Optimizing Texting Interventions for Melanoma Prevention and Early Detection: A Latin Square Crossover RCT

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Introduction: Text messaging is an effective way to reach large populations with health promotion support. This study aims to establish the optimal text messaging intervention to achieve behavior change in young adults at risk of skin cancer.

Study Design: Latin square crossover RCT.

Setting/participants: Participants were women and men aged 18–40 years living in Queensland, Australia who owned a smartphone and had ≥2 skin cancer risk factors.

Intervention: Participants were enrolled from December 2018 to February 2019 and completed an eligibility survey. Eligible participants were randomized to 4 different text message interventions using a Latin square design with varying personalization, interactivity, and message frequency (February 2019–July 2019). Each intervention lasted for 1 month; between interventions, participants had a 1-week washout period in which they completed an online questionnaire. Participants completed a 6-month follow-up online survey in January 2020.

Main outcome measures: Measures included self-reported sun protection habits and sunburns.

Results: A total of 277 (71.2% response rate) participants completed the 6-month follow-up. The sun protection habits index was significantly higher in all the 4 text messaging interventions (p<0.01 for each intervention) than at baseline, with similar sun protection habits improvements among all interventions (p=0.27). Sunburn rates decreased significantly over time (p<0.01 each intervention), with all the 4 interventions achieving reductions in sunburn rates during the intervention periods (p=0.78). Overall, the sunburn rates decreased from 40.3% at baseline to 7.0% at the end of the intervention, and at 6-month follow-up, it remained significantly below baseline levels at 23.5% (p<0.01). .

Conclusions: Regular text messaging interventions result in significantly increased sun protection and decreased sunburn in young adults.

Trial registration: This study is registered at the Australian and New Zealand Clinical Trials Registry ACTRN12618001299291.

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INTRODUCTION

In the U.S., melanoma is a major public health problem and has been one of the most rapidly increasing cancers, now diagnosed in >85,600 people annually.\(^1\)\(^–\)\(^3\) Estimated annual costs of treating melanoma alone in the U.S. are $3.3 billion, and this increases to $8.1 billion for all skin cancer treatments combined.\(^4\) Similarly, Australia reports high melanoma incidence rates that are at least double those of other high-risk countries.\(^2\)\(^,\)\(^5\) Young people aged 15–39 years are often affected, placing a great burden on them and their families.\(^5\)

To promote skin cancer prevention, Australia implemented national public information campaigns such as SunSmart.\(^7\) In the past, SunSmart programs used traditional media message channels (posters, brochures, TV, radio, and newspapers) and achieved reductions in the desire to suntan and improvements in sun protection behaviors.\(^8\) Although such campaigns are highly cost effective,\(^9\) there has not been a national campaign in Australia since 2010; instead, public education has been carried by state and territory governments and public health agencies. The achievable impact of traditional media may be waning owing to a decreased audience and the increased use of personalized, Internet-delivered multimedia channels, especially among young people. Long-term follow-up of traditional strategies found that they often failed to engage some sections of the population.\(^10\)

In Queensland, Australia, high rates of sunburn continue to be reported in 54% of adults and 46% of children in the past 12 months.\(^11\) In the U.S., 34.2% of adults reported ≥1 sunburns in the past 12 months, with sunburn rates highest in young adults aged 18–29 years (51.2%).\(^12\) In 2017, 57.2% of U.S. high-school students reported being sunburned in the past year.\(^13\) These continued sunburns could be explained by a reduction in exposure to standard messaging through traditional media, a large proportion of sunburns occurring during unplanned sun exposure, and competing messages or interests (e.g., highlighting exposure needed for vitamin D while ignoring skin cancer risk or tanned skin seen as attractive). In youth, wide-ranging factors include assumptions of a tan being healthy, peer behavior, fashion trends, and a higher likelihood to partake in risk-taking behaviors.\(^14\) Thus, improved personalized communication strategies to reach young people with health-promoting messages are required.

Such messages could also increase skin awareness, particularly in high-risk populations. Skin self-examination (SSE) is an important practice for early melanoma detection, so that individuals can identify new, different, or changing lesions and present to a doctor with concerns. SSE is underperformed by the population,\(^15\) and many do not feel confident on how to conduct it.\(^16\)\(^,\)\(^17\) A combined approach of prevention and early detection education for melanoma may lead to more positive health outcomes.

Text messaging interventions form part of mobile health technologies with vast potential to facilitate the adoption of healthy lifestyle choices. These have been successfully employed for smoking cessation, physical activity, weight loss, medication adherence, and diabetes self-management.\(^18\) Meta-analytic and systematic reviews of text-delivered interventions show that they are efficacious, cost effective, and have a wide reach.\(^19\)\(^–\)\(^22\) Moderate-to-strong evidence supports text-delivered interventions to promote healthy sun behaviors in adolescents and young adults.\(^18\)\(^,\)\(^20\) By contrast, a meta-analysis of 5 RCTs focusing on skin cancer prevention texting interventions found no benefit for sunburn and contradictory results for sunscreen use and sun protection behaviors.\(^23\) There is also a lack of evidence to support the best delivery mode or frequency.\(^18\) The format in which an intervention is delivered may influence intervention adherence and effectiveness; however, this has received little attention in intervention development and implementation research.\(^24\) For example, it is unclear whether it is more important to personalize messages or to have an interactive exchange or whether message frequency should be higher early to induce the establishment of the new behavior to facilitate habit development or later to facilitate the maintenance of the newly established behavior. In accordance with the Obesity-Related Behavioral Intervention Trials model, which emphasizes the importance of intervention development to prevent and/or manage disease,\(^25\) this study aims to assess the optimal text message intervention for melanoma prevention and early detection.

METHODS

Study Population

This Latin square crossover design trial was conducted in men and women aged 18–40 years living in Queensland, Australia, and recruited through either (1) the population-based Australian Medicare system, (2) TV news, or (3) sponsored Facebook social media posts by the university. Medicare provides universal health care to all Australian permanent residents or citizens. To be eligible, participants had to understand sufficient English, have access to a smartphone, and have ≥2 skin cancer risk factors (light hair color, skin that rarely or never tans, skin that burns easily, many moles, family/personal history of skin cancer). Participants were asked to visit a study-specific website to provide informed consent and complete the eligibility questionnaire.
The study was approved by the University of Queensland Human Research Ethics Committee (approval number: 2018001307) and prospectively registered with the Australian and New Zealand Clinical Trials Registry (registration number: ACTRN12618001299291) on August 2, 2018. The study protocol is provided in the Appendix (available online).

**Measures**

Participants were randomly assigned into 1 of 4 groups (Groups 1 −4) and, based on that group, were rotated through 4 intervention types (A−D) in a different order over 5 months (Table 1). Randomization was done by research staff using REDCap. REDCap enables allocation concealment; thus, research staff were masked to the next sequence. Research staff and statisticians were aware of group allocation. Participants were masked to group allocation.

Participants were enrolled in the study and completed the eligibility survey between December 2018 and early February 2019. All participants commenced the 5-month text message intervention in late February 2019 (summer in Australia) until July 2019 (winter). In Queensland, the ultraviolet radiation (UVR) index is >3 year round, requiring sun protection all year.26 Queensland’s climate varies, with humid subtropical north, temperate south, and arid west environments. The hottest temperatures are in Western Queensland, which has a semiarid to arid climate with warm summers reaching an average maximum temperature of 37°C in summer and 24°C in winter.27 South East Queensland, which includes the capital city of Brisbane, has an average subtropical maximum temperature of 29°C in summer and 20°C in winter.27 Each intervention (A−D) was used by participants for 4 weeks, followed by a 1-week washout period between each intervention. During the washout periods, participants completed an online survey of the main outcomes (Period 1 survey, Period 2 survey, Period 3 survey, end of intervention survey). Participants completed a 6-month follow-up survey in January 2020 (summer). After each survey, participants could enter a prize draw to win sun safety products (e.g., beach umbrellas). Data were analyzed in 2020.

In total, participants received 64 unique text messages that were designed with personalization or interactivity features or a combination of both (examples are in Appendix Table 1, available online). A total of 4 text messages were related to SSE, with the remaining messages about sun safety. On weekdays, text messages were sent between 8:15AM and 11:00AM; on weekends, they were sent between 9:30AM and 12:15PM. The comprehensive, integrated behavior change Capability, Opportunity, Motivation, Behavior (COM-B) model was used to guide message development.28 In the COM-B model, capability messages refer to an individual’s physical and psychological capability to engage in a behavior (i.e., their sun protection and skin cancer knowledge). Opportunity messages were designed to address factors that lie outside the individual that make the behavior possible such as their environment, and motivation messages included automatic processes (i.e., habits and impulses) in addition to reflective processes (i.e., intention). Messages were tested in focus groups to confirm their suitability for the target audience.

Text messages were personalized on participants’ self-reported baseline characteristics, including the following:

1 demographic and phenotypic characteristics (name, age, gender, skin type, hair color, sunburn frequency, previous sunburn intensity [none, mild, moderate, or severe], most frequently sunburned body part, personal skin cancer history, family history of skin cancer, playing outdoor sports, melanoma risk, indoor or outdoor job, attitudes toward sunscreen) and

2 health behavior constructs as detailed in the COM-B model.

**Appendix** Table 1 (available online) shows examples of message personalization. Of the interactive text messages, up to 32 were 2-way messages that required participants to action back a response, and up to 20 required participants to click on a website link within the text. Depending on personalization, not all participants received the same interactive text messages. Predefined responses such as yes or no triggered an automated response in the text messaging platform. If participants responded with an answer outside the predefined options, the system triggered an alert for the research team to respond manually. Weblinks traced back to the study website with further information.

Primary outcomes included (1) self-reported sun protection habits (SPHs) index and (2) sunburn. The SPH index averages the frequency of use for sun protection methods on a 5-point Likert-type scale from 1 (never) to 5 (all the time). The SPH index was extended to assess sun protection using 8 items: wearing a shirt with sleeves, wearing sunglasses, use of a hat, application of sunscreen with a sun protection factor (SPF) ≥15 on the face, application of sunscreen with SPF ≥15 on other parts of the body, staying in the shade, limiting time in the sun during midday hours, and wearing long pants.29,30 It achieved a Cronbach’s α of 0.66 in this sample.

How often participants self-reported sunburn was assessed during the past 4 weeks, and the sunburned body areas and whether it was blistering or painful were also assessed. Owing to a small number of respondents reporting getting sunburned

Table 1. Latin Square Crossover Design

<table>
<thead>
<tr>
<th>Group</th>
<th>Period 1 (4 weeks)</th>
<th>Period 2 (4 weeks)</th>
<th>Period 3 (4 weeks)</th>
<th>Period 4 (4 weeks)</th>
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<tbody>
<tr>
<td>1</td>
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<td>2</td>
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<td>4</td>
<td>D</td>
<td>A</td>
<td>B</td>
<td>C</td>
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</table>

Note: Intervention A: personalized messages 3 times a week for 4 weeks; Intervention B: interactive messages 3 times a week for 4 weeks; Intervention C: personalized and interactive daily messages for first 2 weeks, then 3 times a week messaging for another 2 weeks (decreasing frequency to support habit formation); Intervention D: personalized and interactive 3 times a week for 2 weeks at the start; then daily messaging for the last 2 weeks (increasing frequency to improve the maintenance of the new behaviors).
messages. They prompted a conversation with friends/family. An open-and the usefulness of the text messages, including whether

Appendix Tables 3

period, and other selected sociodemographic and risk factor

els included group, period, the interaction between group and

tively, by each group over the assessment periods. Both mod-

respondent was included in the mixed-effects regression models.

− month follow-up), group (1, 2, 3, 4), and intervention type (A

formed to re

quency and extent were computed. The original data were trans-

in each group (total n =252). A final sample size of 63 at the

doing of the follow-up in each of the 4 groups also provided

80% power to detect a decrease in sunburn by 23%. Because

participation involved the completion of 6 measurement time-

points, it was assumed that 20% of participants may be lost to

follow-up, requiring recruitment of 76 participants for each
group or a total of 380.

Statistical Analysis

The statistical analysis plan is provided in the Appendix

available online). Descriptive statistics of all baseline, feasibility,

and process measures, sun protection, sunburn, and their fre-

quency and extent were computed. The original data were trans-

formed to reflect the Latin square study design, generating

variables for time period (baseline; Periods 1, 2, 3, and 4; and 6-

month follow-up), group (1, 2, 3, 4), and intervention type (A

−D). To account for the repeated measurement of SPH and sun-

burn for each individual, a random effect for the individual

respondent was included in the mixed-effects regression models.

The effects of interventions on SPH index and sunburn

were assessed using mixed-effects linear regression models
(Model 1) and logistic regression models (Model 2), respec-
tively, by each group over the assessment periods. Both mod-
els included group, period, the interaction between group and

and period, and other selected sociodemographic and risk factor

characteristics variables. Variants of these models (Models A

−H) were used to generate the results shown in

Appendix Tables 3–8 (available online).

Available sociodemographic and risk factor characteristics vari-

ables are described in the statistical analysis plan. The variables

were selected by backward stepwise regression with a likelihood-

ratio test used to drop variables with p>0.20. At each step, varia-

bles previously removed from the model were tested to gauge their

eligibility to be reincorporated into the model.

Owing to some missing values in the included variables, a com-
plete case analysis would have excluded ≥16% of the initial cohort.

Multiple imputation methods were used to deal with the missing

data. All statistical analyses were performed using Stata/SE, ver-

sion 16, and IBM SPSS, version 25.

RESULTS

A total of 427 individuals registered their interest in the study, and

the intervention was commenced by 389 participants (Figure 1). A

total of 277 participants (71.2% retention rate) completed the 6-

month follow-up.

Appendix Table 2 (available online) displays the participant
demographics (Group 1: n=95, Group 2: n=98, Group 3: n=98,

Group 4: n=98). Participants’ baseline characteristics assigned to

the 4 groups were mostly similar and well balanced, except that

there were fewer participants with fair skin in Group 1 (17.9%) than

in the total cohort (32.4%). The mean age of participants was

27.5 (range=18−40) years, and participants were predominately

female (82.8%, n=322/389). Most participants had very fair or fair

skin color (76.6%, n=298/389).

Overall, the mean SPH index increased from 3.17 at baseline to

3.40 at Period 1, to 3.49 at Period 2, to 3.46 at Periods 3 and 4,

and 3.54 at 6-month follow-up (Figure 2). This significant

increase compared with baseline (p<0.01) over time was observed

across all the 4 groups (Figure 2).

When evaluating the effects of text message interventions A−D

on SPH, the results from Model B suggested that the 4 interven-
tions led to a similar increase in the SPH index (p=0.27), except

for Intervention C (personalized and interactive with a low fre-

quency) in Period 1 (Appendix Tables 3 and 4, available online).

In Period 1, the SPH index for participants assigned to Intervention

C was 0.22 (95% CI=0.09, 0.35) points higher than that of

participants in Intervention A.

When the combined associations of the SPH measures were

considered over the 4-time periods (Periods 1−4), those who

were in an older age bracket (22−40 years) on average had a

higher SPH index than those aged 18−21 years (p<0.01)
(Appendix Table 3, available online). Participants with light

brown hair on average had 0.12 points higher SPH than those

with dark brown or black hair (p=0.02), and participants with

more moles tended to have higher SPH than those with fewer

moles after receiving the text message intervention (p=0.02). Par-

ticipants who had never had a suntan (p=0.03) or had a suntan

≥6 times (p=0.04) during the past 12 months on average had

higher SPH than those who had a suntan 2−5 times

(Appendix Table 3, available online).

When assessing the impact of the order in which the inter-

vention was received, Model D suggested that the baseline

SPH for Group 2 was marginally higher than those of the other

groups (coefficient=0.15, 95% CI=0.00, 0.29). After the

text message intervention (Period 4), Groups 2 and 3, which

started with Intervention B and C, respectively, had a higher

SPH than other groups in Periods 2 and 3 (Appendix Table 5,

available online).

Overall, the observed probability that a respondent was sun-

burned in the previous 4 weeks decreased from 40.3% at baseline

to 20.6% at Period 1, to 14.8% at Period 2, to 9.3% at Period 3,

and 7.0% at the end of Period 4. The probabilities of getting sun-

burned decreased significantly for all the 4 groups over the inter-

vention periods (p<0.01). At 6-month follow-up (12 months after

baseline), it was 23.5%, almost half of baseline levels (p<0.01)

(Figure 3).

At baseline and 6 months, the most commonly sunburned

body part was the shoulders (n=87/389, 22.4% and n=73/277,

26.4%, respectively), followed by the face (n=67/389, 17.2% and

n=41/277, 14.8% respectively). At baseline, 30.8% (n=48/156)
of participants reported that their sunburn was severe

(blistering or peeling skin), compared with 16.9% at Period 1

(n=13/77), 14.5% at Period 2 (n=8/55), 6.3% at Period 3 (n=2/
Model F exploring the effect of different interventions on the probability of having sunburn within each period suggested that the 4 interventions were similarly successful in reducing the proportion of participants reporting sunburn ($p=0.78$) (Appendix Tables 6 and 7, available online). There was no significant evidence that the order of receiving the intervention changed the probability of getting sunburned (Appendix Table 8, available online).
Figure 2. Mean of sun protection habit index at baseline and at different time periods by group. Note: Image denotes the sun protection habit index. Means were predicted using Model 1. Follow-up information was collected 6 months after the intervention period. Intervention A was personalized messages 3 times a week for 4 weeks; Intervention B was interactive messages 3 times a week for 4 weeks; Intervention C was personalized and interactive daily messages for the first 2 weeks, then 3 times a week messaging for another 2 weeks; and Intervention D was personalized and interactive 3 times a week for 2 weeks at the start, then daily messaging for the last 2 weeks. P=period.

Figure 3. Probabilities of getting at least 1 sunburn at baseline and different time periods by group. Note: Image denotes the participants’ sunburn. Probabilities were predicted using Model 2. Follow-up information was collected 6 months after the intervention period. Intervention A was personalized messages 3 times a week for 4 weeks; Intervention B was interactive messages 3 times a week for 4 weeks; Intervention C was personalized and interactive daily messages for the first 2 weeks, then 3 times a week messaging for another 2 weeks; and Intervention D was personalized and interactive 3 times a week for 2 weeks at the start, then daily messaging for the last 2 weeks. P=period.
Participants who had ≥1 sunburn within the last 4 weeks before this study were 2.84 times more likely to have sunburn at the end of intervention (Appendix Table 6, available online, Model F). Male participants were 2.80 times more likely to have sunburn than female participants (p<0.01). Income had a significant association with the risk of being sunburned (p<0.01), with people on a lower annual income of $20,800−$51,599 reporting the lowest odds of getting sunburned. Those with very fair skin were 2.60 times more likely to get sunburned than participants with medium to brown skin color (p=0.03). Finally, the more freckles a participant had before the intervention, the higher chance that they had sunburn after the intervention.

In regard to SSE behaviors, 38% (n=146/389) of participants reported conducting SSE in the 12 months before the study (Appendix Table 2, available online). In total, 47% (n=154/328) reported conducting SSE during the intervention period (Appendix Table 9, available online).

Most participants reported reading the incoming text messages all the time (66.8%, n=219/328) (Appendix Table 9, available online). Most preferred text messages 3 times a week compared with 7 days a week (74.4% vs 16.2%), with the remaining participants unsure.

Interactive messages asking participants a question had the highest mean helpfulness rating of 3.9 (SE=0.06). In total, 33% (n=108/328) of the participants clicked on the website links often or all the time. In total, 61% (n=200/328) reported that the text messages prompted them to have conversations about sun protection with others.

A total of 319 (97.3% response) participants provided feedback using the open-ended question at the end of the intervention survey asking for general feedback. Themes included timing and season (e.g., sun protection was described as less useful during winter), text message frequency (preference of 3 days per week), enjoyment of personalization, preference for questions, and prompted sun safety action. Themes, descriptions, and example participant comments are reported in Appendix Table 10 (available online).

**DISCUSSION**

This trial aimed to determine the optimal text message intervention to promote skin cancer prevention and early detection outcomes in young adults. The findings showed that the intervention was highly effective and had enduring effects, with all the 4 groups reporting a significant increase in sun protection behaviors as measured by the SPF index over time and a commensurate drop in sunburn rates of large magnitude (>50% reduction) across the 4 intervention groups. The SPF index remained higher, and sunburn remained lower than the baseline levels across all the time-points to the 6-month follow-up, indicating that participants remained motivated to protect their skin during and after the intervention. Participants aged 22−40 years and those with light hair color and more moles were using more sun protection methods than other participants. Although the sunburn rates at the 6-month follow-up increased somewhat from those observed during the intervention, the overall sunburn rates were still reduced to almost half. This indicates a lasting effect of the text message interventions beyond the immediate intervention period. This study found that those with a previous sunburn history, male participants, those with very fair skin, and those with a higher number of freckles were more likely to report a sunburn before, during, and after the intervention period, indicating that further work is required to support those at greatest risk of sunburn.

A review found that text message personalization on demographic and psychosocial variables had better intervention efficacy in health promotion and that decreasing message frequency was preferable. Others speculated that messages that are personally relevant may have the greatest impact to prompt behavior and be remembered. Armstrong et al. found that sunscreen use increased steadily in the intervention group of their daily texting intervention, indicating that daily texts are valuable to initiate and maintain UVR protection behaviors. There are no standard recommendations regarding the frequency of texts, which range from every day to weekly in previous skin cancer prevention texting interventions. In this study, participant feedback suggested a preference for 3 days per week compared with that of daily messaging.

Participants’ preferences were for interactive messages that require them to answer a question. This suggests that participants preferred to become actively involved with the content rather than receive 1-way messages. When participants responded to questions, they were reinforced and praised for their efforts, which may also have elevated their appeal in the respondents’ minds. Approximately one third of participants self-reported that they never or rarely clicked on website links in the text messages, indicating that participants prefer to receive all their information within the text message. A previous review also found that text messaging itself may be an effective channel for interventions designed to change health behavior because there was no difference between text-only and text plus additional modalities such as websites. In this study, most participants reported that the texts prompted them to have a conversation with others, which had also been reported in previous text-delivered sun safety interventions, highlighting the possible value of text message interventions to extend to the participants’ social networks. This study found that just fewer than half of the participants reported that they conducted SSE during the intervention, which improved in frequency from baseline. These results support previous findings of the Healthy Texts intervention, which saw an improvement in SSE behaviors. Of those participants sunburned in this study, alarmingly, just fewer than a third were severely sunburned at baseline. This decreased during the intervention but increased at the 6-month follow-up. The shoulders were the most commonly sunburned area, emphasizing the need for further promotion of sun-protective clothing.

Exposure to UVR in youth increases melanoma risk, with ≥89% of melanomas attributable to excessive UVR exposure. UVR also causes keratinocyte skin cancers, skin aging, and cancers. Thus, improving sun protection behaviors in high-risk young adults who report high rates of sunburn is important. The messages designed in this study could be incorporated into applications that provide UVR, weather, and sun protection advice, for example, the SunSmart application. Improving cancer-related behaviors depends on the ability to understand the multifaceted factors that drive human behavior, and the Obesity-Related Behavioral Intervention Trials initiative encouraged researchers to study how interventions can best be developed, tested, and implemented to improve health outcomes and create more effective policies. This study adds to the evidence that text message interventions are effective in improving sun protection behaviors and reducing sunburn, compared with baseline behaviors.
Limitations

The main outcomes of this study were self-reported, which may be prone to social desirability or reporting bias. With crossover designs, there should be no carry-over effects expected between interventions. In this study, there was only a 1-week break between changing interventions, which may not have been a long enough washout period and may have resulted in carry-over effects diminishing the differences between the intervention groups. Participants were not given an option to choose the exact timing of the day or frequency with which they received the text messages. Although participants began the intervention and completed the 6-month follow-up survey during summer, the third and fourth study timepoints of the intervention were during winter when the population is less likely to use sun protection, as indicated in the participant comments. This seasonality effect may have been a confounder during the winter period, and future studies are necessary to allow for seasonality. However, sun protection increased, and sunburn decreased even during winter months, and at the follow-up timepoint about 1 year after baseline, sunburn frequency was still significantly reduced. The recruitment strategy was designed to yield a representative sample through the Medicare mail out; however, additional recruitment through media channels was required to achieve the necessary sample size. Text messaging interventions may be scalable at a relatively low cost, although some monitoring by study staff was required to reply manually if they fell outside of the preprogrammed responses. For some groups, messages were sent 7 days a week, adding to intervention costs. Finally, the study cohort was highly educated and female, and therefore results may not be generalizable to the broader population.

CONCLUSIONS

This study assessed the optimal text messaging intervention. Findings indicated that all the 4 interventions resulted in a large increase in sun protection and a decrease in sunburn. An interactive text schedule delivered 3 times a week, asking questions with reinforcement and praise for correct answers, was most liked by participants.

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SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at https://doi.org/10.1016/j.amepre.2021.03.024.

REFERENCES


