beyond short message service (SMS) texts, such as WhatsApp or Facebook Messenger, which are not linked to a particular phone number or cellular service plan. It is worth noting newer applications, such as WhatsApp, were not
available during HCSF2 study administration, which highlights the rapidly changing landscape of social
media and messaging technology and trends.

**Strengths and Limitations.** A previous survey of 115 AI patients with diabetes demonstrated
patients were very receptive to receiving health education via mobile platforms, regardless of
sociodemographic factors (e.g., age, education, sex) (22). Another small study reported on the feasibility
of and high engagement with a five-week text messaging campaign to support healthy behavior change
for AI parents with young children (8). The present study adds to this literature with the longest, largest
trial describing text messaging and Facebook support of a healthy lifestyle intervention for AI families,
which was delivered over the course of one year to 450 families. We also describe differences between
urban and rural families, which is noteworthy as the vast majority of AI research focuses on rural,
reservation-based communities. This study was limited by collecting feedback on these components at the
end of the trial only, which did not allow for text messaging and Facebook content to be tailored mid-
intervention. In addition, there may have been response bias, as the site coordinators were often known to
participants. However, the analytic data collected via Facebook provided an objective measure of
Facebook engagement in addition to the self-report participant feedback survey.

**Conclusions.** This paper demonstrates the experiences regarding support of a mailed healthy
lifestyle/obesity prevention intervention using text messaging and Facebook groups to promote wellness
in urban and rural AI families. The emergence of mobile- and internet-based health promotion platforms
offers new and innovative ways to address health disparities. At the same time, socioeconomic-based
differences in disruption-free access to mobile technology could inadvertently perpetuate existing health
disparities, and both initial acquisition and long-term maintenance of technology should be considered
when planning mobile health delivery of health promotion. Future research also should address the most
appropriate and effective methods of communication among small communities where many people are
known to each other. Given the high use of text messaging and Facebook, these platforms could serve as
important avenues of health delivery among AI communities.
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Author’s Contributions

A.K.A., R.J.P., and K.A.C. designed the research; A.K.A., K.A.C., and E.J.T. conducted the research; R.J.P. and E.J.W analyzed the data; E.J.T., E.J.W., and A.K.A wrote the paper; E.J.T. and A.K.A. had primary responsibility for the final content. All authors have read and approved the final manuscript.
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Table 1. Sample text messages and Facebook posts delivered in support of the HCSF2 intervention

| Sample Text Messages                                                                 |
|-------------------------------------------------------------------------------------|
| Tasty Tip! When you make quick breads or muffins – freeze the extra loaf or extra    |
| muffins. When you’re having a crazy week – just pull them out and breakfast or      |
| snacks are D-O-N-E.                                                                   |
| Snack Attack! Peel a banana and dip in yogurt. Roll in crushed cereal and freeze.    |
| Make these the night before and they’ll be perfect for after school snacking! Don’t  |
| forget to check Facebook for new snack recipes.                                      |
| Walk tall as the trees. Live strong as the mountains. Be gentle as the spring winds. |
| Keep the warmth of the summer sun in your heart, and the great spirit will always    |
| be with you.                                                                         |
| Piles of fun! Leaves are falling. Have your kids rake them into big piles, then      |
| jump into them. Mom and Dad can get into the fun too!                                |
| Turn house cleaning into a race – assign each kid one chore and see who can finish   |
| first.                                                                             |
| Grab the kids and turn up the volume on the radio. Jump up and down, touch your      |
| toes, boogie till the cows come home!                                               |
| Active kids are happy kids! Being active gives kids a chance to socialize, will      |
| help them feel good, and kids who are physically active every day will sleep better |
| too!                                                                               |

| Sample Facebook Posts (text only here, photos were often included)                  |
|-------------------------------------------------------------------------------------|
| Does it take you forever to fall asleep because you’re rehashing a bad day or      |
| worrying about all the things on your to do list for tomorrow? Try doing a        |
| challenging mental task that completely forces you to concentrate, like counting  |
| backward by threes from 535. If you try this, let us know how it goes (after you   |
| wake up, that is!)                                                                 |
| Did you know that if you give your kids caffeinated drinks, especially in the      |
| evening, that this can reduce the quality of their sleep and then they can be      |
| drowsy during the day? Caffeine can be found in soda, bottled and brewed teas, even |
| some drinks you make from powder, like some types of Crystal Light. Best bets?     |
| Milk or water.                                                                     |
| Can't beat this snack recipe - cheap, easy and healthy! If you've never tried      |
| chickpeas this will get you hooked! Chickpeas are also used to make hummus and    |
| are great in soups and on salads. Crunchy Taco Chickpeas (recipe was included)     |
| Are you going to be on the go this summer? Here's an idea for your next road trip. |
| Reuse an old plastic peanut butter jar and fill partway with low fat peanut        |
| butter, lite ranch dip, or another favorite dip, then stick in carrots and         |
| celery sticks. Or try ½ cup low fat plain yogurt or ¼ cup peanut butter and a      |
| tablespoon of honey with some apple slices. Make sure you've got room in the       |
| cooler and you’re good to go.          Happy trails!                          |
| Instead of doing nothing because I am overwhelmed, today I will do something even |
| if it is small because it will be one step closer to my goal. Progress is progress |
| Let us know how you’re doing with your family goal this month! We love to hear from |
| you.                                                                             |
| Since this is a leap year, we get an extra day in February. Celebrate by playing   |
| "Leap the Creek"! Lay two sticks or pieces of rope parallel to each other to form   |
| a gap for your child to jump over. Have your kids “leap the creek.” Keep making    |
| the creek wider, a little at a time, to see how far your child can jump before     |
| “falling in.” Mom and Dad can get in on the fun too!                                |
| Interested in yet another FREE event? Come participate in the Just Move It Series  |
| at [Community A]! Registration begins at 5:30 PM and the walk/run starts at 6 PM.   |
| You can choose to walk or run and your distance of 1.5 miles or 3 miles. Team      |
| Healthy Children Strong Families! Let me know if you have any questions. See you   |
| there! (posted by local site coordinator)                                          |
Table 2. Participant-reported engagement with and perceptions of HCSF2 intervention support components delivered through text messaging compared by urban/rural community status

|                                | Total Respondent S (n=369) | Rural Respondent S (n=206) | Urban Respondent S (n=163) | p-value |
|--------------------------------|-----------------------------|-----------------------------|----------------------------|---------|
| **Satisfaction receiving text messages** |                             |                             |                            |         |
| Very satisfied                 | 153 (41.5%)                 | 73 (35.4%)                  | 80 (49.1%)                 | 0.33    |
| Satisfied                      | 140 (37.9%)                 | 82 (39.8%)                  | 58 (35.6%)                 | 0.33    |
| Neither satisfied nor dissatisfied | 64 (17.3%)                 | 43 (20.9%)                  | 21 (12.9%)                 | 0.04    |
| Dissatisfied                   | 6 (1.6%)                    | 3 (1.5%)                    | 3 (1.8%)                   | 0.79    |
| Very dissatisfied              | 2 (0.5%)                    | 1 (0.5%)                    | 1 (0.6%)                   | 0.88    |
| **Helpfulness of text messages in making healthier lifestyle choices** |                             |                             |                            |         |
| Very helpful                   | 102 (27.6%)                 | 40 (19.4%)                  | 62 (38.0%)                 | <0.01   |
| Helpful                        | 140 (37.9%)                 | 81 (39.3%)                  | 59 (36.2%)                 | 0.36    |
| Somewhat helpful               | 75 (20.3%)                  | 53 (25.7%)                  | 22 (13.5%)                 | <0.01   |
| Slightly helpful               | 30 (8.1%)                   | 17 (8.3%)                   | 13 (8.0%)                  | 0.83    |
| Not helpful                    | 14 (3.8%)                   | 7 (3.4%)                    | 7 (4.3%)                   | 0.71    |
| **Frequency of text messages** |                             |                             |                            |         |
| Too frequent                   | 27 (7.3%)                   | 16 (7.8%)                   | 11 (6.7%)                  | 0.62    |
| Just right                     | 310 (84.0%)                 | 169 (82.0%)                 | 141 (86.5%)                | 0.84    |
| Too infrequent                 | 23 (6.2%)                   | 12 (5.8%)                   | 11 (6.7%)                  | 0.80    |
| **Most helpful text messages (more than one response was allowed)** |                             |                             |                            |         |
| Texts including tips/health information | 246 (66.7%) | 122 (59.2%) | 124 (76.1%) | <0.01 |
| Texts including recipe or activity ideas | 215 (58.3%) | 115 (55.8%) | 100 (61.3%) | 0.28 |
| Texts including quotes         | 57 (15.4%)                  | 28 (13.6%)                  | 29 (17.8%)                 | 0.27    |
| Texts including questions that require a response | 47 (12.7%) | 23 (11.2%) | 24 (14.7%) | 0.31 |
| Other                          | 22 (6.0%)                   | 7 (3.4%)                    | 15 (9.2%)                  | 0.02    |
| **Cell phone number changed during study period** | 117 (31.7%) | 75 (36.4%) | 42 (25.8%) | 0.02 |

Percentages may not add to 100 due to missing and non-applicable values.
Table 3. Participant-reported engagement with and perceptions of HCSF2 intervention support components delivered through Facebook groups compared by urban/rural community status

|                                | Total Respondents (n=369) | Rural Respondents (n=206) | Urban Respondents (n=163) | p-value |
|--------------------------------|---------------------------|---------------------------|---------------------------|---------|
| **Did you look at the postings in our HCSF Facebook group?** |                           |                           |                           |         |
| Yes                            | 237 (64.2%)               | 119 (57.8%)               | 118 (72.4%)               | <0.01   |
| No                             | 132 (35.8%)               | 87 (42.2%)                | 45 (27.6%)                | <0.01   |
| **Of those who answered “No”, reasons for not looking at postings:** |                           |                           |                           |         |
| I am not on Facebook           | 44 (33.3%)                | 30 (34.5%)                | 14 (31.1%)                | 0.08    |
| I was added to the group, but did not receive notifications when anything was posted | 30 (22.7%)                | 19 (21.8%)                | 11 (24.4%)                | 0.39    |
| I was not added to the group   | 13 (9.8%)                 | 11 (12.6%)                | 2 (4.4%)                  | 0.05    |
| I did not want to have to be in a group with other people | 11 (8.3%)                 | 8 (9.2%)                  | 3 (6.7%)                  | 0.26    |
| I was not interested in the type of content that was posted | 9 (6.8%)                  | 8 (9.2%)                  | 1 (2.2%)                  | 0.08    |
| **Other**                      | 25 (18.9%)                | 11 (12.6%)                | 14 (31.1%)                | 0.07    |
| **Self-reported Facebook group engagement** |                           |                           |                           |         |
| Posted a question              | 32 (8.7%)                 | 12 (5.8%)                 | 20 (12.3%)                | 0.11    |
| Commented on a post            | 93 (25.2%)                | 42 (20.4%)                | 51 (31.3%)                | 0.16    |
| "Liked" a post                | 202 (54.7%)               | 94 (45.6%)                | 108 (66.3%)               | <0.01   |
| **Device(s) used to view Facebook** |                           |                           |                           |         |
| Phone                          | 150 (40.7%)               | 68 (33.0%)                | 82 (50.3%)                | <0.01   |
| Computer/tablet                | 23 (6.2%)                 | 13 (6.3%)                 | 10 (6.1%)                 | 0.95    |
| Both phone and computer/tablet | 68 (18.4%)                | 40 (19.4%)                | 28 (17.2%)                | 0.59    |
| **Satisfaction with Facebook group posts** |                           |                           |                           |         |
| Very satisfied                 | 141 (38.2%)               | 69 (33.5%)                | 72 (44.2%)                | 0.08    |
| Satisfied                      | 124 (33.6%)               | 73 (35.4%)                | 51 (31.3%)                | 0.25    |
| Neither satisfied nor dissatisfied | 87 (23.6%)               | 52 (25.2%)                | 35 (21.5%)                | 0.28    |
| Dissatisfied                   | 7 (1.9%)                  | 3 (1.5%)                  | 4 (2.5%)                  | 0.53    |
| Very dissatisfied              | 1 (0.3%)                  | 0 (0.0%)                  | 1 (0.6%)                  | 0.96    |
| **Helpfulness of Facebook posts in making healthier lifestyle choices** |                           |                           |                           |         |
| Very helpful                   | 56 (15.2%)                | 21 (10.2%)                | 35 (21.5%)                | 0.03    |
| Helpful                        | 105 (28.5%)               | 57 (27.7%)                | 48 (29.4%)                | 0.32    |
| Somewhat helpful               | 58 (15.7%)                | 32 (15.5%)                | 26 (16.0%)                | 0.43    |
| Slightly helpful               | 18 (4.9%)                 | 10 (4.9%)                 | 8 (4.9%)                  | 0.66    |
| Not helpful                    | 2 (0.5%)                  | 1 (0.5%)                  | 1 (0.6%)                  | 0.99    |
| **Frequency of Facebook postings** |                           |                           |                           |         |
| Frequency        | Group 1 | Group 2 | Group 3 | p-value |
|------------------|---------|---------|---------|---------|
| Too frequent     | 5 (1.4%)| 2 (1.0%)| 3 (1.8%)| 0.65    |
| Just right       | 215 (58.3%) | 109 (52.9%) | 106 (65.0%) | 0.64    |
| Too infrequent   | 17 (4.6%) | 8 (3.9%) | 9 (5.5%) | 0.79    |

**Most useful Facebook posts (more than one response was allowed)**

| Category                              | Group 1       | Group 2       | Group 3       | p-value |
|---------------------------------------|---------------|---------------|---------------|---------|
| Recipes/Meal ideas                    | 224 (60.7%)   | 111 (53.9%)   | 113 (69.3%)   | <0.01   |
| Games/Activity ideas                  | 183 (49.6%)   | 94 (45.6%)    | 89 (54.6%)    | 0.09    |
| Posts with information                | 141 (38.2%)   | 65 (31.6%)    | 76 (46.6%)    | <0.01   |
| Links to healthy lifestyle information| 67 (18.2%)    | 24 (11.7%)    | 43 (26.4%)    | <0.01   |
| Invitations to events                 | 59 (16.0%)    | 37 (18.0%)    | 22 (13.5%)    | 0.25    |
| Being able to connect with other parents | 24 (6.5%)   | 11 (5.3%)     | 13 (8.0%)     | 0.31    |
| Polls/surveys                         | 9 (2.4%)      | 5 (2.4%)      | 4 (2.5%)      | 0.98    |
| Documents you had to open             | 6 (1.6%)      | 2 (1.0%)      | 4 (2.5%)      | 0.28    |
| Other                                 | 6 (1.6%)      | 3 (1.5%)      | 3 (1.8%)      | 0.77    |

Percentages may not add to 100 due to missing and non-applicable values
Table 4. Facebook analytic data on actual participant engagement with Facebook intervention content compared by urban/rural community status

| Variables                                      | Total (n=305) | Rural (n=157) | Urban (n=148) | p-value |
|------------------------------------------------|---------------|---------------|---------------|---------|
| **Number of participants who…[n, (%)]**       |               |               |               |         |
| Viewed Posts, n (%)                            | 239 (78.4%)   | 119 (75.8%)   | 120 (81.1%)   | 0.26    |
| “Liked” Posts, n (%)                           | 155 (50.8%)   | 69 (44.0%)    | 86 (58.1%)    | 0.01    |
| Commented on Posts, n (%)                      | 69 (22.6%)    | 26 (16.6%)    | 43 (29.1%)    | 0.01    |
| Posted Content, n (%)                          | 19 (6.2%)     | 7 (4.5%)      | 12 (8.1%)     | 0.19    |
| **Mean number of… (mean±SD)**                 |               |               |               |         |
| Posts Viewed                                   | 91.5±75.8     | 88.9±75.6     | 94.2±176.2    | 0.76    |
| “Likes”                                        | 6.2±15.2      | 3.9±9.3       | 8.6±19.3      | <0.01   |
| Comments Made                                  | 0.8±3.0       | 0.5±1.6       | 1.2±3.9       | <0.01   |
| Posts Initiated                                | 0.1±0.7       | 0.1±0.3       | 0.2±0.9       | 0.02    |