Nutrition Research and Practice 2016;10(4):456-463

http://e-nrp.org

Evaluation of emotion-based messages designed to motivate Hispanic and Asian parents of early adolescents to engage in calcium-rich food and beverage parenting practices

Jinan Corinne Banna[1§], Marla Reicks[2], Carolyn Gunther[3], Rickelle Richards[4], Christine Bruhn[5], Mary Cluskey[6], Siew Sun Wong[6], Scottie Misner[7], Nobuko Hongu[7] and N Paul Johnston[8]

[1]Department of Human Nutrition, Food and Animal Sciences, 1955 East West Road, Agricultural Sciences 216, University of Hawaii at Manoa, Honolulu, HI 96822, USA
[2]Food Science and Nutrition, University of Minnesota, Minneapolis, MN 55455, USA
[3]Department of Human Nutrition, The Ohio State University, Columbus, OH 43210, USA
[4]Department of Nutrition, Dietetics and Food Science, Brigham Young University, Provo, UT 84602, USA
[5]Center for Consumer Research, Food Science and Technology, University of California-Davis, Davis, CA 95616, USA
[6]Nutrition, School of Biological and Population Health Sciences, Oregon State University, Corvallis, OR 97331, USA
[7]Department of Nutritional Sciences, University of Arizona, Tucson, AZ 85721, USA
[8]Department of Nutrition, Dietetics and Food Science, Brigham Young University, Provo, UT 84602, USA

BACKGROUND/OBJECTIVES: Setting healthful beverage expectations, making calcium-rich foods and beverages (CRF/B) available, and role modeling are parenting practices promoting calcium intake among early adolescents. This study aimed to evaluate emotion-based messages designed to motivate parents of early adolescents to perform these practices.
SUBJECTS/METHODS: Emotion-based messages were developed for each parenting practice and tested in 35 parents from 5 states. Findings were used to modify messages and develop a survey administered via Amazon MechanicalTurk to a convenience sample of Asian (n = 166) and Hispanic (n = 184) parents of children 10-13 years. Main outcome measures were message comprehension, motivation, relevance, acceptability, and novelty. Engagement in the parenting practices was also assessed.
RESULTS: Message comprehension was acceptable for the majority of parents. Most also agreed that messages were motivational (setting healthful beverage expectations (69.0%), making CRF/B available (67.4%), and role modeling (80.0%)), relevant and acceptable. About 30-50% indicated they had not seen the information before. Many parents indicated they were already engaging in the practices (> 70%). No racial/ethnic differences were observed for responses to messages or engaging in parenting practices.
CONCLUSIONS: Results indicate that emotion-based messages designed to motivate parents to engage in parenting practices that promote calcium intake among early adolescents were motivating, relevant, and acceptable.

Nutrition Research and Practice 2016;10(4):456-463; doi:10.4162/nrp.2016.10.4.456; pISSN 1976-1457 eISSN 2005-6168

Keywords: Emotion-based message, Hispanic, Asian, early adolescent, calcium

INTRODUCTION

Osteoporosis, a condition characterized by low bone mass, may result in debilitating fractures that are costly both for the individual and society [1]. Prevention of osteoporosis begins in childhood with strategies to maximize bone mineral density, which include dietary approaches [2]. Sufficient calcium intake is one particularly important factor for bone mass acquisition during childhood and adolescence; therefore, consumption of calcium-rich foods and beverages (CRF/B) should be encouraged during these periods [3]. According to national dietary data from 2001-2008, however, approximately half of males and three-fourths of females (9-18 years) are not meeting the estimated average requirements for calcium intake, regardless of supplement use [4]. In certain racial/ethnic population groups, intake of CRF/B may be challenging. For example, Hispanic adults have higher rates of lactose intolerance compared to whites, which may hinder the consumption of dairy foods which make a large contribution to calcium intake [5]. Calcium intake has also been shown to be low in Asian populations, for whom nondairy foods are often the main contributors to intake [6].

Previous studies have indicated that parents play a key role in influencing intake of CRF/B in early adolescents (10-13 years), with several parenting practices being important predictors of

This work was supported by money appropriated by Congress through the Hatch Act to the Agricultural Experiment Stations of land grant universities for multistate research projects.
§ Corresponding Author: Jinan Corinne Banna, Tel. 808-956-7857, Fax. 808-956-4024, Email. jcbanna@hawaii.edu
Received: December 20, 2015, Revised: February 29, 2016, Accepted: March 1, 2016

intake [7]. One such practice is making CRF/B available in the home, with previous studies demonstrating higher intake of calcium among adolescents offered milk and other CRF/B at meals [8-10]. Setting healthful beverage expectations, such as providing encouragement to drink milk, is another key parenting practice for promoting calcium intake among children [11]. In addition, parental role modeling also impacts adolescents' intake of CRF/B; thus, parents' own consumption of foods such as cheese and yogurt is important [9,10,12,13]. Given the evidence pointing to the significance of parenting practices with regards to adolescents' dietary behavior and the need for improvement in intake of CRF/B particularly in some segments of the population, influencing those practices shown to impact calcium consumption in youth may be a valuable way to improve intake of this micronutrient.

Emotion-based messaging is one such strategy that may be employed to encourage parents to engage in parenting practices that promote intake of CRF/B in children, and has previously been used to effectively inspire audiences to engage in a number of health-promoting behaviors [14-16]. Emotion-based messages are those that appeal to values and emotional states to persuade the individual to adopt a belief or perform a specific action [17,18]. To motivate the population targeted, emotion-based messages may use symbolic cues that seek to evoke an emotional arousal of needs, leading to performance of a behavior. Emotional motives imply using personal or subjective criteria to make a decision, such as the desire for individuality, pride, fear or regret, affection, or status [19]. In emotion-based messages, a simple cue triggering an affective state in the persuasion context influences attitudes in the absence of argument processing, implying that the 'peripheral route' may be used to set goals or make decisions [20]. Emotional responses are characterized by a special strength and immediacy, and play an important role in persuasion, as individuals may make quicker and simpler judgments in a positive affective state [18,21]. While data indicate that the use of emotion-based messaging may be an effective method for eliciting positive dietary behaviors [22,23], to our knowledge, no studies have examined if and to what degree such messages might be used to motivate parents to engage in practices that influence their children's intake of CRF/B.

To effectively impact behavior, messages should have a number of key characteristics and must be evaluated on several important dimensions. First, comprehension on the part of the target audience must be assessed. Comprehension refers to the amount of meaning accurately derived from the message [24] and is a function of both characteristics of the message and of the receiver, such as his/her ability to process the message [24]. Relevance to the audience is another key factor to examine, which may be achieved by tailoring health communications to customize the message to a given population [25,26]. Motivation/behavioral intention (e.g. an individual's perceived likelihood or subjective probability that he/she will engage in a specific behavior in response to a message) [27], is an additional factor that should be studied. Finally, acceptability of messages on the part of the audience is also important to gauge, along with novelty, or the degree to which information in the message is new to the individual [28].

The objective of the current study was to evaluate a series of emotion-based messages designed to motivate Hispanic and Asian parents of early adolescents to engage in practices promoting intake of CRF/B for comprehension, motivation, relevance, acceptability, and novelty. Positive evaluation results would indicate that the messages are appropriate for use in future parent nutrition education programs.

SUBJECTS AND METHODS

Message development

A flow chart detailing the process of message development is provided in Fig. 1. Several emotion-based messages (images and taglines) were developed for each of the 3 parenting practices (setting healthy beverage expectations, making CRF/B available at home, and role modeling CRF/B intake). The research team prepared creative briefs based on previous research with Asian and Hispanic parents of children (10-13 years) using the nominal group technique [29]. The creative brief is a tool used in marketing to allow a graphic designer to understand the target audience and the goal of the promotional effort [30]. In this study, the creative briefs included a description of the audience; the desired behaviors to be promoted and rationale; underlying emotional motivators; benefits, barriers and facilitators of the behaviors; and considerations based on the media that would be used for dissemination. A graphic artist used the briefs to create messages (images and taglines) based on iterative feedback from the research team. The messages were tailored to each race/ethnicity (Asian and Hispanic) by using pictures of culturally appropriate CRF/B and individuals appearing to be of the same race/ethnicity. Preliminary qualitative interview data were collected from a convenience sample of parents or caregivers of children (10-13 years) to select a final group of three messages, one for each parenting practice. Parents providing interview data had primary responsibility for food acquisition and preparation in the child's household, lived in the U.S. for at least 12 months; spoke English; and self-identified as Hispanic (n = 17) or Asian (n = 18). Parents were from 5 states (California, Hawaii, Minnesota, Oregon, and Utah) and participated in brief individual interviews from April to October 2013. The interview questions were designed to examine message comprehension, motivation, acceptability, personal and cultural relevance, and overall impression. All interviews were transcribed verbatim and responses were grouped according to race/

Fig. 1. Flow chart outlining message development and testing process

Setting expectations for healthful beverage intake | Making calcium-rich foods and beverages available | Role modeling

Fig. 2. Messages for Hispanic parents

ethnicity of parents and parenting practice. Researchers used this information to determine overall acceptability of each message and selected one for each parenting practice (Fig. 2). The selected messages were tested further among a larger sample of parents using an online survey.

Survey participants

A convenience sample of parents or caregivers of children (10-13 years) responded to a questionnaire available through Amazon MechanicalTurk, a crowd-sourcing website where Requesters (research team member) provide Human Intelligence Tasks (HITS) for workers (individuals who register with the site) to complete. Inclusion criteria were: 1) being the adult responsible for food acquisition and preparation in a household with a child 10-13 years, 2) living in the U.S.; 3) speaking English and being comfortable speaking English; and 4) self-identifying as Hispanic (n = 184) or Asian (n = 166). Asian parents/caregivers participated from May-June 2014 and Hispanic parents/caregivers participated from July-August 2014. Respondents completed the survey in an average of 14.7 minutes (SD 43.4 minutes). Each respondent had $0.50 entered into their Amazon payment account by Amazon MechanicalTurk for their participation. The study protocol was determined to be exempt from full committee review by the University of Minnesota Institutional Review Board.

Survey data collection and analysis

A questionnaire was developed by the research team using a Qualtrics platform hosted by the University of Minnesota. Frequencies for setting expectations for healthy beverage intake (10 items) and making CRF/B available in home (13 items) were assessed with previously validated scales (1 = never to 5 = always) [31,32]. Frequency of role modeling intake of CRF/B was assessed with a previously validated brief calcium intake assessment tool including 15 food/beverage items [33] using parental intake as a proxy measure for role modeling intake for children. A series of questions was included at the end of the survey to gather information about demographic characteristics.

A set of questions was included about each message (1 = strongly disagree to 5 = strongly agree) to assess motivation to engage in the practice (e.g., Seeing this poster would make me want to buy calcium-rich foods and drinks for my child to have at home. - for "making CRF/B available"), relevance (The information in this poster is important to me as a parent), acceptability (This poster is acceptable to me), and novelty (I have seen the information in this poster before).

The survey was pretested by the research team and several graduate students for readability, flow, and timing. After minor revisions, the survey was made available to Amazon Mechanical Turk workers. Qualtrics survey results were downloaded into an Excel file and used for analysis. A total of 268 Hispanic and 293 Asian parents/caregivers logged onto the survey; of these, 211 were excluded because they did not self-report as Hispanic or Asian, had a duplicate IP address or did not answer any questions, did not respond after consent, did not indicate they had children under 18 years or adults in the home, or took less than 2 minutes to complete the survey. Thus, data from 62% of those who logged onto the survey was used, yielding a final sample of 350 participants.

SAS 9.4 (copyright 2002-2013, SAS Institute Inc., Cary NC) software was used for data analysis. Means and frequencies were generated to describe demographic characteristics, frequency of parenting practices, and responses to survey questions regarding messages. Chi square and t-tests were used to determine statistical significance for categorical and continuous variables by race/ethnic group, respectively. A P value of < 0.05 was considered statistically significant.

RESULTS

Participant characteristics

Most parents/caregivers (n = 350) were between the age of 18-40 (87.7%), with 1-2 adults (83.2%) and 1-2 children < 18 years (82.0%) in the home (Table 1). Most had some college education or a 4-year degree (81.5%) and fell across the range of income levels. However, Asian parents/caregivers (n = 166) were more likely to have higher levels of education and income compared to Hispanics (n = 184). Most respondents were born in the US (80.6%) with no differences by race/ethnicity and most (88.8% had lived in the US more than 10 years. A majority

Table 1. Demographic characteristics of survey respondents (parents/caregivers of early adolescents (10-13 yrs))[1]

	All (n = 350)	Asian (n = 166)	Hispanic (n = 184)	*P*-value[2]
		n (%)		
Gender				
Male	NA[3]	NA	68 (37.8)	
Female	NA	NA	112 (62.2)	
Age				0.132
18-30	111 (32.7)	42 (26.4)	69 (38.3)	
31-40	187 (55.2)	95 (59.8)	92 (51.1)	
41-50	33 (9.7)	18 (11.3)	15 (8.3)	
51+	8 (2.4)	4 (2.5)	4 (2.2)	
Number adults in home				0.339
1	57 (16.8)	21 (13.2)	36 (20.0)	
2	225 (66.4)	114 (71.7)	111 (61.7)	
3	31 (9.1)	12 (7.6)	19 (10.6)	
4	26 (7.7)	12 (7.6)	14 (7.8)	
Number children (< 18 yrs) in home				
1	151 (44.5)	70 (44.0)	81 (45.0)	
2	127 (37.5)	68 (42.8)	59 (32.8)	
3	41 (12.1)	16 (10.1)	25 (13.9)	
4+	20 (5.9)	5 (3.1)	15 (8.4)	
Education				0.002
Not completed high school	5 (1.5)	2 (1.3)	3 (1.7)	
High school diploma/GED	58 (17.1)	16 (10.1)	42 (23.2)	
Some college	127 (37.4)	56 (35.2)	71 (39.2)	
4 year degree or higher	150 (44.1)	85 (53.5)	65 (35.9)	
Marital status				0.064
Now married	243 (71.5)	123 (77.4)	120 (66.3)	
Never married	66 (19.4)	26 (16.4)	40 (22.1)	
Divorced/widowed/separated	31 (9.1)	10 (6.3)	21 (11.6)	
Income				0.001
< 30 K	84 (24.7)	25 (15.7)	59 (32.6)	
30-49.9 K	96 (28.2)	46 (28.9)	50 (27.6)	
50-74.9 K	96 (28.2)	49 (30.8)	47 (26.0)	
75 K+	64 (18.8)	39 (24.5)	25 (13.8)	
Family status				0.089
Not born in the US	66 (19.4)	39 (24.5)	27 (14.9)	
Born in US, at least one parent was not	136 (40.0)	64 (40.3)	72 (39.8)	
Born in US, parents born in US, at least one grandparent not	82 (24.1)	35 (22.0)	47 (26.0)	
Born in US, parents and grandparents all born in US	56 (16.5)	21 (13.2)	35 (19.3)	
Language spoken in the home				
Speak only English at home	149 (43.8)	76 (47.8)	73 (40.3)	
More English than another language	58 (17.1)	26 (16.4)	32 (17.7)	
English and another language equally	107 (31.5)	43 (27.0)	64 (35.4)	
Another language more than English	19 (5.6)	10 (6.3)	9 (5.0)	
Don't speak English at home	7 (2.1)	4 (2.5)	3 (1.7)	
Years lived in the US				0.251
1-3 yrs	10 (2.9)	2 (1.3)	8 (4.4)	
4-6 yrs	12 (3.5)	7 (4.4)	5 (2.8)	
7-10 yrs	16 (4.8)	9 (5.7)	7 (3.9)	
> 10 yrs	302 (88.8)	141 (88.7)	161 (89.0)	

[1] Where n≠350 for all parents, 166 for Asian and 184 for Hispanic parents, data are missing.
[2] *P*-value according to Chi square tests for differences by race/ethnicity
[3] NA = not available, not included in the survey for Asian parents

Table 2. Frequency of engaging in parenting practices for all parents and by race/ethnicity

	All (n = 350)	Asian (n = 166)	Hispanic (n = 184)	*P*-value[3]
		Mean (SD)		
Expectations score[1]	3.3 (0.4)	3.7 (0.5)	3.3 (0.4)	0.141
Availability[1]	3.7 (0.5)	3.6 (0.5)	3.2 (0.4)	0.155
Calcium score[2]		n (%)		0.096
> 58	174 (49.7)	73 (44.0)	101 (54.9)	
43-57	52 (14.9)	25 (15.1)	27 (14.7)	
27-42	86 (24.6)	44 (26.5)	42 (22.8)	
≤26	38 (10.9)	24 (14.5)	14 (7.6)	

[1] Expectations and Availability scores based on scales, with 1 = never to 5 = always [32], t-tests were used to determine statistical significance by race/ethnic group.
[2] Calcium Score from the Brief Calcium Assessment Tool [33], 58 = 1,300 mg, 43 = 1,000 mg, 27 = 700 mg calcium/day, Chi square tests were used to determine statistical differences by race/ethnic groups.
[3] $P < 0.05$ indicates statistically significant differences.

indicated they spoke mostly or only English at home (60.9%).

Engagement in parenting practices

Parental indication of engaging in the three parenting practices is presented in Table 2. The mean scores on scales to assess making CRF/B available and setting expectations for healthful beverage intake were 3.7 and 3.3 of 5.0, respectively. About two-thirds of all parents/caregivers (69.6%) had calcium scores indicating they were consuming 1,000 mg calcium/day (Table 2). No differences were observed by race/ethnicity for engaging in the practices assessed by scale scores or the calcium score.

Evaluation of messages

For all 3 parenting practices, the majority of respondents agreed (strongly agree or agree) that they understood the message intent. For setting healthful beverage expectations, making CRF/B available and role modeling, 78.6%, 76.2% and 83.2%, respectively, agreed that the poster was telling the respondent to engage in the behavior. For example, for making CRF/B available, parents/caregivers agreed with the statement that "This poster is telling me to buy calcium-rich foods and drinks for my child to have at home." Results did not differ by race/ethnicity or across marital status, education, age or income.

Many parents/caregivers agreed that the messages for all three parenting practices were motivational, relevant, and acceptable (Table 3). Parents/caregivers agreed that setting healthful beverage expectations (69.0%), making CRF/B available (67.4%), and role modeling (80.0%) messages were motivational. Similar ratings were observed for relevance (expectations-76.2% agreement, availability-75.0% agreement, role modeling-81.2% agreement) and acceptability (expectations-77.1%, availability-76.8%, role modeling-80.9%). For all parenting practices, between 36% and 48% of participants indicated they had not previously seen the information presented in the messages. No differences were observed by race/ethnicity for any message characteristics.

Table 3. Ratings of emotion-based messages for parenting practices by parents of early adolescents (10-13 yrs) regarding motivation, relevance, acceptability and novelty

Setting expectations for healthy beverage intake	All (n = 350)	Asian (n = 166)	Hispanic (n = 184)	*P*-value[1]
Motivation[2]				0.077
Disagree[3]	32 (9.3)	19 (11.7)	13 (7.1)	
Agree	238 (69.0)	109 (67.3)	129 (70.5)	
Relevance[4]				0.379
Disagree	27 (7.8)	14 (8.6)	13 (7.1)	
Agree	263 (76.2)	121 (74.7)	142 (77.6)	
Acceptability[5]				0.855
Disagree	22 (6.4)	12 (7.4)	10 (5.5)	
Agree	266 (77.1)	122 (75.3)	144 (78.7)	
Novelty[6]				0.161
Disagree	133 (38.6)	58 (35.8)	78 (48.2)	
Agree	145 (42.0)	75 (41.0)	67 (36.6)	
Making CRF/B available				
Motivation				0.576
Disagree	46 (13.5)	21 (13.2)	25 (13.8)	
Agree	229 (67.4)	109 (68.6)	120 (66.3)	
Relevance				0.907
Disagree	29 (8.5)	15 (9.4)	14 (7.7)	
Agree	255 (75.0)	119 (78.4)	136 (75.1)	
Acceptability				0.864
Disagree	27 (7.9)	11 (6.9)	16 (8.8)	
Agree	261 (76.8)	121 (76.1)	140 (77.4)	
Novelty				0.474
Disagree	129 (38.0)	62 (39.0)	67 (37.1)	
Agree	138 (40.6)	62 (39.0)	76 (42.0)	
Role modeling				
Motivation				0.160
Disagree	24 (7.1)	9 (5.7)	15 (8.3)	
Agree	272 (80.0)	129 (81.1)	143 (79.0)	
Relevance				0.574
Disagree	16 (4.7)	8 (5.0)	8 (4.4)	
Agree	278 (81.2)	132 (83.0)	144 (79.6)	
Acceptability				0.920
Disagree	17 (5.0)	8 (5.0)	9 (5.0)	
Agree	275 (80.9)	126 (79.3)	149 (82.3)	
Novelty				0.893
Disagree	132 (38.8)	60 (37.7)	72 (39.8)	
Agree	138 (40.6)	65 (40.9)	73 (40.3)	

[1] *P*-value < 0.5 indicates significant differences between Asian and Hispanic parents according to chi square tests
[2] Motivation-seeing this poster would make me want to have my child: drink a calcium-rich drink every day, buy calcium-rich foods and drinks to have for my child at home, set an example for my child by choosing calcium-rich foods and drinks.
[3] Disagree = strongly disagree + disagree, Agree = agree + strongly agree
[4] Relevance-information is important to me as a parent.
[5] Acceptability-information is acceptable.
[6] Novelty-information seen before.

DISCUSSION

Results from the current study demonstrate that emotion-based messages aiming to motivate Hispanic and Asian parents/

caregivers to promote intake of CRF/B in early adolescents are appropriate for use in efforts seeking to improve calcium intake. Parents play a major role as food gatekeepers for children, therefore effective methods to motivate parents to promote CRF/B intake are important given that one-half to three-fourths of early adolescents in the US have dietary calcium intakes at levels less than recommended [4]. Several individual characteristics may affect the potential for messages to motivate parents and should be considered in the message development and testing process.

Asian and Hispanic populations represent those most at risk of osteoporosis compared to others racial/ethnic groups [34]. In the current study, messages were tested with Asian and Hispanic parents to determine the potential for use with these audiences. Results indicated that responses to questions about message motivation, relevance, acceptability, or novelty and frequency of engaging in parenting practices did not differ between Hispanic and Asian parents. Studies on the acceptance of emotional messages to motivate parents to engage in the three parenting practices by racial/ethnic group have not been conducted. However, previous qualitative research has also examined calcium parenting practices among Hispanic and Asian parents of youth [35] and found few differences by racial/ethnic group as noted in the current study involving a quantitative study based on a larger sample size. The majority of parents in the current study reported consuming an equivalent of 1,000-1,300 mg calcium per day, which is much higher than previous reports in adult populations of these racial/ethnic backgrounds [4,36,37]. The high percentage of parents that were highly educated may have influenced the number in the current study indicating that they engaged in the three parenting practices. A recent review showed that parental education was consistently associated with home availability of healthy foods, parental support for healthy eating, and in several studies, with parental role modeling [38].

The emotion-based messaged tested in the current study were gain-framed messages, depicting positive benefits for children and family based on the particular parent practice (Fig. 2). A review of studies on the effects of health message framing indicated that gain-framed messages would be more effective with certain versus uncertain outcomes, low involvement in the issue, and risk-averse versus risk-seeking behaviors [39]. These findings are consistent with the majority of parents in the current study reacting positively to the messages, and finding them motivational and relevant. The parenting practices being promoted by the messages were depicted as having certain positive outcomes, a low level of involvement on the part of parents, and may have appealed to parents' need to protect children from risk of having an inadequate intake of CRF/B. Barriers to CRF/B consumption, such as lactose intolerance, were also considered in message development, as non-dairy sources of calcium were pictured. Fear-based, loss-framed messages may, therefore have been less appealing for this audience.

The message argument type (cognitive or affective) is another factor that may be altered to appeal to individual preferences [40]. The current study examined emotion-based (affective) messages, and did not include the testing of those that are information or fact-based (cognitive) [40]. In a previous study aiming to evaluate the acceptability of messages focused on disease prevention, researchers examined whether individuals who read messages matched to their preferred style of message argument would respond more favorably to message characteristics (appeal, understandability, persuasiveness, and relevance) than individuals who read messages not matched to their preferred style of message argument [41]. Results indicated that determining message argument preferences may be an important preliminary step in designing educational materials, as these preferences do affect responses. Future research on messages promoting intake of CRF/B in adolescents may incorporate the testing of fact-based cognitive arguments and the examination of the degree to which they are accepted in populations with diverse preferences.

A noteworthy finding from the current study was that not all participating parents reported an emotional response to the test messages, even though the messages were designed specifically with images and tagline phrases to evoke an emotional response from the target audience to ultimately motivate them to engage in the target behavior. For example, for role modeling, a picture of a family with positive face expressions and body language of similar racial/ethnic background was shown sharing a meal together, with the tagline, "Super Families Share Healthy Meals Together". According to the Elaboration Likelihood Model (ELM), a communications psychology theory that may be useful in predicting how consumers respond to nutrition messages [42], a person's motivation to respond to a persuasive message is partially dependent on how personally relevant the topic is to the individual [43]. Personal relevance is defined by how important the topic is to the target audience and their level of emotional investment in the issue. In this case, according to the ELM, these results may imply that the parents who failed to experience an emotional response to the test messages may not feel as if the topic at hand (that is, parenting practices that promote intake of CRF/B among their children) is one of personal relevance. On the other hand, since character identification in advertising typically produces an emotional response by consumers to a product or message [44], individuals who did not report having an emotional response to the messages may have been unable to identify with the 'actors' portrayed in the messages.

In the current study, a higher proportion of parents reported the role modeling message to be motivational (80.0%) compared to the messages addressing the topics of setting healthful beverage expectations (69.0%) and making CRF/B available (67.4%). According to the Social Cognitive Theory (SCT) of behavior change, the key motivating variable is outcome expectancies, or the outcomes-both positive and negative-one expects to receive by performing in the target behavior [45]. A recent study of a convenience sample of U.S. parents of early adolescent children reported on the personal benefits (i.e., positive outcomes) that parents receive by engaging in these three parental practices, which included emotional rewards for the availability practice and child health promotion for the setting expectations and role modeling practices [1]. While Richards *et al.* [29] did not ask parent participants to rank their perceived benefits for each of the three parenting practices, according to SCT, results from the current study indicate that the positive

and negative outcomes received by engaging in the role modeling practice may slightly outweigh those of the other two parenting practices of availability and setting expectations.

Strengths of this study include inclusion of participants from diverse geographic areas across the U.S. both in the development and testing of messages. In addition, use of qualitative methods to evaluate messages and images in five states prior to testing in a larger population allowed for modification of posters based on feedback from the target population.

The current study had several limitations. First, there was a lack of demographic variability, as messages were tested in only two racial/ethnic groups; thus, it is unknown how appropriate these would be in other populations. Future studies may involve testing of messages with images tailored for a variety of racial/ethnic groups. In addition, this study made use of a convenience sample, which limits the generalizability of findings. Those who opted to participate had a fairly high level of education, further limiting the applicability of results to the general population. In addition, while results provide information regarding the perceived effect of the messages on motivation to perform the desired behaviors, information on parental behaviors was not collected in this study to assess whether the emotion-based messages designed had any effect on practices. A future study examining the effects of the messages on behavior may incorporate messages into an intervention and include a control group for comparison.

Widespread internet use has emerged in behavior interventions (e.g. increasing fruits and vegetables intakes, weight loss, and smoking cessation, etc.) that are delivered via website programs. Evidence suggests that participants in website programs respond to tailored messages with better outcome than information only [46]. As the current study demonstrated, parents in both ethnic groups reported to be motivated by the messages to engage in the three parental practices (setting healthful beverage expectation, making CRF/B in home, and role modeling). With new technological innovations, and greater numbers of people having access to the internet and mobile apps, the process of message delivery to a large group is possible and may be cost-effective.

Of note, a large proportion of participants indicated they had not seen the information on the posters before, indicating the novelty of the messages. In an examination of promotion of intrinsic motivation, Ryan & Deci [28] state that individuals will be intrinsically motivated only for activities that hold intrinsic interest for them, activities that have the appeal of novelty, challenge or aesthetic value. Previous research examining individuals' responses to the information environment has also demonstrated that new content attracts audience attention by deviating from existing schemata, and is also more likely to be retransmitted to others [47,48]. That most parents found messages to be motivational in the current study may in part reflect the novelty of the information, which is a factor that should be considered in planning behavior change interventions.

Further research is needed to determine whether these messages would be accepted in a variety of socioeconomic and ethnic populations through selected dissemination channels-community, health care organizations or disease prevention programs.

ACKNOWLEDGEMENTS

The authors acknowledge and thank the participants in the study for their contribution to this research.

REFERENCES

1. Office of the Surgeon General (US). Bone Health and Osteoporosis: a Report of the Surgeon General. Rockville (MD): Office of the Surgeon General; 2004.
2. Grossman JM. Osteoporosis prevention. Curr Opin Rheumatol 2011;23:203-10.
3. Golden NH, Abrams SA; Committee on Nutrition. Optimizing bone health in children and adolescents. Pediatrics 2014;134:e1229-43.
4. Wallace TC, Reider C, Fulgoni VL 3rd. Calcium and vitamin D disparities are related to gender, age, race, household income level, and weight classification but not vegetarian status in the United States: analysis of the NHANES 2001-2008 data set. J Am Coll Nutr 2013;32:321-30.
5. Nicklas TA, Qu H, Hughes SO, Wagner SE, Foushee R, Shewchuk RM. Prevalence of self-reported lactose intolerance in a multi-ethnic sample of adults. Nutr Today 2009;44:222-7.
6. Larsson SC, Orsini N, Wolk A. Dietary calcium intake and risk of stroke: a dose-response meta-analysis. Am J Clin Nutr 2013;97:951-7.
7. Reicks M, Degeneffe D, Ghosh K, Bruhn C, Goodell LS, Gunther C, Auld G, Ballejos M, Boushey C, Cluskey M, Misner S, Olson B, Wong S, Zaghloul S. Parent calcium-rich-food practices/perceptions are associated with calcium intake among parents and their early adolescent children. Public Health Nutr 2012;15:331-40.
8. Larson NI, Story M, Wall M, Neumark-Sztainer D. Calcium and dairy intakes of adolescents are associated with their home environment, taste preferences, personal health beliefs, and meal patterns. J Am Diet Assoc 2006;106:1816-24.
9. Lee S, Reicks M. Environmental and behavioral factors are associated with the calcium intake of low-income adolescent girls. J Am Diet Assoc 2003;103:1526-9.
10. Vue H, Reicks M. Individual and environmental influences on intake of calcium-rich food and beverages by young Hmong adolescent girls. J Nutr Educ Behav 2007;39:264-72.
11. Cluskey M, Auld G, Edlefsen M, Zaghloul S, Bock MA, Boushey CJ, Bruhn C, Goldberg D, Misner S, Olson B, Reicks M. Calcium knowledge, concern, and expectations for intake among parents of Asian, Hispanic, and non-Hispanic white early adolescents [Internet]. Raleigh (NC): Department of 4-H Youth Development and Family & Consumer Sciences; 2008 [cited 2015 October 1]. Available from: http://ncsu.edu/ffci/publications/2008/v13-n3-2008-winter/cluskey-auld-adlefsen-zaghloul-bock-bouskey-bruhn-goldberg-nisner-olson-reicks.php.
12. Barr SI. Associations of social and demographic variables with calcium intakes of high school students. J Am Diet Assoc 1994;94:260-6, 269.
13. Winzenberg T, Hansen E, Jones G. How do women change osteoporosis-preventive behaviours in their children? Eur J Clin Nutr 2008;62:379-85.
14. Bagozzi RP, Gopinath M, Nyer PU. The role of emotions in marketing. J Acad Mark Sci 1999;27:184-206.
15. Biener L, Ji M, Gilpin EA, Albers AB. The impact of emotional tone, message, and broadcast parameters in youth anti-smoking

advertisements. J Health Commun 2004;9:259-74.
16. Bates SB, Riedy CA. Changing knowledge and beliefs through an oral health pregnancy message. J Public Health Dent 2012;72: 104-11.
17. Poggi I. The goals of persuasion. Pragmat Cogn 2005;13:297-336.
18. Miceli M, de Rosis F, Poggi I. Emotional and non-emotional persuasion. Appl Artif Intell 2006;20:849-79.
19. Kotler P. Marketing Management: Millennium Edition. 10th ed. Upper Saddle River (NJ): Prentice-Hall; 1999.
20. Petty RE, Cacioppo JT. The elaboration likelihood model of persuasion. In: Berkowitz L, editor. Advances in Experimental Social Psychology:Vol 19. New York (NY): Academic Press; 1986. p.123-205.
21. Ray ML, Batra R. Emotion and persuasion in advertising: what we do and don't know about affect. In: Tybout AM, Bagozzi RP, editors. Advances in Consumer Research: Vol 10. Ann Arbor (MI): Association for Consumer Research; 1983. p. 543-8.
22. Pivonka E, Seymour J, McKenna J, Baxter SD, Williams S. Development of the behaviorally focused fruits & Veggies--More Matters public health initiative. J Am Diet Assoc 2011;111:1570-7.
23. Colchamiro R, Ghiringhelli K, Hause J. Touching hearts, touching minds: using emotion-based messaging to promote healthful behavior in the Massachusetts WIC program. J Nutr Educ Behav 2010;42:S59-65.
24. Tyagi CL, Kumar A. Advertising Management. New Delhi: Atlantic Publishers & Dist; 2004.
25. Kreuter MW, Wray RJ. Tailored and targeted health communication: strategies for enhancing information relevance. Am J Health Behav 2003;27 Suppl 3:S227-32.
26. Wirtz JG, Kulpavaropas S. The effects of narrative and message framing on engagement and eating intention among a sample of adult Hispanics. J Nutr Educ Behav 2014;46:396-400.
27. Institute of Medicine Committee on Communication for Behavior Change in the 21st Century Improving the Health of Diverse Populations (US). Speaking of Health: Assessing Health Communication Strategies for Diverse Populations. Washington (D.C.): National Academies Press; 2002.
28. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. Am Psychol 2000;55:68-78.
29. Richards R, Reicks M, Wong SS, Gunther C, Cluskey M, Ballejos MS, Bruhn C, Johnston NP, Misner S, Watters C. Perceptions of how parents of early adolescents will personally benefit from calcium-rich food and beverage parenting practices. J Nutr Educ Behav 2014;46:595-601.
30. Blakeman R. Integrated Marketing Communication: Creative Strategy from Idea to Implementation. Blue Ridge Summit (PA): Rowman & Littlefield; 2014.
31. Vyduna JL, Boushey CJ, Bruhn CM, Reicks M, Auld GW, Cluskey M, Edlefsen M, Misner S, Olson B, Schram J, Zaghloul S. Field-testing a questionnaire assessing parental psychosocial factors related to consumption of calcium-rich foods by Hispanic, Asian, and non-Hispanic white young adolescent children. Ecol Food Nutr 2016;55:1-15.
32. Reicks M, Ballejos ME, Goodell LS, Gunther C, Richards R, Wong SS, Auld G, Boushey CJ, Bruhn C, Cluskey M, Misner S, Olson B, Zaghloul S. Individual and family correlates of calcium-rich food intake among parents of early adolescent children. J Am Diet Assoc 2011;111:376-84.
33. Yang YJ, Martin BR, Boushey CJ. Development and evaluation of a brief calcium assessment tool for adolescents. J Am Diet Assoc 2010;110:111-5.
34. Siris ES, Miller PD, Barrett-Connor E, Faulkner KG, Wehren LE, Abbott TA, Berger ML, Santora AC, Sherwood LM. Identification and fracture outcomes of undiagnosed low bone mineral density in postmenopausal women: results from the National Osteoporosis Risk Assessment. JAMA 2001;286:2815-22.
35. Edlefsen M, Reicks M, Goldberg D, Auld G, Bock MA, Boushey CJ, Bruhn C, Cluskey M, Misner S, Olson B, Wang C, Zaghloul S. Strategies of Asian, Hispanic, and non-Hispanic white parents to influence young adolescents' intake of calcium-rich foods, 2004 and 2005. Prev Chronic Dis 2008;5:A119.
36. Borugian MJ, Sheps SB, Whittemore AS, Wu AH, Potter JD, Gallagher RP. Carbohydrates and colorectal cancer risk among Chinese in North America. Cancer Epidemiol Biomarkers Prev 2002;11:187-93.
37. Ma J, Johns RA, Stafford RS. Americans are not meeting current calcium recommendations. Am J Clin Nutr 2007;85:1361-6.
38. Zarnowiecki DM, Dollman J, Parletta N. Associations between predictors of children's dietary intake and socioeconomic position: a systematic review of the literature. Obes Rev 2014;15:375-91.
39. Wansink B, Pope L. When do gain-framed health messages work better than fear appeals? Nutr Rev 2015;73:4-11.
40. Kreuter MW, Oswald DL, Bull FC, Clark EM. Are tailored health education materials always more effective than non-tailored materials? Health Educ Res 2000;15:305-15.
41. Quintiliani LM, Carbone ET. Impact of diet-related cancer prevention messages written with cognitive and affective arguments on message characteristics, stage of change, and self-efficacy. J Nutr Educ Behav 2005;37:12-9.
42. Wilson BJ. Designing media messages about health and nutrition: what strategies are most effective? J Nutr Educ Behav 2007;39:S13-9.
43. Petty RE, Cacioppo JT. Communication and Persuasion: Central and Peripheral Routes to Attitude Change. New York (NY): Springer -Verlag; 1986.
44. Hobbs R, Broder S, Pope H, Rowe J. How adolescent girls interpret weight-loss advertising. Health Educ Res 2006;21:719-30.
45. Bandura A. Social Foundations of Thought and Action: a Social Cognitive Theory. Englewood Cliffs (NJ): Prentice Hall; 1986.
46. Lustria ML, Noar SM, Cortese J, Van Stee SK, Glueckauf RL, Lee J. A meta-analysis of web-delivered tailored health behavior change interventions. J Health Commun 2013;18:1039-69.
47. Shoemaker PJ, Chang T, Brendlinger N. Deviance as a predictor of newsworthiness: coverage of international events in the US media. In: McLaughlin ML, editor. Communication Yearbook: Vol. 10. London: SAGE Publications; 1987. p. 348-65.
48. Kim HS, Lee S, Cappella JN, Vera L, Emery S. Content characteristics driving the diffusion of antismoking messages: implications for cancer prevention in the emerging public communication environment. J Natl Cancer Inst Monogr 2013;2013:182-7.