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A Summative Evaluation of a Food Safety Social Marketing Campaign "4-Day Throw-Away" Using Traditional and Social Media

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Abstract: Foodborne illnesses remain a common problem in the United States. Focus group results indicated that lack of knowledge and improper handling of leftovers were common among food preparers in families with young children. The USDA-recommended storage time for leftovers was used to develop and conduct a food safety social marketing campaign, **4 Day Throw Away** using both traditional and social media. A procedural model for developing a theory-based nutrition education intervention and the Health Belief Model were used to design, implement, and evaluate this campaign. The #4 mascot made numerous public appearances (in person and TV) to convey the **4 Day Throw Away** message; 10000 magnets were distributed; and 500 posters with tear-off note card were posted in the traditional campaign. Magnets and note card directed recipients to a website (4984 visits) with food safety information about leftovers. The social media campaign included 4 YouTube videos (11759 views); a Facebook page (166 users with over 21240 post views); and 51 followers on Twitter. The use of multiple media channels increased awareness and intention to change health behaviors especially among parents of children 10 and younger. Both traditional and social media methods in the **4 Day Throw Away** campaign reached the intended audience suggesting that interventions using a mix of media channels broaden the reach and potential for intended behavior change.

Introduction

Foodborne illnesses remain a common problem in the United States (CDC 2011). Specific food handling behaviors are linked to undesirable microorganisms in foods that consequently lead to foodborne illness in those who consume the contaminated food. One behavior is the improper storage of leftovers. Most consumers are unaware of recommendations for handling leftovers and neither refrigerate leftovers within 2 h of cooking food (Trepka and others 2006) nor discard leftovers within the recommended 3 to 4 d of storage (Lum 2010).

The Health Belief Model provides a theoretical framework for food safety behavior research that was originally developed by Rosenstock and others (1988) and employed 4 constructs: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. Self-efficacy and cues to action were added later (Janz and Becker 1984). Perceived susceptibility and perceived severity are particularly influential relative to food handling behaviors with leftover foods. Trepka and others (2006) found that WIC program clients did not perceive foodborne illness as an important problem. They also did not perceive that their own food handling practices at home put them at risk for foodborne illnesses. Results from focus groups conducted with primary food preparers for children 10 y and under indicated that these individuals believed that their children were susceptible to foodborne illness but did not perceive the consequences to be severe enough to adversely affect their child's health (Meysenburg 2009). However, studies suggest that parents of children age 10 and under are likely to change their food safety behavior, but only for their children (USDA 2005). Although practicing food safety may reduce their children's risk for foodborne illness, parents stated that barriers of time, lack of knowledge, and family demands outweighed the benefits. Home food preparers need to take precautions to minimize pathogen contamination; these precautions come from knowledge of effective food handling skills and perceived need to be motivated to act on that knowledge (Medeiros and others 2004).

Social marketing campaigns to influence health behaviors have increased dramatically within the past 20 y (Samuels 1993; Baldwin Group 2001; USDA-FSIS 2005; Craig and others 2007; Nash and others 2006; Huhman and others 2008; Huberty and others 2009; Watson and others 2009). Social marketing is defined as "the planning and implementation of programs designed

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to bring about social change using concepts from commercial marketing" (Andreasen 1999). Traditional mass media campaigns have included the use of television and radio public service announcements (PSAs) and print materials including newspaper articles, posters, brochures, and flyers. The increased complexity and use of the Internet presents opportunities for social marketing campaigns to use the Internet and social media for influencing health behaviors. Thackeray and others (2008) suggested Web 2.0 promotes/fosters sharing, linking, collaborating, and inclusion of use-generated content. A Pew Research Center (2011) report stated that 29% of Internet users search for information about food safety or recalls and social networking sites are most popular with women and young adults under age 30. Social networking sites such as Facebook or LinkedIn are used by 65% of online adults age 18 and older, and 13% of online adults used Twitter (Madden and Zickuhr 2011). Because social media has the ability to engage target audiences in great capacities, social marketers should consider these interactive Internet applications to promote health behavior change.

The purpose of this study was to conduct a summative evaluation of the traditional and social media food safety social marketing campaign, **4 Day Throw Away**, on awareness, knowledge, attitudes, and intended behaviors for food safety practices of leftovers in 2 Midwestern states (Nebraska and Iowa). The target audience of this campaign was the primary food preparer in families with children age 10 and under. This goal of the study intended to examine whether the campaign reached the intended audience and initiated behavior change for appropriate food safety practices related to leftovers.

Materials and Methods

The **4 Day Throw Away** campaign was based on USDA/USDHHS recommended consumer storage time for leftovers (USDHHS 2009). According to the 2005 Food Code, leftovers can be stored in a refrigerator longer than 4 d when the refrigerator maintains a temperature of 41 °F or less; however, in refrigerators set at 45 °F, leftovers can be kept safely for only 4 d (FDA 2005). Since the temperatures of home refrigerators are unknown, the conservative timeframe of 4 d for storing leftovers was used as the target message of the campaign.

The procedural model for developing a theory-based nutrition education intervention (Contento 2011) was used as a framework to design, implement, and evaluate the **4 Day Throw Away** social marketing campaign using the Health Belief Model (Janz and Becker 1984; Rosenstock and others 1988). The campaign used both traditional and social media methods together to deliver the social marketing message of: "after 4 d, throw your leftovers away."

To evaluate the effectiveness of the campaign, 3 pilot-test communities (the campaign was conducted in Omaha, Nebraska/Council Bluffs, Iowa metro area; Kearney, Nebraska including the rural area surrounding Kearney; and Iowa City/Cedar Rapids, Iowa metro area) and 3 control communities (Scottsbluff, Nebraska; Sioux City, Iowa/ South Sioux City, Nebraska metro area; and Davenport, Iowa) were chosen and matched for population size. The target audience for the social marketing message was defined as any adult, ages 19 to 40 with child(ren) 10 y of age or younger. Individuals with children 10 y of age or younger were targeted and Institutional Review Board approval was granted (20110311602EX).

Traditional media methods

In pilot-test communities, the social marketing campaign was delivered using a variety of traditional and social media strategies. Traditional media strategies included displaying posters (Figure 1) with pull off pads placed in locations where the target audience frequented such as grocery stores, daycare centers, children's museums, and libraries. In addition, magnets (Figure 2) were distributed at local grocery stores and handed out at scheduled health and nutrition fairs. PSAs were developed and distributed to local radio and television programs. The traditional social marketing campaign also included appearance by the campaign mascot, **#4** (Figure 3). The mascot visited local grocery stores and fairs to hand out food safety materials and educate individuals on the **4 Day Throw Away** message.

Finally, the magnet and poster with tear off notecards from the traditional media campaign directed the recipient to the website (www.4daythrowaway.org) (Figure 4) so that individuals could learn information about safe handling practices of leftovers. Leftover myths created by food safety experts were rotated on the website every week and website users were polled about their behaviors and knowledge on leftover topics. The traditional campaign started the week before Thanksgiving and continued through January. The holidays were selected because leftover food is common during this time period.

Social media methods

A variety of social media strategies were also developed for the **4 Day Throw Away** campaign and were available to the 3 pilot test communities during the same time period that the traditional campaign was conducted. In contrast to the traditional media tools, the social media campaign was supported solely through Internet-based tools. A Facebook page (www.facebook.com/4daythrowaway) was developed with regular posting of leftover tips, which were also "tweeted" using the Twitter account (www.twitter.com/4daythrowaway). In addition, 6 short informational videos with **#4** were created and posted on YouTube (www.youtube.com/4daythrowaway) and on the website. In the videos, the mascot #4 was portrayed as the "super hero" saving consumers from situations or scenarios that presented a food safety risk. There was a constant flow of interaction between individuals using the social media tools and the campaign team. The social media strategies were linked to the **4 Day Throw Away** website. In addition, the magnet and poster with tare off notecards from the traditional campaign directed the recipient to the website (www.4daythrowaway.org). Two different Internet addresses (4daythrowaway.org and fourdaythrowaway.org) were created to track whether users accessed the respective website from the traditional or social media tools. Finally, an iPhone/iPad® application (http://itunes.apple.com/app/leftovers/id427307538?mt=8) was developed to inform families with young children about safe food handling of leftovers and other foods, and the risk of foodborne illness (Albrecht and others 2012).

The control communities were isolated from the traditional campaign messages, received no contact from the researchers during the campaign, and were utilized for evaluation purposes only. The researchers carefully selected control communities similar in size and demographics to the pilot test communities based on the Metropolitan and Micropolitan Statistical Areas of the U.S. Census Bureau (http://www.census.gov/population/metro/) and ensure that traditional media channels in these communities did not overlap in the test and control communities.

Figure 1–Poster for 4 Day Throw Away Campaign with tear-off sheets.

Figure 2–Magnet with 4 Day Throw Away logo and website address.

Evaluation methods

The reach of the **4 Day Throw Away** food safety campaign was measured for both the traditional and social media campaigns. The number of posters, magnets, and notecards distributed was monitored in the traditional campaign. Quantitative data including number of friends on Facebook, Twitter followers, views on YouTube, and unique visits to the **4 Day Throw Away** campaign website were monitored by the social media campaign. Qualitative data captured from the social media campaign included comments from each of the social media outlets utilized (Facebook, Twitter, YouTube). Finally, access to the website from the 2 different urls was quantified to differentiate access from the traditional compared to social media campaign. Results from the polling questions on the website were collected as an additional piece of quantitative data.

A survey to evaluate the traditional social marketing campaign was developed using questions to evaluate the target audience's awareness of knowledge and behaviors toward food safety practices in handling leftovers. Grocery stores were contacted 4 mo after the launch of the social marketing campaign in the pilot-test and control communities as sites to conduct the evaluation surveys. Individuals were intercepted as they walked in the door of grocery stores and asked if they had children living with them under the age of 10. If they responded "yes," they were asked to orally respond to the survey questions. A total of 100 individuals completed the survey from each of the 6 communities ($n = 600$). Data were recorded and analyzed using Chi Square function in the statistical computer software SAS V9.2 (2008) with statistical significance set at P value of 0.05.

Results

Electronic resources developed included: website, YouTube® videos, Facebook® and Twitter® postings, and iPhone/iPad® application. Table 1 includes the reach for materials developed and delivered for the **4 Day Throw Away** campaign.

Evaluation of the traditional social marketing campaign consisted of 600 individuals (554 females and 46 males) completing the grocery store intercept survey (Table 2). Of the 300 participants surveyed from the pilot-test communities, 24% ($N = 70$) provided unprompted or prompted awareness of the **4 Day Throw Away** campaign. In the control communities, only 1% (3 individuals) had heard of the campaign even when prompted. This was a significant difference ($P = 0.0001$) between awareness of the campaign in pilot-test communities compared to the control communities.

Respondents were asked what length of time they currently kept leftovers in their homes. A significantly higher number ($P = 0.0001$) of respondents in pilot-test communities had heard of the recommendation for the length of time to safely keep leftovers. This awareness also led to safe handling of leftovers; 50% of the respondents (149 respondents) from pilot-test communities reported throwing away leftovers 4 d or less after preparation

Figure 3–Picture of Mascot, #4 at events.

compared to 38% (115 respondents) from the control communities ($P = 0.0093$).

Respondents were also asked to rank their level of comfort throwing away all leftovers after 4 d using a 5-point Likert scale. No significant difference was found between the pilot-test communities (95%) and the control communities (94%) for their comfort level to throw away leftovers during the recommended time frame.

The magnets and notecards used in the traditional campaign directed recipients to the campaign website that had 4984 visits and continued to increase. During the first 6 mo of the campaign, 60% of viewers entered the website via the traditional campaign compared to 40% via social media campaign (Table 1). A total of 400 website visitors responded to the polling function on the website. When asked how long leftovers stay in the refrigerator before being used, the most frequent response chosen was 3 to 4 d.

Figure 4–Screen shot of Website (www.4daythrowaway.org).

Table 1–Distribution and reach of social marketing educational materials for the "4 Day Throw Away" campaign.

Social media reach	Traditional media reach
YouTube® videos total views: 11759	Magnets distributed: 10000
Facebook® users: 166	Posters distributed: 500 posters
Facebook® post views: 21240	Notecards distributed (30 per poster): 15000 notecards
Twitter® followers: 51	
Mobile app users (not downloads, actual users): 4679; Mobile app total sessions: 13592	
Website visits: 1976	Website visits: 3008
Total reach: 53463	**Total reach: 28508**

Table 3–Selected Facebook comments for 4 Day Throw Away.

"I didn't listen and ate last weekend's leftover chicken tacos . . . I've learned my lesson. 4 days and throw it away!"
"Our frig is cleaner lately, but it's really hard to part with some leftovers!"
"My husband and I usually take our leftovers to work the next day for lunch. So, we usually don't have leftovers past 2 days."
"I have teenagers – so leftovers usually aren't an issue. But when we have had leftovers, I used to chuck them out if they'd been in the fridge a week. As I've learned about this campaign I've revised that to 4 days."
"The trick is to think about WHEN you will eat leftovers. If it will be more than 4 days freeze it."
"I thought I was going to see #4 show up in our kitchen last night! . . . I am still working on Kurt to get on board with the 4 day rule! It is nice to have these guidelines from ISU and UNL back me up when I argue with his "scientific" method of smelling and looking at leftovers to decide if they are OK to eat."
"Practicing Food Safety means keeping healthy!"
"Can you eat bean burritos stored in the fridge "on" the 4th day, cuz I took a bite of a bean burrito after heating it up, and I am a bit worried. I tossed it out tho . . . "

Over 53% of respondents reported throwing out leftovers they brought home from a restaurant before 4 d. To determine if leftovers were safe to eat, 55% of respondents answered labeling leftovers and using them within 4 d.

The 6 YouTube videos had over 12000 views combined and the Twitter account had over 50 followers, with neither having any comments posted. The YouTube videos were viewed predominately by those in the United States (92%) with Iowa and Nebraska as the top 2 states (41% of the views). Of the viewers, 62% were female and 38% male. The Facebook page had 166 "friends" with over 21000 post views. Facebook friends continue to engage in a variety of interactions on the Facebook page including comments on pictures and posts of **#4**. Selected comments can be found in Table 3.

Discussion

Foodborne illness affects millions of people each year with a sizeable proportion of these cases due to the lack of preventable actions taken by consumers. Young children are at high risk for developing foodborne illness and parents or guardians are largely responsible for preparing food for their young children at home. Safe food handling practices among parents and/or guardians are vital in reducing the risk of foodborne illness. The **4 Day Throw Away** social marketing campaign, using both traditional and social media methods, was developed to increase the awareness of food safety of leftovers. Two-thirds of adult Internet users (65%), which has more than doubled since 2008, report using social networking sites like those used in this campaign (Fox, 2011). The place at which new users have started to use social networking sites has been staggering and suggested that social media venues will be critical in the success of reaching multiple audiences with nutrition, health, and food safety behavior messages.

Traditional media methods, which included press releases, PSAs, distribution of campaign magnets and posters as well as appearances by the campaign's mascot **#4**, were all utilized in the 3 pilot test communities. Individuals from the pilot tests communities were significantly more aware of the **4 Day Throw Away** campaign than those from the control communities ($P = 0.0001$). Further, pilot tests communities also had a greater percentage of individuals (50%, $P = 0.0093$) throwing leftovers away after 4 d compared to control communities, which suggests that the campaign impacted their food safety behaviors for leftovers. Respondents from pilot-test and control communities were very comfortable with disposing of leftovers during the recommended time frame of 4 d. This indicates that when individuals have knowledge of food safety for handling leftovers, they are more likely to adopt the desirable practice. A large number of magnets and notecards were distributed, which directed recipients to the campaign website.

YouTube, Facebook, and Twitter were social media strategies employed in the **4 Day Throw Away** campaign. The website utilized for both traditional and social media campaigns had 4984 unique users; 60% of these users were referred by traditional media methods compared to 40% from social media methods. These results indicate that the use of traditional media methods remains a viable means to reach young parents/guardians with health-related information. The **4 Day Throw Away** website was a tool in assessing individuals' knowledge and behaviors toward handling leftovers through the use of an interactive polling function. The majority of individuals responded to the polling questions in a manner that represented safe food handling practices.

Facebook and YouTube appeared to be more effective than Twitter in sharing information about the food safety of leftovers. Facebook engaged more than 166 "friends" and YouTube videos were viewed 11759 times collectively. Comments left by users of Facebook indicated positive behavior change in the area of food safety of leftovers. Qualitative data (Table 3) provided a rich source of how individuals interacted with the information and took action or changed behavior. Social media is in its infancy and more research is needed to evaluate its educational use. Yet,

Table 2–Grocery store intercept survey results from 6 midwestern cities of food safety social marketing campaign ($n = 600$; 554 females, 46 males with child(ren) 10 y old and younger).

		Test sites ($N = 300$)		Control sites ($N = 300$)	
		N	%	*N*	%
Awareness of campaign (yes/no)	Prompted	40[a]	13	3[a]	1
	Unprompted	30[a]	10	0[a]	0
Current behaviors (throw away leftovers $\leq$ 4 d)		149[a]	50	115[a]	38
Intended behavior for food safety of leftovers (comfortable/very comfortable)		284	95	282	94

[a]Statistical significant using Chi Square within rows at $P = 0.01$.

these results suggest that social media is a method to reach the target audience (families with young children) with relevant food safety information. The goal of social media as an educational or marketing tool is to create a campaign that goes "viral." Viral messages that are appealing to individuals using social networking have a high probability of being spread by these individuals in their communications with others in a short period of time. Because of its popularity with younger audiences, more exploration into the effectiveness of these technologies as educational tools is needed. Through the use of social media, there is the ability to reach any audience including hard to reach audiences 24 h a day/7 d a week.

Use of social media tools will be important to consider for the success of public health intervention designed to reach young audiences. Large social marketing campaigns should utilize an appropriate mix of traditional media and social media methods when focusing on food safety topics. Behavior change as a result of large food safety campaigns using social marketing strategies is difficult to measure. Extension professionals and food and nutrition professionals would benefit from research on the impact of social marketing campaigns with a food safety message. Government entities and other researchers interested in designing and funding social marketing campaigns would also benefit from the added knowledge on the use and effectiveness of social media to disseminate a food safety message.

Future research should focus on methods to evaluate not only the reach but also the behavior change as a result of large, multifaceted public health interventions similar to the **4 Day Throw Away**, particularly campaigns utilizing social media. As social media continues to advance, comparisons between using social media methods as opposed to more traditional methods should be employed. Also, an important part of evaluation is not only to determine if an intervention was achieved, but also to answer the question of why it was effective or not. Incorporating process evaluation techniques and qualitative research methodology should be considered for evaluation methodologies.

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Conflict of Interest

There is no conflict of interest by any author.

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