



## Original article

## Efficacy of Abstinence Promotion Media Messages: Findings from an Online Randomized Trial

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**Abstract**

**Objective:** We conducted an online randomized experiment to evaluate the efficacy of messages from the Parents Speak Up National Campaign (PSUNC) to promote parent–child communication about sex.

**Methods:** We randomly assigned a national sample of 1969 mothers and fathers to treatment (PSUNC exposure) and control (no exposure) conditions. Mothers were further randomized into treatment and booster (additional messages) conditions to evaluate dose–response effects. Participants were surveyed at baseline, 4 weeks postexposure, and 6 months postexposure. We used multivariable logistic regression procedures in our analysis.

**Results:** Treatment fathers were more likely than control fathers to initiate conversations about sex at 4 weeks, and treatment fathers and mothers were more likely than controls at 6 months to recommend that their children wait to have sex. Treatment fathers and mothers were far more likely than controls to use the campaign Web site. There was a dose–response effect for mothers' Web site use.

**Conclusions:** Using new media methods, this study shows that PSUNC messages are efficacious in promoting parent–child communication about sex and abstinence. Future research should evaluate mechanisms and effectiveness in natural settings. © 2009 Society for Adolescent Medicine. All rights reserved.

**Keywords:**

Abstinence; Parent–child communication; Social marketing; New media

Early sexual activity is a risk factor for unplanned and teen pregnancy, HIV/sexually transmitted infections, and associated negative health consequences in adolescence and beyond. Since enactment of Title V, Section 510 of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996, U.S. Government policy and the primary focus of related funding has been sexual abstinence education. Since 1998, the Title V, Section 510 program has received approximately \$50 million annually to teach

abstinence from sexual activity as the expected standard for children under age 18.

There is ongoing debate about the effectiveness of abstinence education programs funded under Title V [1–4]. Some recent studies have found that students who received abstinence education had lower rates of sexual activity compared to youth who did not receive abstinence training [1,2]. Other studies have suggested that such programs are ineffective, and may promote lack of knowledge and negative attitudes toward risk prevention behaviors such as condom use [3,4]. All of these studies focus primarily on educational interventions with youth.

Using a randomized controlled design, the present study examines the effectiveness of the Parents Speak Up National Campaign (PSUNC), a media campaign aimed at parents that promote parent–child communication about delaying sexual

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debut. Parent–child communication about sex has been associated with delayed sexual debut [5], and parental involvement is a protective factor for many risk behaviors in children [6].

This study builds on previous evaluations of health communication and marketing (HCM) campaigns that address abstinence messages aimed at youth and messages aimed at parent–child communication. In the United States, DuRant and colleagues [7] found that exposure to a media campaign promoting parent–child communication about sex was associated with increased communication and parental intentions to communicate in the next month. However, the study used a postexposure only design with no control group.

There is also evidence from HCM campaigns in Africa for the effectiveness of abstinence messages. The *Nimechill* campaign was effective in increasing self-efficacy and intentions to remain abstinent among 10- to 14-year-old boys and girls [8], but showed no effect on sexual activity. The *Trust* and *Salama* campaigns promoted messages of abstinence, faithfulness, and condom use (the “ABC” message), and have been associated with delayed sexual debut and reduced sexual activity among young people [9,10].

This article reports on the effects of PSUNC campaign message exposure on parent–child communication outcomes. It is one component of a broader campaign evaluation, which has been described elsewhere [11]. This study represents an initial analysis of the short-term effects of PSUNC message exposure, to be followed up when additional panel data become available. Specific aims of the present study were to:

1. identify the effects of exposure to PSUNC messages on parents’ communication behaviors with their children about sexual activity; and
2. determine whether there is a dose–response effect of PSUNC message exposure on parent–child communication and the magnitude of that effect.

## Methods

### Campaign

PSUNC applies many of the transferable principles of public health communication and marketing [12,13]. In particular, the campaign uses a behavior change model, grounded in Social Cognitive Theory, that hypothesizes increased parent–child communication will result from modeling effective communication behavior and promoting positive outcome expectancies [14–16]. PSUNC develops a credible and appealing “argument” for delaying initiation of sexual activity by communicating personal (social, educational, career-related) advantages of delayed sexual debut [13]. The campaign also promotes parents’ self-efficacy and outcome efficacy to communicate and make a difference with their children, and uses risk communication strategies to highlight the health risks of early sexual debut and benefits of

communication [14,17,18]. PSUNC was formally launched on June 21, 2007, using paid and unpaid television, radio, print, and outdoor advertisements. The primary communication channel for the campaign is Public Service Announcements (PSAs) designed for a general audience, and targeted PSAs for African American, Hispanic American, and Native American audiences. The targeted PSAs used actors and settings specific to the racial/ethnic audience but retained the same specific messages and script. Health messaging specific to target audience is more salient and more likely to be recalled [12]. The PSAs feature age-appropriate youth letting their parents know that it is okay to talk to them about sex and that they should “talk early and often” [19].

In addition to the public awareness campaign, PSUNC includes the [4Parents.gov](http://4Parents.gov) Web site and associated parent and adolescent guides. The public awareness campaign is designed to drive traffic to the site, which provides several categories of information to parents about how to talk with their preteen or teenage children about sex. The site includes information about social norms among teens, perceived barriers to communication among parents, broader related topics such as parent–child relationship quality and goal setting, establishing rules and expectations about dating and sex, teaching refusal skills, characteristics of healthy relationships, and other topics (e.g., what to do if the teen has already had sex, pregnancy, contraception, and legal issues) [11].

### Study design, sample, and data collection

Knowledge Networks ([www.knowledgenetworks.com](http://www.knowledgenetworks.com)) was chosen to assist in participant recruitment and sampling for this study because it offered a probability-based sample of the U.S. population and sufficient numbers of the study target population. The entire Knowledge Networks panel consists of approximately 50,000 adult U.S. citizens. It is the only available online panel based on a nationally representative sample of U.S. adults. Knowledge Networks panelists are first selected using random-digit-dialing (RDD) telephone methodology, providing a probability-based starting sample of U.S. telephone households. The panel is adjusted to match U.S. Census demographic benchmarks. Households that do not already have Internet connectivity are provided a Web TV set-top box and free monthly Internet access to ensure representation on non-Internet households.

Knowledge Networks has in-depth demographic and other descriptive information on its panelists, which permitted us to recruit only eligible members of the target audience (parents with children aged 10–14 years). Also, PSUNC is a Federally funded campaign and the evaluation data collection required Office of Management and Budget (OMB) approval. Knowledge Networks studies have previously received OMB approval based on the panel methodology, and to the investigators’ knowledge other online panels had not. All Knowledge Networks panelists receive Internet connectivity. Thus, study participants were able to

complete surveys, receive video and audio, and read print ads.

Parents living with their 10- to 14-year-old children were entered into an individual-level, randomized experimental design. Recruitment, data collection, and PSUNC exposure were accomplished online through the Knowledge Networks panel and secure Web site. We identified all adult panelists (N = 3217) living with at least one child aged 10 to 14 years. Each of these panelists was invited to participate in the study. Respondents were then screened to confirm eligibility (that they were the parent or guardian of at least one age-eligible child who lived with them) and asked to participate. Mothers and fathers were sampled separately, and parents who did not participate were not replaced with a parent of the opposite sex. For survey purposes, the parent and one child in the target age range were paired and subsequent surveys referenced that one child (programmed into the survey after the parent consented to participate). A total of 2439 parents (75.8%) responded to the study invitation and were identified as eligible for the study. Among those, a total of 1969 parents (80.7%: 1456 mothers and 844 fathers) completed the baseline survey between August and October 2007.

Mothers were randomly assigned to one of three experimental conditions: control (no PSUNC exposure), treatment (core messages about the importance of parent–child communication delivered through print, video, and radio PSAs), and a booster (core messages plus a second set of messages aimed at overcoming communication barriers) condition. Mothers received the booster treatment at the 6-month follow-up to test for a dose–response effect of increased campaign exposure. We included the booster condition for mothers only based on the literature on mother–child communication about sexual activity [20,21]. Fathers were separately sampled and randomly assigned to one of two experimental conditions: control and treatment (as defined for mothers). Only one parent per household participated in the study.

Immediately following the baseline survey (during the same online session), treatment participants read, viewed, and listened to the PSUNC PSAs. Each treatment participant assigned to an exposure condition read, viewed, or listened to a package of multimedia that included: two print PSAs, one 60-second radio PSA, and one 60-second TV PSA (“Talk to me”) that featured preteen children asking their parents to talk to them about waiting to have sex. Prior to the second follow-up, each booster participant reviewed this same package of multimedia plus two additional print PSAs, one 60-second radio PSA, and one 60-second TV PSA (“Muffin-head”) that featured preteen children telling their parents that by talking to them about waiting to have sex they will remain close as a family.

The PSAs were targeted to specific racial/ethnic audiences. Print and radio PSAs targeted general audiences, African Americans, American Indians, and Hispanics.

PSUNC TV PSAs targeted general audiences, African Americans, and Hispanics. We exposed participants to a specific protocol of print, radio, and television ads based on their race/ethnicity: African Americans received the African American targeted versions of the PSAs, Hispanic Americans got their targeted versions, and Native Americans got their targeted versions. All other racial/ethnic groups got a general audience protocol.

Four weeks after baseline, 1754 of the 1969 baseline participants (89.1%) completed a follow-up survey. Immediately before completing the follow-up survey (during same online session), treatment participants again reviewed the PSUNC PSAs. Prior to the second follow-up 6 months after baseline, treatment condition mothers were randomly assigned to remain in that condition or receive the booster. Again, immediately before completing the second follow-up survey, all treatment and booster participants reviewed the PSUNC PSAs for their condition. Of the 1969 baseline participants, 1456 (73.9%) completed the 6-month follow-up survey.

### Measures

Participants completed the 64-item PSUNC evaluation survey online at the secure Knowledge Networks Web site at each time point. The survey was divided into major sections including sociodemographic characteristics; knowledge, attitudes, and beliefs about parent–child communication and children’s sexual activity; parent reports of children’s sexual activity and related behaviors; parent–child communication behaviors; media habits; and other community-level influences such as school- or community-based sex education or abstinence programs. The follow-up surveys for exposure participants included the same core items plus additional items on reactions to the PSUNC PSAs and subsequent actions taken (such as visiting and using the [4parents.gov](http://4parents.gov) Web site).

For this analysis, we focused on the effects of PSUNC messages and time on behavioral outcomes of interest: parent–child communication about sexual activity and use of the [4parents.gov](http://4parents.gov) Web site to obtain information. The survey items for the outcome variables were as follows (response options in parentheses): How often have you initiated conversations with {CHILD NAME} about sexual activity or waiting to have sex? (often, sometimes, seldom, never); How much have you talked to {CHILD NAME} about being sexually active? (a great deal, a moderate amount, somewhat, not at all); How much have you and {CHILD NAME} talked about (his/her) being sexually active and . . . whether to wait to be sexually active until you are married? (a great deal, a moderate amount, somewhat, not at all); Have you asked (recommended) that {CHILD NAME} wait to have sex? (yes, no); Have you ever visited the Web site “[www.4parents.gov](http://www.4parents.gov)”? (yes, no).

In our multivariable model, we used a number of parent, child, and social environmental covariates to account for other possible influences on parents' communication and information seeking behaviors, as follows: child's gender; marital status; highest educational attainment; race/ethnicity; parent age; full-time employment status; family structure (one or two parents in the home); child's access to TV, Internet, and other media in their bedroom; Metropolitan Statistical Area (MSA) status (urban/rural); parent involvement, measured by an eight-item scale of joint parent-child activities done together and frequency of activities (seven items drawn from previous research and one item developed by the investigators) [22,23].

To assess reliability of our measure for parent involvement, we conducted principal factor analyses and estimated Cronbach's alpha coefficient for the scale. The parent involvement scale includes eight items that measure past month frequency ("never," "less often," "at least once a month," or "at least once a week") of the following parent-child activities: (1) shopping; (2) going to the movies or sporting events; (3) watching television; (4) attending religious services; (5) homework; (6) attending a party; (7) volunteering; and (8) playing a game or sport. Results from principal factor analyses of these items suggested that all eight items loaded into a single scale (Cronbach's  $\alpha = 0.62$ ) with factor loadings ranging from 0.23 to 0.52 for each item.

#### Data analysis

We used multivariable logistic regression procedures to construct separate models for each of the five behavioral outcome variables described above. The model outcome variables were dichotomous indicators for whether the parent's response changed in the desired direction between baseline and follow-up time periods. Parents who already provided the extreme desired response (e.g., indicating "very often" frequency of parent-child communication) to an outcome measure at baseline were excluded from the analysis for that specific measure because there was no opportunity for positive change at follow-up. Thus, our analysis for each outcome variable includes only participants who had room for positive change at baseline. We include the resulting model sample size for each model we estimated in our results table that follows. The number of parents that are excluded from each model can be calculated by comparing the model sample size with the total 6-month sample size for mothers ( $N = 811$ ) and fathers ( $N = 645$ ) listed in Table 2.

We used logistic regressions to estimate the odds of any positive change in responses to each of the behavioral outcome variables as a function of treatment and booster conditions relative to control condition participants. All control variables described earlier were also included. We compared treatment effects from baseline to the first follow-up, and baseline to second follow-up. Separate models were run for mothers and fathers. Stata Version 9 (College Station, TX) was used in all data analyses.

## Results

A total of 1969 participants—1456 mothers and 844 fathers—completed the baseline survey. With attrition, 1754 parents (89.1%) completed the 4-week follow-up survey and 1456 parents (73.9%) completed the 6-month follow-up. Overall attrition was 10.9% between baseline and the 4-week follow-up survey and 26.1% between baseline and the 6-month follow-up survey. Further analysis of attrition by experimental condition suggests that both mothers and fathers in the treatment condition were more likely to drop out of the study 6 months postbaseline. Approximately 30.3% of treatment condition mothers dropped out of the study at the second follow-up compared to 22.6% of control condition mothers. Attrition was slightly lower overall among fathers, but differences by condition were similar—27.6% attrition among treatment fathers and 17.6% among control fathers. These differences were statistically significant ( $p < .01$ ) for both mothers and fathers. Table 1 summarizes sample sizes for each survey wave, by gender and experimental condition.

We further assessed study attrition rates among parents who at baseline already reported the extreme desired response for each outcome (and were thus excluded from the analysis for that outcome) compared to parents who had opportunity for positive change at baseline. For each of the five behavioral outcome variables we assessed in this study, there were no statistically significant differences in attrition between these groups of parents, and neither group differed significantly from the overall 6-month attrition rate of 26.1%. We also did not find significant differences in 6-month attrition by parent race, education, or employment status.

Table 2 summarizes parent sociodemographic characteristics. Respondents were generally between the ages of 35 to 55, white, and had some College education or a bachelor's degree. The sample sizes of African American and Hispanic American parents were low compared to the U.S. population. The rates of Bachelor's Degree or higher education were high compared to the United States. Other statistics were generally representative of population norms.

Table 1  
Survey sample sizes

| Survey wave/condition | Mothers     | Fathers     |
|-----------------------|-------------|-------------|
| Baseline              |             |             |
| Treatment             | 776 (69.0%) | 504 (59.7%) |
| Control               | 349 (31.0%) | 340 (40.3%) |
| Total                 | 1,125       | 844         |
| 4-Week Follow-up      |             |             |
| Treatment             | 663 (67.1%) | 444 (58.0%) |
| Control               | 326 (32.9%) | 321 (42.0%) |
| Total                 | 989         | 765         |
| 6-Month Follow-up     |             |             |
| Normal treatment      | 266 (32.8%) | 365 (56.6%) |
| Booster treatment     | 275 (33.9%) | —           |
| Control               | 270 (33.3%) | 280 (43.4%) |
| Total                 | 811         | 645         |

Table 2  
Unweighted sample demographics of efficacy study participants who completed all three survey waves

| Total (N = 1456)              | Mothers (N = 811) |                     |                             | Fathers (N = 645) |                     |
|-------------------------------|-------------------|---------------------|-----------------------------|-------------------|---------------------|
|                               | Control (N = 270) | Treatment (N = 266) | Booster treatment (N = 275) | Control (N = 280) | Treatment (N = 365) |
| Baseline demographic variable |                   |                     |                             |                   |                     |
| Average parent age            | 42.8              | 42.5                | 41.4                        | 44.5              | 44.8                |
| Average child age             | 12.2              | 12.3                | 12.1                        | 12.3              | 12.3                |
| Parent education              |                   |                     |                             |                   |                     |
| Less than high school         | 1.1%              | 1.5%                | 1.5%                        | 3.2%              | 2.7%                |
| High school grad              | 14.8%             | 13.9%               | 11.3%                       | 13.9%             | 13.2%               |
| Some college                  | 37.8%             | 44.0%               | 41.8%                       | 31.8%             | 34.5%               |
| Bachelors degree+             | 46.3%             | 40.6%               | 45.5%                       | 51.1%             | 49.6%               |
| Race/ethnicity                |                   |                     |                             |                   |                     |
| White                         | 86.7%             | 83.5%               | 85.5%                       | 87.1%             | 88.8%               |
| African American              | 7.4%              | 8.7%                | 7.3%                        | 2.1%              | 4.1%                |
| Hispanic                      | 2.6%              | 4.9%                | 3.6%                        | 3.9%              | 3.0%                |
| Other                         | 3.3%              | 3.0%                | 3.6%                        | 6.8%              | 4.1%                |
| Child gender                  |                   |                     |                             |                   |                     |
| Male                          | 49.3%             | 50.0%               | 50.2%                       | 60.4%             | 53.4%               |
| Female                        | 50.7%             | 50.0%               | 49.8%                       | 39.6%             | 46.6%               |
| Employed full-time            | 70.7%             | 71.3%               | 74.5%                       | 91.4%             | 94.0%               |

Table 3 summarizes the multivariable logistic regression models. At the first followup (FL1), we found a significant treatment effect for increased initiation of conversations among fathers (odds ratio [OR] = 1.763,  $p = .0004$ ), but no such effect among mothers. Both mothers (OR = 7.846,  $p = .000$ ) and fathers (OR = 10.152,  $p = .000$ ) were overwhelmingly more likely to have visited the [4parents.gov](http://4parents.gov) Web site compared to control participants. We observed no other treatment effects at FL1.

At the second follow-up (FL2), we observed significant treatment effects on recommending waiting to have sex among both fathers and mothers. Treatment fathers were more than twice as likely to recommend waiting to their children (OR = 2.326,  $p = .005$ ) as control fathers. Treatment mothers showed a very similar effect (OR = 2.354,  $p = .027$ ). We continued to observe large treatment effects on [4parents.gov](http://4parents.gov) use among both fathers (OR = 3.854,  $p = .000$ ) and mothers (OR = 6.995,  $p = .000$ ), although the magnitude of the effect was considerably smaller among fathers compared to FL1.

We observed only limited evidence of a dose–response effect among the mothers. Compared to the treatment mothers, booster mothers were more likely to have visited the [4parents.gov](http://4parents.gov) Web site (OR = 9.441,  $p = .000$ ).

## Discussion

This study sought to determine whether: (a) PSUNC message exposure increased parent–child communication about sexual activity, and (b) there was a campaign dose–response effect. With respect to the first aim, we found evidence of a treatment effect that fathers had increased initiation of conversations with their children about sex 4 weeks after exposure, and an effect on both fathers and mothers recommendations to their children to wait before becoming sexually active 6 months postexposure. The magnitude of

these effects was large, and in the case of fathers suggests a pattern of moving from greater initiation of conversations with their children to then making a clear recommendation to wait. This is consistent with PSUNC’s objectives and theory of behavior change.

We also found large effects of PSUNC exposure on visiting the [4parents.gov](http://4parents.gov) Web site. One of the campaign’s objectives is to raise parents’ awareness of the health risks associated with early sexual debut and urge them to talk to their children about waiting. The [4parents.gov](http://4parents.gov) Web site is the campaign’s major informational tool, and another objective is to drive traffic to the site. The campaign appears to have been highly successful in this regard.

However, we found no evidence of a campaign dose–response effect with respect to parent–child communication behavior. Booster condition mothers were no more likely to initiate conversations about sexual activity, talk frequently with their children, or urge them to wait. However, we did find evidence of a dose–response effect on [4parents.gov](http://4parents.gov) use among mothers.

There are several possible explanations. First, the literature suggests that fathers are less likely to talk to their children about sexual activity than mothers, especially to their daughters [21,24–27]. Thus, fathers may be less attuned to the issue of their children becoming sexually active, or may be less prone to address the issue failing some salient stimulus such as PSUNC messages. The campaign may have succeeded in communicating its “call to action” (“talk early and often to your children about sex”), especially to fathers [28]. They responded by initiating conversations at first follow-up, and then by recommending waiting at second follow-up, which follows that call to action.

Mothers, being more likely to talk their children about sexual activity, did not respond in statistically significant numbers to the initial call to action, but responded to repeated exposure to PSUNC messages by second follow-up. The

Table 3

Unweighted logistic regressions showing odds ratios of any positive change related to psunc exposure (*p*-value) [model sample size]

| Outcome variable  | Baseline—FL1 change        |                             | Baseline—FL2 change        |                            |                            |
|---|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|
|   | Mothers                    | Fathers                     | Mothers                    |                            | Fathers                    |
|   | Treatment OR               | Treatment OR                | Treatment OR               | Booster Treatment OR       | Treatment OR               |
| Increased initiation of conversations with child about sexual activity or waiting to have sex | 1.158 (0.411)<br>[n = 733] | 1.763 (0.004)<br>[n = 664]  | 1.216 (0.359)<br>[n = 606] | 1.103 (0.645)<br>[n = 606] | 1.200 (0.335)<br>[n = 559] |
| Increased frequency of talking to child about being sexually active                           | 0.988 (0.943)<br>[n = 790] | 1.064 (0.726)<br>[n = 693]  | 1.184 (0.402)<br>[n = 649] | 1.118 (0.575)<br>[n = 649] | 0.915 (0.621)<br>[n = 582] |
| Has talked to child about whether to wait until marriage (increased frequency)                | 0.963 (0.828)<br>[n = 702] | 0.945 (0.753)<br>[n = 615]  | 1.234 (0.321)<br>[n = 583] | 1.033 (0.876)<br>[n = 583] | 1.004 (0.983)<br>[n = 520] |
| Has asked or recommended that child wait to have sex (recommended waiting)                    | 1.003 (0.989)<br>[n = 255] | 1.244 (0.422)<br>[n = 266]  | 2.354 (0.027)<br>[n = 201] | 1.597 (0.202)<br>[n = 201] | 2.326 (0.005)<br>[n = 220] |
| Has visited the 4parents.gov Web site (Web site use)  | 7.846 (0.000)<br>[n = 915] | 10.152 (0.000)<br>[n = 724] | 6.995 (0.000)<br>[n = 742] | 9.441 (0.000)<br>[n = 742] | 3.854 (0.000)<br>[n = 596] |

Note: All models limited to baseline participants not already in strongest desired category. All models control for: child gender; marital status; highest educational attainment; race/ethnicity; parent age; employment status; family structure; whether child has computer, cable TV, or internet in their bedroom; MSA status; a scale for parental involvement.

MSA = Metropolitan Statistical Area; OR = odds ratio; FL1 = first follow-up; FL2 = second follow-up.

evidence suggests a delayed but equally strong effect of campaign exposure on mothers. Future studies using PSUNC data will investigate the differences in communication outcomes between mothers and fathers, and between communication outcome measures.

The large effects of PSUNC exposure on 4parents.gov use may also facilitate communication behavior. Parents who visit the site may obtain information that facilitates their communication, which may increase their self-efficacy, outcome efficacy (i.e., belief that talking to their children will lead to delayed sexual debut) and intentions to talk to their children. Although that analysis is beyond the scope of the present study, it is an important hypothesis for future investigation.

This study adds a new dimension to the larger debate on abstinence education and intervention programs. Abstinence education has been questioned as a public health strategy in recent years on the basis of inadequate evidence of effectiveness [29,30]. Recent studies showing positive effects of abstinence education programs have sought to fill this evidence gap [1,2]. However, the issue remains highly contentious and public policy makers have debated the future of U.S. government funding for Title V programs [3].

The present study does not resolve this debate, which centers primarily on education programs for youth. However, it shows that abstinence messaging delivered to parents through a mass media HCM is efficacious in promoting parent–child communication about sex. To the extent that such communication is effective in abstinence promotion among youth, and the evidence suggests that it is within specific environmental and program contexts, this study suggests that messaging to promote parent–child communication about abstinence is an effective public health strategy [31,32].

Our findings are also consistent with results from other recent evaluations of HCM campaigns to promote parent–child communication about sex [7]. However, this

study builds the evidence base through use of a randomized experimental design and rigorous examination of dose–response effects.

There are four limitations to this study that should be considered in interpreting results. First, it is important to recognize that the level of parent–child communication, and increase in level of communication, are not equal and should ultimately be examined in a discrete manner. Initiating conversations “seldom” with a child and increasing to “sometimes” at a follow-up time point is not the same as moving from “sometimes” to “often.” Also, potential reductions in communication over time should be examined.

Second, the study evaluated effects of campaign messages in a controlled online environment, whereas the campaign was designed to be implemented in a natural setting. Thus, although it has high internal validity it may have low external validity in that it does not evaluate the campaign in a real world context [33]. The study demonstrates the efficacy of PSUNC messages but leaves open the question whether they will be effective on a population level. Efficacy studies are a growing area of HCM research because of the feasibility of experimental designs and opportunities for message testing using new media, so this is an important future research question [19].

Third, we exposed participants to PSUNC in a controlled setting, but it is possible that they may have also encountered the campaign in everyday life, thus contaminating the control condition. However, nationwide campaign reach during the timeframe of data collection was very low because of reliance on unpaid PSAs in the general population, so it is very unlikely that any appreciable number of participants in this study were exposed. However, this is a potential threat to internal validity that will be examined in the third and fourth PSUNC follow-up surveys.

Fourth, there appears to be disproportionate survey attrition among mothers and fathers in the normal treatment condition

at 6 months postbaseline. Higher attrition among the treatment condition is to be expected, given that treatment participants have greater burden of time when exposed to stimuli and answering questions. Differential attrition may affect study findings, but given the large effect sizes observed for behavioral outcomes it is unlikely to affect the direction of results.

The observed efficacy of PSUNC raises future research questions. First, future research will examine the mechanisms through which PSUNC works. What attitudes, beliefs, and intentions are associated with or mediate behavioral outcomes? Second, future analyses will investigate differences in efficacy between population groups. Are there meaningful differences in campaign reactions between racial/ethnic, socioeconomic, geographic, religious or other population groups? Finally, the informational contribution of the [4parents.gov](http://4parents.gov) Web site, which this study found is being widely used as a result of PSUNC exposure, will be investigated. What is the relationship between [4parents.gov](http://4parents.gov) use, and health information found there, and behavioral outcomes?

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