Awareness of the Fruits and Veggies (FNV) Campaign Among Target Audiences in California and Virginia: A Cross-sectional Study

Tessa Rhianon Englund (✉ retessa@med.unc.edu)

Virginia Tech <https://orcid.org/0000-0003-0418-7434>

Valisa Ellen Hedrick

Virginia Polytechnic Institute and State University

Sofia Rincón-Gallardo Patiño

Virginia Polytechnic Institute and State University

Lauren Elaine Kennedy

Tennessee State University

Kathryn Wright Hosig

Virginia Polytechnic Institute and State University

Elena Lidia Serrano

Virginia Polytechnic Institute and State University

Vivica Ingrid Kraak

Virginia Polytechnic Institute and State University

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Abstract

Background

The Partnership for a Healthier America launched the branded Fruits & Veggies (FNV) Campaign in 2015 to promote fruit and vegetable sales and intake to mothers and teens in two US pilot media market areas: Fresno, California and Hampton Roads, Virginia. Limited evidence is available on the effectiveness of marketing strategies to influence consumers' fruit and vegetable demand. This cross-sectional study assessed associations between awareness of the FNV Campaign and attitudes, beliefs, intentions, and behaviors related to fruit and vegetable purchases and consumption among targeted audiences from the California and Virginia pilot markets.

Methods

Data were collected using an online survey between February and July 2017 using a purposive sample ($n = 1604$) of youth aged 14–20 years ($n = 744$) and mothers aged 21–36 years ($n = 860$).

Results

Approximately 20% ($n = 315$) of respondents reported awareness of the FNV Campaign. Youth aware of the FNV Campaign ($n = 167$) reported higher intentions to buy ($p = 0.003$) and eat ($p = 0.009$) fruits and vegetables than unaware youth respondents. Mothers aware of the FNV Campaign ($n = 148$) reported greater encouragement for friends and family to eat fruits and vegetables ($p = 0.013$) and had approximately 1.5 times higher odds of reporting trying a new fruit or vegetable ($p = 0.04$) than unaware mothers. Daily fruit and vegetable intake frequency did not differ by Campaign awareness.

Conclusions

Awareness of the FNV Campaign was associated with limited but positive cognitive and behavioral outcomes among target audience respondents. The present findings can inform future research to enhance understanding and improve effectiveness of FNV Campaign marketing practices as it expands throughout new markets nationwide.

Background

The health benefits of consuming recommended amounts of fruits and vegetables are well recognized and include reduced risk of chronic non-communicable diseases, such as cardiovascular disease, stroke, and cancer [1]. However, the vast majority of children, adolescents, and adults in the United States (US) do not meet the Dietary Guidelines for Americans 2015–2020 recommendations for fruit and vegetable intake (2 and 2.5 cup-equivalents, respectively, for an adult consuming 2,000 calories per day) to promote

health and prevent chronic disease [2]. Research suggests that large-scale interventions, including mass media and marketing campaigns, have potential to increase population fruit and vegetable intake [3]. Unfortunately, previous large-scale US public health campaigns that used rational, informational and educational approaches for fruit and vegetable promotion have not demonstrated meaningful and sustained improvements in consumption patterns [4]. US commercial marketing campaigns that promote specific fruit and vegetable products, such as mandarin oranges [5] and baby carrots [6], have reported positive impacts on consumer demand but data on dietary intake and health outcomes from empirical evaluations have not been published.

Some researchers have called for a shift towards positive promotional approaches common in commercial marketing practices to encourage healthy food-related behaviors, away from the practices in traditional information-based campaigns [4, 7–9]. Commercial food and beverage marketing communications often feature creative, humorous, and emotional appeals designed to attract consumers' attention and elicit positive affective and cognitive responses and associations with brands and products; these positive associations can interact with a consumer's experience to influence their behavior [10]. Proponents of commercial marketing approaches highlight the potential to achieve mutually beneficial outcomes relevant to stakeholders' interests from the private- (e.g., farmers, producers, processors, retailers) and public health sectors (e.g., individuals, government, society) [7, 11]. The Partnership for a Healthier America (PHA), a US non-profit aimed at combating childhood obesity through collaboration with the private sector, has emphasized these benefits and leveraged support for marketing initiatives designed to increase consumer demand for healthy foods and beverages [12].

In 2015, the PHA announced that it was launching the branded Fruits & Veggies (FNV) Campaign in Fresno, California (CA) and Hampton Roads, Virginia (VA) to promote sales and intake of fruits and vegetables among targeted teen and mom audiences [13, 14]. In contrast to previous theory-based US fruit and vegetable campaigns that received support from public health agencies, such as *Fruits and Veggies—More Matters* and *Five a Day* [15], the FNV Campaign was intentionally designed without health-based rational appeals and instead focused on affective appeals commonly used in commercial marketing [7].

FNV Campaign Strategy

The creative advertising firm, Victor & Spoils, designed the FNV Campaign strategy that was “inspired by big consumer brands, whose tactics are relentless, compelling, catchy, and drive an emotional connection with their products” [13]. The FNV Campaign strategy was oriented around an integrated marketing communication (IMC) approach to reach and engage target audiences with creative and humorous content to build positive associations and connections with the FNV brand and fruits and vegetables. Marketers use IMC with the aim of maximizing impact through targeted and synergized exposure to multiple marketing communications strategies and tactics [16]. The messaging content featured was designed to elicit affective responses among consumers to build positive associations with the FNV

brand and fruits and vegetables. The advertisements used visually appealing graphics and *pro bono* celebrity endorsers throughout IMC promotions, including multi-media advertising, public relations and event appearances, on the basis that celebrity endorsers could positively influence fruit and vegetable attitudes and behaviors of consumers [13, 14]. Examples of marketing promotions and links to FNV social media accounts can be viewed at the FNV Campaign website (<https://fnv.com/>).

Local FNV Campaign execution began in June 2015 and included television, radio, print, in-store, and billboard advertising in the two media markets [12]. Additionally, the FNV Campaign sponsored community events including branded mobile markets to sell produce in both Norfolk, VA [17] and Fresno, CA [18]. The November launch event in Norfolk, VA was one of the most notable local activities, gaining national attention with the participation of First Lady Michelle Obama and other celebrity endorsers [19]. Digital and social media complemented the local execution but also reached a wider audience and received national earned media attention.

The PHA aimed to pilot the FNV Campaign in two racially and ethnically diverse markets over the first year to inform future efforts and leverage partnerships and support for further expansion [20]. Over half of the Fresno County, CA population is of Hispanic ethnicity (52%) [21], which is about three times higher than the national population; while the Hampton Roads, VA metropolitan area has more than double the proportion of Black or African American residents (31%) than the national population [22]. These demographic segments are of particular interest for public health intervention as research has shown that Black or African American and Hispanic youth are disproportionately targeted by creative marketing promotions for nutritionally poor foods and beverages, which influence dietary behaviors and ultimately health outcomes [23, 24].

One year after the 2015 launch, the PHA reported that the FNV Campaign garnered over 650 million impressions through earned media and 350 million impressions through social media, though the reach of paid media advertisements were not publicly reported [25]. Engagement rates and examples of the FNV Campaign content were reported for its entry in a social media contest [26]. Sales of fruits and vegetables among Farm Fresh retailers reportedly increased by 2.5% across stores where the FNV Campaign was implemented [27]. Additional outcomes were reported for positive shifts in attitudes, intentions and consumption of fruits and vegetables among those exposed to the FNV Campaign [12, 25], but not from empirical and independent evaluations.

In 2016, the PHA announced that the FNV Campaign would expand nationally through community and state partnerships and continue efforts in the Fresno, CA and Hampton Roads, VA markets where it was first launched [28, 29]. By 2017, the PHA had engaged over 80 celebrity athletes and entertainers in FNV Campaign IMC promotions in the national markets [12]. As a social marketing campaign aimed at increasing fruit and vegetable consumption, the FNV Campaign has partnered with numerous public health organizations as it has been scaled-up [30]. The FNV Campaign has been included as a social marketing and Policy, Systems and Environmental (PSE) intervention in the Supplemental Nutrition Assistance Program-Education (SNAP-ED) Toolkit, which lists the Campaign as an emerging evidence-

based approach that requires further evaluation. As the FNV Campaign marketing strategy was not designed around a traditional health behavior theory and promoted fruit and vegetable products broadly, it is important to evaluate and understand the potential of this novel strategy to positively influence target audiences' diet-related fruit and vegetable outcomes. Understanding the cognitive, affective, and behavioral outcomes of target audiences in the two pilot markets can inform the refinement and effectiveness of the FNV Campaign as it expands to new markets. This is particularly important as there is no evidence available on the formative research used to develop the FNV brand and messaging content or detailed information on the reach, engagement, influence and timeline of marketing elements implemented in the two pilot markets.

Understanding outcomes in the context of the two markets where the FNV Campaign was launched can guide future research and practice to advance the body of evidence available for large-scale approaches to improve consumers' fruit and vegetable intake and public health. The purpose of this study was to examine whether awareness of the FNV Campaign was associated with differences in fruit- and vegetable-related outcomes for attitudes, beliefs, intentions, and behaviors among the target audiences in the Fresno and Hampton Roads markets.

Methods

Participants and Study Design

This study was part of an independent evaluation of the FNV Campaign conducted between September 2015 and December 2017. Data were collected from a cross-sectional survey conducted among the target audiences from the two pilot markets between February and July 2017. The objectives, eligibility criteria and measures used in the survey were developed in conjunction with the grant funder with input from the PHA. Recruiting a large sample from the pilot market target audiences was prioritized; due to resource limitations and a lack of baseline data, alternative designs that included comparison groups (e.g., alternative markets) or pre- post- tests were not feasible, so a cross-sectional study design was used.

Participants were recruited by members of the research team to complete an online survey through a purposive sampling strategy. Recruitment in the two markets included community outreach with assistance of local organizations (e.g., daycare and youth activity centers, faith-based and social support non-profits) involved with the target populations, and distribution of print and digital flyers to local organizations that described the study, eligibility criteria, and provided a link to access the survey. Organizations were asked to post and/or email recruitment flyers to potentially eligible contacts. The main organizations involved with recruitment in Virginia included Head Start, Virginia Cooperative Extension, and the Five Points Community Farmers Market; main organizations involved with recruitment in Fresno included Head Start, Fresno Parks and Recreation, and the non-profits Cultiva La Salud and Centro La Familia.

Adolescents and young adults (referred to as teens) aged 14–20 years and mothers aged 21–36 years who were residents of Fresno, CA or Hampton Roads, VA were eligible to participate in the study. The target audience criteria for this survey were identified in coordination with the PHA and the grant funders based on the target audience demographic characteristics of the FNV Campaign at the time. Participants were instructed to use the survey link that corresponded to their demographic criteria so that those ages 14–20 years could participate in the adolescent/young adult survey and mothers aged 21–36 years could choose the mom survey. The Virginia Tech Institutional Review Board approved this study in December 2016 (IRB #15-1110).

The survey was pilot-tested for clarity and ease of use among a small sample of mom and teen participants in the target age range who lived outside of the pilot markets. Participants were screened prior to taking the survey to ensure that their demographic characteristics and residence met the eligibility criteria, by asking respondents to indicate their age range and place of residence. Participants received information about the research prior to participating and provided implied informed consent or assent by beginning the survey. As there was minimal to no risk involved in participating in the survey, a request to waive parental permission for teens under the age of 18 was approved by the Virginia Tech Institutional Review Board (IRB #15-1110). Participants could take the online survey in English or Spanish one time either onsite with a researcher using an iPad tablet, or remotely at participants' convenience. Respondents that did not meet the eligibility criteria (e.g., outside of the target audience age range or market location) were restricted from participating in the survey. Participants received a \$10 gift card in-person or through email after completing the survey.

Survey Measures

The evaluation approach used in this cross-sectional study was similar to that used for the *Fruits and Veggies—More Matters* Campaign [31] was used to compare outcomes described below between respondents categorized as aware and unaware of the FNV Campaign.

To assess awareness of the FNV Campaign, participants were asked the following questions: (1) “Do you know what this brand or logo represents?” (featured in an image of the FNV logo along with the text of this question), (2) “Have you seen any versions of the FNV brand or logo around town or in your community?”, and (3) “Have you heard of the FNV Campaign?”; response categories were “yes”, “no”, or “unsure”. Respondents who indicated a positive response to one or more of the three questions were coded as aware of the FNV Campaign.

Three items were adapted from the Food Attitudes and Behaviors Survey [32] to assess correlates of fruit and vegetable intake (i.e., attitudes, beliefs, and encouragement)[33]. Participants were asked to indicate their agreement with each statement on a five-point Likert scale ranging from “strongly disagree” to “strongly agree”. *Attitudes* toward consuming new fruits and vegetables (i.e., neophobia) were assessed through the statement: “I enjoy trying new fruits and vegetables”. *Cognitive beliefs* around perceived barriers to fruit and vegetable consumption were evaluated through respondents' agreement with the

statement “I just do not think of fruits and vegetables when I am looking for something to eat”; for the purposes of this evaluation, this statement was also used to indicate salience of fruits and vegetables. *Encouragement* was assessed through respondents’ agreement with the statement “I encourage my friends and family to eat fruits and vegetables”. *Behavioral intentions* related to fruit and vegetable purchases and intake were evaluated using two items that asked participants how likely they were to buy, and eat, “a fruit or vegetable over the next week”. The response categories for the two behavioral intention items were collapsed into unlikely (“unsure” or “unlikely”), and likely (“likely” or “very likely”) to dichotomize the responses to intending or not intending to buy and eat fruits and vegetables over the next week.

Behavioral outcomes were assessed for new fruit and vegetable intake and frequency of fruit and vegetable intake. An open-ended question asked respondents to list any new fruits and/or vegetables they had tried in the past six months. Written responses were transformed into a dichotomous response variable to indicate whether respondents reported trying any new fruits or vegetables. Fruit and vegetable intake frequency was assessed through items adapted from the Behavioral Risk Factor Surveillance System (BRFSS) fruit and vegetable screener [34]. Participants were asked through six items to indicate how many times they ate or drank 100% fruit juice, fruit, vegetable juice; and dark green, orange, and other vegetables during the past month, from “never” to “2 or more times per day”. At the time that this study was developed, legumes and beans were not widely promoted in the FNV Campaign and were not included in the vegetable intake assessment. Fruit and vegetable intake responses were converted into frequencies per day, which was summed into total daily fruit and vegetable intake frequency for analysis. The demographic characteristics of survey respondents included sex, age, race/ethnicity, highest level of education, and geographic residence.

Data analysis

All statistical analyses were performed separately for the mom and teen target audience respondents and by location using SPSS statistical software version 25 for Windows. Data analysis methods were selected and implemented with consultation from the Virginia Tech Statistical Applications and Innovations Group based on study objectives and data. Multivariate analysis of covariance (MANCOVA) was conducted to evaluate associations of FNV Campaign awareness with differences in responses for the attitude, belief, and encouragement outcomes. The use of MANCOVA to analyze several related variables is recommended over conducting separate univariate analyses to reduce the risk of family-wise error [35]. Associations between awareness and dichotomous variables for behavioral intentions and trying new fruits and vegetables were assessed using binary logistic regression. Analysis of covariance (ANCOVA) was used to determine whether total frequencies of daily fruit and vegetable intake differed between aware and unaware respondents.

Descriptive statistics were calculated for respondent demographic characteristics. Chi-squared tests were used to assess sample representativeness based on proportions of race/ethnicity [21] and educational attainment [22] as compared to proportions in the Fresno and Hampton Roads market locations.

Race/ethnicity, sex (adolescents only), education (mothers only), age, and geographic location were included as covariates in all analyses because of potential biasing effects on outcomes related to fruit and vegetable consumption [36, 37].

Results

The final sample contained 1604 eligible mom and teen respondents across the two pilot locations. Table 1 shows the demographic characteristics of the respondents. The sample was made up of more target audience respondents who were mothers (53.6%; $n = 860$), and residents of the Hampton Roads, VA market (53.5%; $n = 858$). Overall, the sample had more non-Hispanic White respondents than Hispanic or Non-Hispanic Black respondents (Table 1). Within the target market locations, the majority of Fresno, CA respondents were Hispanic (53.4%) or White (20%), whereas most respondents from Hampton Roads, VA were White (42.7%) or Black (40.9%). Approximately 19% ($n = 304$) of the total sample and 41% of the teen sample was male. Representation of racial and ethnic groups in the sample did not significantly differ from the total population for the Fresno sample, but did for the Hampton Roads sample ($p < 0.05$), which had a higher proportion of Black respondents (42.7%) than in the Hampton Roads population [21, 22]. The percentage of the Fresno, CA or Hampton Roads, VA respondents with a high school education (or higher and a bachelor's degree or higher) did not significantly differ from the total population for either location [38].

Approximately 20% ($n = 315$) of respondents reported that they were aware of the FNV Campaign, and a higher percentage of teens (22.4%) were aware than moms (17.2%). Table 2 summarizes the results comparing fruit and vegetable attitudes, beliefs, and encouragement between aware and unaware respondents, controlling for demographic characteristics. No statistically significant differences were found between the FNV aware versus unaware teen respondents. Among mothers, the only significant difference was that those aware of the FNV Campaign reported greater encouragement of fruit and vegetable intake than those who were unaware ($p = 0.013$). Outcomes by race/ethnicity, location, and sex (teens only) for the analyses reported in Tables 2–4 are available in the online supplement.

Findings from the comparison of intention and behavioral outcomes between respondents categorized as aware and unaware of the FNV Campaign are shown in Table 3. Teens who were aware of the FNV Campaign, but not moms, significantly differed in their purchase and consumption intentions. Aware teens had 2.13 times higher odds of reporting the intention to buy ($p = 0.003$) and 3.04 times higher odds of reporting intention to eat ($p = 0.009$) fruits and vegetables than unaware teens. The odds of having tried a new fruit or vegetable in the past 6 months was 1.46 times higher for moms who were aware of the FNV Campaign ($p = 0.04$), compared to unaware moms.

Associations between awareness of the FNV Campaign and fruit and vegetable intake frequency are outlined in Table 4. After controlling for demographic characteristics, there were no significant differences in mean daily fruit and vegetable intake frequency between aware and unaware mom and teen target audience respondents.

Discussion

Key findings

The present study is the first independent evaluation of the FNV Campaign to report on fruit- and vegetable-related outcomes among targeted audiences in the Hampton Roads, VA and Fresno, CA markets. Results from this evaluation indicated that the FNV Campaign IMC strategy reached targeted teen and mom audiences to raise brand awareness, which was positively associated with some pre-behavioral outcomes among targeted audiences. Awareness of the FNV Campaign was roughly 20% after two years of the Campaign intervention in the two pilot markets and is consistent with levels reported for the *Fruits and Veggies–More Matters Campaign*; three years after the launch in 2007, awareness of the Campaign was 19% among target audience of moms aged 20–45 years [39]. Findings from formative and outcome evaluations of the adapted FNV Campaign for Wisconsin SNAP-Ed showed that awareness among millennial target audiences aged 18–34 years was 22% after only 6 months [27]. These findings suggest that the formative research to tailor the FNV Campaign intervention may have improved reach and relevance for local audiences and that partnership with SNAP-Ed may have enhanced evaluation and outcome reporting.

For teen respondents, positive associations between awareness and intentions to purchase and consume fruits and vegetables is especially relevant as adolescence is a time of increasing autonomy in making food choices among a variety of competing products [40]. Results for mom target audience respondents suggest that awareness of the FNV Campaign was related to greater encouragement for others to eat fruits and vegetables, along with more frequent reporting of trying new fruits and vegetables. These findings are of importance as encouraging and modelling behaviors are important for establishing fruit and vegetable preferences and consumption among children [41, 42] and supporting greater intake among friends and family [43, 44]. Although frequency of fruit and vegetable intake did not differ among aware and unaware moms, higher intake variety can still provide health benefits and reduce the risk of diet-related chronic diseases [15, 45].

Findings that respondents who were aware and unaware of the FNV Campaign did not differ in their reported fruit and vegetable intake frequency is not surprising given that increasing consumption is regarded as a long-term goal (e.g., five or more years) for large-scale fruit and vegetable promotion campaigns [4]. While differences in consumption were not observed among survey respondents, positive sales results in Hampton Roads, VA Farm Fresh retail locations where the FNV Campaign was implemented suggest that it may influence behavior at the point-of-choice [27]. Future research can build upon findings from this study and conduct longitudinal evaluations on consumption patterns in the two pilot markets and other locations where the FNV Campaign has expanded. Additionally, comparing cognitive, affective, and behavioral outcomes at similar points of Campaign duration could aid in identifying interventions, populations, or settings with greater potential to affect fruit and vegetable intake.

Strengths, Limitations And Implications For Future Research And Practice

Results from this study provide a foundational description of FNV Campaign awareness and outcomes among the target audiences in the California and Virginia markets where it was initially launched. Generalizability of these results are strengthened by the large and diverse sample of target audience participants representative of the racial and ethnic characteristics of the populations from which they were drawn.

The main limitations of this study stem from the cross-sectional survey design that cannot determine causality and reliance on self-reported data that are subject to selection, recall, and social desirability biases. Respondents who were aware of the FNV Campaign may have been more attuned to these promotions and already had more positive attitudes, beliefs, intentions and behaviors related to fruits and vegetables. Additionally, the online survey format may have excluded some populations with limited online access. Eligibility criteria were determined by the age groups that the FNV Campaign targeted and our survey did not assess maternity status among teen respondents, so our analysis of outcomes among moms may have overlooked younger mothers who were in the teen/young adult respondent category.

This study was funded and initiated after the launch of the FNV Campaign in 2015; the target audience characteristics were defined at the initiation of the grant process so results may not be generalizable to new locations and target demographic groups where the FNV Campaign has since scaled up and expanded. This point may be especially pertinent in markets where the FNV Campaign has been adapted to target low-income audiences through national partnerships, and state- and local-level implementation through the Supplemental Nutrition Assistance Program-Education and food banks [28, 46]. Future research is needed to understand the relationships between the FNV Campaign content (e.g., messaging, celebrities, featured fruits and vegetables); dosage, duration, and medium of exposure; and changes in target audiences' awareness and fruit- and vegetable-related outcomes.

The interpretation of study outcomes is limited without detailed documentation on the intermediate- and long-term target outcomes and criteria for success. Impressions, intensity, and duration of the FNV Campaign IMC strategies implemented over the two-year period prior to the survey implementation in 2017 have not been publicly reported from third-party evaluations and were beyond the scope of our research. As brand awareness is not a prerequisite for changes in cognitive, affective, or behavioral outcomes [10], the characterization and comparison between aware and unaware participants' pre-behavioral outcomes may not be predictive of actual behavior. It would be useful to assess the adequacy and diversity of fruit and vegetable intake, in addition to total intake, as is done in the 2015 Healthy Eating Index [47].

Rigorous process and outcome evaluations should be developed and initiated alongside FNV Campaign and combined PSE initiatives to assess casual relationships with target outcomes and progress toward long-term goals. Future evaluations of the FNV Campaign can contribute to food environment research by

collecting and assessing the validity of objectively measured sales with self-reported measures of fruit and vegetable intake [48]. Evaluating the FNV Campaign in smaller-scale settings, such as schools and food retailers, could allow for more feasible intervention documentation and stronger evaluation designs (e.g., pre-post assessments, randomized control studies). Evaluation in smaller settings could also allow assessment of FNV Campaign intervention effects when combined with PSE intervention approaches, such as subsidies, school meal policies and increasing availability in retail to influence fruit and vegetable consumption. In-store retail interventions have shown promise in increasing purchases of healthy foods, including fruits and vegetables, particularly when they are multicomponent and include pricing incentives [48]. Cost-effectiveness and -benefit evaluations are needed to assess the potential return on investment for the FNV Campaign in different contexts and in comparison to other public health interventions.

To impact and sustain behavior change over the long-term, the FNV Campaign and other initiatives should aim to improve fruit and vegetable access across multiple dimensions (i.e., availability, accessibility, affordability, acceptability, accommodation) [49], while considering context-specific socio-ecological factors that guide and constrain health behaviors and health outcomes. Ultimately, meaningful and sustained improvements in population health and reductions in health disparities require social and political support to enact policies and programs that address social determinants of health [50]. Just as IMC strategies are used to synergize and maximize exposure effects with consumers, the FNV Campaign can maximize impact through collaboration with public health interventions across individual and societal levels.

Conclusions

To our knowledge, this research is the first independent evaluation to report fruit- and vegetable-related outcomes of the FNV Campaign in the peer-reviewed literature. There is substantial potential to affect consumers' consumption of fruits and vegetables through large-scale social marketing initiatives to meet both industry and public health goals and support widespread adoption. Further research is needed to understand how the FNV Campaign, and commercial marketing strategies broadly, can be utilized to effectively and sustainably increase fruit and vegetable demand and support optimal health in diverse settings and populations. Rigorous evaluations of the FNV Campaign are needed to build the evidence and leverage support for marketing campaigns to effectively and sustainably impact consumers' food choice behaviors and health outcomes.

Abbreviations

Analysis of covariance (ANCOVA); Fruits & Veggies (FNV); integrated marketing communication (IMC); Multivariate Analysis of covariance (MANCOVA); Partnership for a Healthier America (PHA); Policy, Systems and Environmental (PSE); Supplemental Nutrition Assistance Program-Education (SNAP-ED); United States (US)

Declarations

Ethics approval and consent to participate:

The Virginia Tech Institutional Review Board approved this study (IRB #15-1110) and consent process, including the waiver of parental consent for participants under the age of 18. Prior to beginning the survey, participants were provided information about the research and informed that consent or assent was implied by proceeding to participate in the survey.

Consent for publication:

Not applicable

Availability of data and materials:

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests:

The authors declare that they have no competing interests.

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Authors' contributions:

VK secured funding and developed the initial study design. SRGP, LK, and TE conducted participant recruitment, data collection, and preliminary data analyses. VH and KH assisted with the statistical analysis approach. TE prepared the drafted manuscript and all authors contributed to manuscript edits and read and approved the final version.

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Tables

Table 1

Demographic characteristics, FNV Campaign awareness, and fruit- and vegetable-related outcomes among teen and mom respondents

Characteristics	Total sample (n=1604)	Teens (n=744)	Moms (n=860)
Location, n (%)			
Fresno	746 (46.5)	392 (52.7)	354 (41.2)
Hampton Roads	858 (53.5)	352 (47.3)	506 (58.8)
Age, y, mean (SD)	24.3 (7.0)	17.7 (2.0)	30.0 (4.1)
Race/ethnicity, n (%)			
Non-Hispanic White	515 (32.1)	247 (33.2)	268 (31.2)
Non-Hispanic Black	426 (26.6)	174 (23.4)	252 (29.3)
Hispanic	457 (28.5)	204 (27.4)	253 (29.4)
Other/multiracial	206 (12.8)	119 (16.0)	87 (10.1)
Education, n (%)			
Less than high school	374 (23.3)	308 (41.4)	66 (7.7)
High school graduate	323 (20.1)	190 (25.5)	133 (15.5)
Some college	562 (35.0)	240 (32.3)	322 (37.4)
College graduate or higher	345 (21.5)	6 (.8)	339 (39.4)
Nutrition assistance program participation, n (%)	483 (30.4)	155 (21.3)	328 (38.1)
Aware of the FNV Campaign, n (%)	315 (19.6)	167 (22.4)	148 (17.2)

Attitude: Enjoy trying new FV, mean (SD)	4.14 (0.97)	3.92 (1.05)	4.33 (0.86)
Belief: Do not think of FV when looking for something to eat ^a , mean (SD)	3.94 (1.03)	3.71 (1.10)	3.13 (0.92)
Encouragement: Encourage my friends and family to eat FV, mean (SD)	4.06 (0.99)	3.74 (1.08)	4.33 (0.82)
		568	813
Intention to buy FV over the next week, n (%)	1381 (86.1)	(76.3)	(94.5)
		665	826
Intention to eat FV over the next week, n (%)	1491 (93.0)	(89.4)	(96.0)
		305	362
Trying a new FV in the past 6 months, n (%)	667 (41.6)	(41.0)	(42.10)
		2.75	3.53
Daily FV intake frequency, mean (SD)	3.17 (2.29)	(2.0)	(2.46)

Abbreviations: Fruits & Veggies (FNV); Standard Deviation (SD)

Data presented as number and percent of participants within each column subcategory. Numbers may not equal total n because of unreported data and percentages may not add to 100 because of rounding.

Table 2

Fruit- and vegetable-related attitudes, beliefs, and encouragement by awareness of the FNV Campaign

Survey Measure	Teens ^b		Moms ^c	
	Aware (mean $\pm$ SE)	Unaware (mean $\pm$ SE)	Aware (mean $\pm$ SE)	Unaware (mean $\pm$ SE)
Attitude: Enjoy trying new FV	4.02 $\pm$ 0.08	3.87 $\pm$ 0.04	4.48 $\pm$ 0.08	4.35 $\pm$ 0.04
Belief: Do not think of FV when looking for something to eat ^a	3.62 $\pm$ 0.09	3.69 $\pm$ 0.05	3.95 $\pm$ 0.08	4.01 $\pm$ 0.04
Encouragement: Encourage my friends and family to eat FV	3.82 $\pm$ 0.08	3.66 $\pm$ 0.05	4.50 $\pm$ 0.07	4.32 $\pm$ 0.04*

Abbreviations: Fruits & Veggies (FNV); Fruits and Vegetables (FV); Standard Error (SE)

Data for “Aware” and “Unaware” respondents presented as estimated marginal mean agreement $\pm$ SE; response options ranged from 1 (strongly disagree) to 5 (strongly agree)

^a Item was reverse coded so that disagreement indicated lower perceived barrier to consumption

^b MANCOVA with location, race/ethnicity, sex, and age as covariates

^c MANCOVA with location, race/ethnicity, education, and age as covariates

* $p < 0.05$

Table 3

Fruit- and vegetable-related intentions and behavioral outcomes by awareness of the FNV Campaign

	Teens	Moms
	Odds Ratio ^a	Odds Ratio ^b
Aware vs unaware odds of reporting:	(95% CI)	(95% CI)
Intention to buy FV over the next week	2.13 (1.30 – 3.50)**	1.08 (0.44 – 2.69)
Intention to eat FV over the next week	3.04 (1.32 – 7.0)**	3.17 (0.72 – 13.87)
Trying a new FV in the past 6 months	1.18 (0.83 – 1.69)	1.46 (1.02 – 2.09)*

Abbreviations: Fruits & Veggies (FNV); Fruit or Vegetable (FV); Confidence Interval (CI)

^a Logistic regression with location, race/ethnicity, sex, and age as covariates

^b Logistic regression with location, race/ethnicity, education, and age as covariates

* p < 0.05; **p < 0.01

Table 4

Estimated marginal means of daily fruit and vegetable intake frequency by FNV Campaign awareness

	Teens ^a		Moms ^b	
	Aware	Unaware	Aware	Unaware
	(mean ± SE)	(mean ± SE)	(mean ± SE)	(mean ± SE)
Daily FV intake frequency	2.82 ± 0.16	2.77 ± 0.09	3.73 ± 0.22	3.32 ± 0.12

Abbreviations: Fruits & Veggies (FNV); Fruits and Vegetables (FV); Standard Error (SE)

Data for “Aware” and “Unaware” respondents presented as estimated marginal mean frequency of fruit and vegetable intake per day ± SE

^a ANCOVA with location, race/ethnicity, sex, and age as covariate

^b ANCOVA with location, race/ethnicity, education, and age as covariate

Supplementary Files

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