The Journal of Extension

Volume 60
Number 3 *Summer 2022*

Article 5

9-21-2022

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Recommended Citation

Greene, M., Losavio, C. R., & Holston, D. (2022). Covid-19 Prevention Behaviors in a Cooperative Extension Audience: Findings from a Nutrition Education Study. *The Journal of Extension, 60*(3), Article 5. https://doi.org/10.34068/joe.60.03.05

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Cover Page Footnote

This study was funded by the US Department of Agriculture SNAP-Ed and Louisiana State University Extension. The authors would also like to thank LSU AgCenter SNAP-Ed staff and community partners for their help distributing the survey to participants.

JOURNAL OF Extension

Feature Article

Volume 60, Issue 3, 2022

COVID-19 Prevention Behaviors in a Cooperative Extension Audience: Findings from a Nutrition Education Study

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Abstract. The COVID-19 pandemic has dramatically impacted the delivery of nutrition education through Cooperative Extension. This study aimed to identify a Cooperative Extension audience's attitudes towards virus prevention behaviors, preferred sources of information regarding COVID-19, and nutrition education preferences during the pandemic. We distributed an online survey to 477 potential nutrition education participants including questions about behaviors like mask wearing, preferences for virtual nutrition lesson delivery, and attitudes towards sources of information about COVID-19. Attitudes towards mask wearing and preferred sources of information differed significantly by race, income, and age. These differences have serious implications for future outreach and program delivery.

INTRODUCTION

The COVID-19 pandemic is a continuously evolving threat that has had serious consequences for Americans' health and livelihoods. Reducing the spread of the virus has necessitated the adoption of infection prevention behaviors, including social distancing, wearing of facemasks, and cancellation of large gatherings (Anderson et al., 2020; Lunn et al., 2020). While vital to the public health of all Americans, these prevention behaviors pose a challenge for the general public as well as Cooperative Extension professionals working for programs that continue to operate during the pandemic.

COVID-19 and the policies and behaviors intended to reduce its spread have resulted in serious economic consequences around the world (Bonaccorsi et al., 2020; Pak et al., 2020)2020; Pak et al., 2020. In the United States, widespread unemployment and reduced working hours due to COVID-19 restrictions or lockdowns have resulted in increased rates of food insecurity, and it has been proposed that food insecurity may increase one's susceptibility to COVID-19 (Nagata et al., 2020). Nutrition education programs for low-income audiences have been shown to alleviate food insecurity (Rivera et al., 2019). One such program is the Supplemental Nutrition Assistance Program Education (SNAP-Ed), which provides nutrition education to those receiving or those eligible for SNAP benefits and is implemented in most states through the Cooperative Extension Service (CES). SNAP-Ed is intended to provide participants with knowledge to help them make healthier food choices and to stretch their food dollars. SNAP-Ed and other nutrition education programs addressing food insecurity are a vital resource for Americans facing economic burdens imposed by the COVID-19 pandemic.

Eating and physical activity behaviors have also changed substantially following the imposition of lockdowns to prevent the spread of the virus, and these negative changes may be ameliorated by SNAP-Ed. Survey respondents have reported consuming more unhealthful snack foods at home and getting less exercise (Ammar et al., 2020; Ruíz-Roso et al., 2020). Consumption of a typical American diet high in saturated fats, sugars, and refined carbohydrates may put Americans at a higher risk of severe complications from COVID-19 (Butler & Barrientos, 2020). Nutrition education provided through the SNAP-Ed program has an important role to play in reducing the consumption of unhealthy diets and confronting the obesity epidemic, which may have been exacerbated by the COVID-19 pandemic.

The SNAP-Ed program is only one of many educational programs implemented through the CES, which is a trusted source of research-based information for Americans. Extension programming has continued during the pandemic and has been a resource for Americans facing disruptions imposed by lockdowns and loss of employment. For example, a study of Utah Extension professionals found that their programming addressed COVID-19 topics, such as telehealth, temporary homeschooling, and stress management, and that they adapted to the pandemic by providing online outreach and educational activities for children (Narine & Meier,

2020). CES education has therefore become an even more vital service during the pandemic.

Any CES or nutrition education programming during the pandemic must take into account the unique challenges imposed by COVID-19 infection prevention behaviors and should be tailored to participants' needs. For example, prior to the pandemic, the University of Georgia SNAP-Ed program developed an online, asynchronous version of SNAP-Ed programming that could be delivered via smartphone and was well suited for use during the pandemic (Stotz & Lee, 2018). However, at the Louisiana State University (LSU) AgCenter, SNAP-Ed nutrition educators typically implement programs that are entirely face-to-face. As part of their response to the pandemic, these staff adapted to a live, synchronous delivery of nutrition education lessons through videoconferencing software. Initial feedback from these lessons reflected a need to better understand participants' preferences and needs for virtual SNAP-Ed program delivery.

It is also important for CES administrators and educators to understand potential participants' attitudes toward COVID-19 infection prevention behaviors to determine appropriate communication strategies when in-person classes resume. Participants unwilling to engage in these prevention behaviors pose a threat to the safety of Cooperative Extension staff and other participants. Understanding participants' attitudes regarding these behaviors will allow educators and administrators to put policies in place to address participant concerns and plan for responses to noncompliance with these policies.

The aim of this study was to identify and describe potential SNAP-Ed participants' attitudes toward COVID-19 infection prevention behaviors, their preferred sources of information regarding COVID-19, and their nutrition education preferences during the pandemic. We also investigated these attitudes and behaviors across categories of race, eligibility for the SNAP-Ed program, and age.

METHODS

This study, conducted in July and August of 2020, was a cross-sectional analysis of the SNAP-Ed and CES audience in Louisiana during the COVID-19 pandemic. While the study targeted SNAP-eligible women between 18 and 50 years of age, the survey remained open to all willing participants regardless of SNAP eligibility. The study was deemed exempt from review by the Institutional Review Board at the LSU AgCenter.

An online survey was developed and distributed to a convenience sample of potential participants using Qualtrics survey software. The survey was distributed to LSU AgCenter SNAP-Ed audiences via email and social media posts by SNAP-Ed staff. This method of recruitment emulated recruitment strategies used by the LSU AgCenter SNAP-Ed program. Prior to distribution, the survey was assessed for face validity through a review by a small group of SNAP-Ed frontline staff and several SNAP-Ed participants recruited by those staff.

Respondents were asked to report their age, gender, race, and SNAP-Ed eligibility. Age was dichotomized according to whether participants were between the ages of 18 and 50, inclusive, or over the age of 50. Eligibility for SNAP-Ed was determined according to whether participants were receiving or had applied for SNAP benefits, received another income-determined federal assistance program like WIC, or reported an income at or below 185% of the federal poverty level for their household size.

Questions were developed based on guidelines for in-person meetings set by the LSU AgCenter and COVID-19-related health behaviors recommended by the CDC (CDC, 2020). Questions also asked about participants' trusted sources of information for recommended COVID-19 behaviors and preferences for nutrition education program delivery. Respondents selected their preferred method of delivery for virtual nutrition lessons among the following options: recorded videos, live virtual lessons with a nutrition educator, written materials in workbook format, online quiz format, a combination of methods, or other. Respondents were able to choose multiple options. Finally, respondents indicated whether they trusted information about the virus in print and TV news, from the government, and on social media.

Data analysis was conducted using Stata version 16.1. Pearson chi-square tests were used to assess differences in responses across categories of race, age, and eligibility for the SNAP-Ed program. We did not assess differences by gender because a large proportion of participants were female. Participants who did not identify as white or African American were excluded from the analysis presented here because of the small number (n=19) of respondents who identified as other races, and because the SNAP-Ed eligible population in Louisiana is majority (93%) African American or white (US Census Bureau, 2018). No significant differences emerged between analyses conducted with and without this group of participants. In the analysis presented here, race was dichotomized as African American or white.

After statistically significant differences in attitudes about COVID-19 prevention behaviors and sources of information were identified across categories of race, age, and SNAP-Ed eligibility, logistic regression was used to investigate the odds of responding yes or sometimes to each of the survey questions related to COVID-19 infection prevention behaviors and sources of information about the virus. Unadjusted odds ratios were first calculated for the effects of race, age, and SNAP-Ed eligibility on each dependent variable of interest. Finally, adjusted odds ratios were calculated using a model which included age, eligibility for SNAP-Ed, and race.

RESULTS

A total of 477 respondents completed the survey in its entirety, and 458 identified as white or African American and are included in this analysis. Of these 458, the majority were white (62%), female (91%), eligible for SNAP-Ed (57%), and between the ages of 18 and 50 (65%). Table 1 illustrates that the majority of respondents agreed it was important to physically distance from others (95%) and wash their hands (99%), while a smaller majority felt that it was important to wear face masks in public (79%). Survey participants who identified as African American and those over 50 were significantly more likely to say that it was important to wear a mask in public compared to white participants and those ages 50 and under, respectively. African American participants were also significantly more likely than white participants to trust information about the virus coming from the government, the news, or on social media than white participants. SNAP-Ed eligible respondents were more likely than respondents not eligible for SNAP-Ed to trust information about the virus on social media.

Table 2 shows nutrition education preferences by race, SNAP eligibility, and age. African American participants were more concerned about the risk posed by attending in-person programming and more likely to report that they would prefer live lessons, online quizzes, and/or workbooks than white participants. Respondents over 50 were more likely to prefer a written or workbook format than those under 50, and SNAP-Ed eligible respondents were more likely to prefer online quizzes than those respondents not eligible for SNAP-Ed.

Unadjusted and adjusted odds ratios for beliefs about COVID-19 infection prevention behaviors and participants' sources of information about the pandemic are presented in Table 3. Race had significant effects on attitudes toward COVID-19 infection prevention behaviors and trusted sources of information about the virus. The odds were 15 times higher that a participant would say it is important to wear a mask if they identified as African American, an effect that did not change in the adjusted model that included SNAP-Ed eligibility and age categories. African American participants also had twice the odds of reported trusting or sometimes trusting news about the virus in social media as white participants. Survey respondents eligible for SNAP-Ed had 1.4 times higher odds of saying they trust or sometimes trust information about the virus on social media than respondents not eligible for SNAP-Ed.

DISCUSSION

The COVID-19 pandemic and its economic consequences have disrupted Americans' lives, have been associated with unfavorable changes in eating and physical activity patterns (Ammar et al., 2020; Ruíz-Roso et al., 2020), and are projected to contribute to a rise in food insecurity in the United States (Gundersen et al., 2020; Laborde et al., 2020). CES educational programs and nutrition education programs like SNAP-Ed are therefore increasingly vital to people living in the United States. The pandemic has also had serious implications for the delivery of these programs. CES educators and administrators need to adapt programs to a format that mitigates the spread of the virus but also considers the needs and preferences of their audience (Eck et al., 2022). Our results demonstrate that attitudes toward infection prevention behaviors, sources of trusted information, and preferences for delivery format differ across categories of race, SNAP-Ed eligibility, and age in our convenience sample of a potential CES audience in Louisiana.

CES educators need to take these differences into consideration when targeting different audiences. For example, compared to white participants, African American participants were more likely to feel at risk of infection from attending in-person lessons and more likely to prefer live virtual lessons. They also were more likely to prefer a written workbook format and online quizzes, though small percentages preferred those options. Nutrition education and other education provided by the CES may therefore better reach and engage with African American participants if it is implemented as a virtual, synchronous format rather than in-person programming. In contrast to differences with regards to education preferences observed by race, SNAP-Ed eligible participants did not differ significantly from ineligible participants, with the exception that they were more likely to prefer an online quiz format. This preference was expressed by a minority of participants (23.7%), so the delivery of SNAP-Ed during the pandemic may not warrant an entirely different format than nutrition education geared toward higher-income audiences.

Plans for future CES programming should also consider participants' attitudes towards infection prevention behaviors. The overwhelming majority of participants reported favorable attitudes about social distancing, handwashing, and wearing masks. It may be appropriate for CES and SNAP-Ed programs conducted by the LSU AgCenter to occur in person if the necessary precautions are taken, because our results indicate most potential program participants agree with these precautions. However, those educators working with majority white populations should prepare for non-compliance with COVID-19 policies and put plans in place to deal with non-compliance given that the participants who felt it was not important to wear masks were overwhelmingly white.

Finally, CES programming should consider participants' trusted sources of information about the coronavirus. Low-income, SNAP-Ed eligible participants reported more trust in social media as a source of information about the virus than did participants not eligible for SNAP-Ed. It may therefore

Table 1. Beliefs About COVID Infection Prevention Behaviors and Sources of Information by Race, SNAP-Ed Eligibility, and Age Category

Variable of Interest	Total (n=458)	Black Participants (n=173)	White Participants (n=285)	P value[1]	SNAP-Ed Eligible Participants (n=262)	Participants not Eligible for SNAP-Ed (n=196)	P value[1]	Participants Aged 18–50 (n=300)	Participants Over Age 50 (n=158)	P value[1]
Is it important to physically distance from others to avoid the coronavirus?										
Yes	435 (95.0)[2]	173 (100%)	262 (91.9%)	0.000	249 (95.0%)	186 (94.9%)	0.946	281 (94.0%)	154 (97.5%)	0.077
No	23 (5.0%)	0 (0%)	23 (8.1%)		13 (5.0%)	10 (5.1%)		19 (6.0%)	4 (2.5%)	
Is it important to wash your hands for at least 20 seconds to avoid the virus?										
Yes	454 (99.1%)	172 (99.4%)	282 (98.9%)	0.597	259 (98.9%)	195 (99.5%)	0.470	296 (98.7%)	158 (100%)	0.144
No	4 (0.9%)	1 (0.6%)	3 (1.1%)		3 (1.1%)	1 (0.5%)		4 (1.3%)	0 (0%)	
Do you think it is important to wear face masks when going out in public?										
Yes	363 (79.3%)	168 (97.1%)	195 (68.4%)	0.000	216 (82.4%)	147 (75.0%)	0.052	223 (74.3%)	140 (88.6%)	0.000
No	95 (20.7%)	5 (2.9%)	90 (31.6%)		46 (17.6%)	49 (25.0%)		77 (25.7%)	18 (11.4%)	
Do you feel uncomfortable covering your face in public?										
Yes	170 (37.1%)	36 (20.8%)	134 (47.0%)	0.000	133 (40.8%)	63 (32.1%)	0.057	125 (41.7%)	45 (26.6%)	0.005
No	288 (62.9%)	137 (79.2%)	151 (53.0%)		155 (59.2%)	107 (67.9%)		175 (58.3%)	113 (71.5%)	
Do you feel that covering your face in public makes you look suspicious?										
Yes	58 (12.7%)	12 (6.9%)	46 (16.1%)	0.004	38 (14.5%)	20 (10.2%)	0.171	48 (16.0%)	10 (6.3%)	0.003
No	400 (87.3%)	161 (93.1%)	239 (83.9%)		224 (85.5%)	176 (89.8%)		252 (84.0%)	148 (93.7%)	
Do you trust information about the virus in the news?										
Yes	79 (17.2%)	45 (26.0%)	34 (11.9%)	0.000	53 (20.2%)	26 (13.2%)	0.099	43 (14.4%)	36 (22.8%)	0.050
Sometimes	287 (62.7%)	117 (67.6%)	170 (59.7%)		162 (61.8%)	125 (63.8%)		190 (63.5%)	96 (60.8%)	
No	92 (20.1%)	11 (6.4%)	81 (28.4%)		47 (18.0%)	45 (23.0%)		66 (22.1%)	26 (16.4%)	
Do you trust information about the virus from the government? For example, from the CDC?										
Yes	172 (37.5%)	88 (50.9%)	84 (29.5%)	0.000	96 (36.6%)	76 (38.8%)	0.897	95 (31.8%)	76 (48.1%)	0.002
Sometimes	217 (47.4%)	78 (45.1%)	139 (48.8%)		126 (48.1%)	91 (46.4%)		153 (51.2%)	64 (40.5%)	
No	69 (15.1%)	7 (4.0%)	62 (21.7%)		40 (15.3%)	29 (14.8%)		51 (17.0%)	18 (11.4%)	
Do you trust information about the virus on social media?										
Yes	17 (3.7%)	11 (6.3%)	6 (2.1%)	0.000	16 (6.1%)	1 (0.5%)	0.002	8 (2.7%)	9 (5.7%)	0.205
Sometimes	197 (43.0%)	93 (53.8%)	104 (36.5%)		118 (45.0%)	79 (40.3%)		126 (42.1%)	70(44.3%)	
No	244 (53.3%)	69 (39.9%)	175 (61.4%)		128 (48.9%)	116 (59.2%)		165 (55.2%)	79 (50.0%)	

[1]Results of Pearson's chi-square test. [2]Presented as n (%).

Table 2. Nutrition Education Preferences by Race, SNAP-Ed Eligibility, and Age Category

	Total (n=458)	Black Participants (n=173)	White Participants (n=285)	P value[1]	SNAP-Ed Eligible Participants (n=262)	Participants not Eligible for SNAP-Ed (n=196)	P value	Participants Aged 18–50 (n=300)	Participants Over Age 50 (n=158)	P value
Do you feel that attending in-person classes up to 20 people would put them at risk for contracting the coronavirus?										
Yes	295 (64.4%)[2]	132 (76.3%)	163 (57.2%)	0.000	176 (67.2%)	119 (60.7%)	0.153	199 (66.3%)	96 (60.8%)	0.236
No	163 (36.6%)	41 (23.7%)	132 (76.3%)		86 (32.8%)	77 (39.3%)		101 (33.7%)	62 (39.2%)	
Would you prefer to view recorded videos as part of a nutrition education program?										
Yes	238 (52.0%)	96 (55.5%)	142 (49.8%)	0.239	137 (52.3%)	101 (51.5%)	0.872	156 (52.0%)	82 (51.9%)	0.984
No	220 (48.0%)	77 (44.5%)	143 (50.2%)		125 (47.7%)	95 (48.5%)		144 (48.0%)	76 (48.1%)	
Would prefer to participate in live virtual lessons as part of a nutrition education program?										
Yes	212 (46.3%)	102 (59.0%)	110 (38.6%)	0.000	117 (44.7%)	95 (48.5%)	0.418	147 (49.0%)	65 (41.1%)	0.109
No	246 (53.7%)	71 (41.0%)	175 (61.4%)		145 (55.3%)	101 (51.5%)		153 (51.0%)	93 (58.9%)	
Would prefer to participate in a paper workbook format as part of a nutrition education program?										
Yes	93 (20.3%)	45 (26.0%)	48 (16.8%)	0.018	59 (22.5%)	34 (17.3%)	0.173	52 (17.3%)	41 (25.9%)	0.029
No	365 (79.7%)	128 (74.0%)	237 (83.2%)		203 (77.5%)	162 (82.7%)		248 (82.7%)	117 (74.1%)	
Would you prefer to participate in online quizzes as part of a nutrition education program?										
Yes	92 (20.1%)	51 (29.5%)	41 (14.4%)	0.000	62 (23.7%)	30 (15.3%)	0.027	64 (21.3%)	28 (17.7%)	0.359
No	366 (79.9%)	122 (70.5%)	244 (85.6%)		200 (76.3%)	166 (84.7%)		236 (78.7%)	130 (82.3%)	

[1]Results of Pearson's chi-square test. [2]Presented as n (%).

Table 3. Odds Ratios for Selected Survey Responses by Race, SNAP-Ed Eligibility, and Age Category

Total (n=458)	White Participants (n=285)	Black Participants (n=173)	P value	Participants not Eligible for SNAP-Ed (n=196)	SNAP-Ed Eligible Participants (n=262)	P value	Participants Aged 18–50 (n=300)	Participants Over Age 50 (n=158)	P value
Believe it is important to wear a mask									
Unadjusted OR	Reference	15.51 [6.16, 39.1]	0.000	Reference	1.56 [0.99, 2.46]	0.053	Reference	2.70 [1.55, 4.70]	0.000
Adjusted OR[1]	Reference	15.90 [6.25, 40.4]	0.000	Reference	1.40 [0.84, 2.30]	0.194	Reference	3.33 [1.85, 6.00]	0.000
Feel that attending in-person classes up to 20 people would put them at risk for contracting the virus									
Unadjusted OR	Reference	2.41 [1.58, 3.67]	0.000	Reference	1.32 [0.90, 1.95]	0.153	Reference	0.79 [0.53, 1.18]	0.247
Adjusted OR	Reference	2.34 [1.52, 3.59]	0.000	Reference	1.12 [0.75, 1.67]	0.577	Reference	0.81 [0.54, 1.23]	0.326
Not trust information about the virus in the news[3]									
Unadjusted OR	Reference	0.17 [0.09, 0.33]	0.000	Reference	0.73 [0.46, 1.16]	0.185	Reference	0.69 [0.42, 1.15]	0.156
Adjusted OR	reference	0.17 [0.09, 0.34]	0.000	Reference	0.86 [0.53, 1.40]	0.560	Reference	0.64 [0.38, 1.08]	0.095
Not trust information about the virus from the government[3]									
Unadjusted OR	Reference	0.15 [0.07, 0.34]	0.000	Reference	1.04 [0.62, 1.74]	0.889	Reference	0.62 [0.35, 1.11]	0.110
Adjusted OR	Reference	0.14 [0.06, 0.32]	0.000	Reference	1.26 [0.73, 2.17]	0.410	Reference	0.61 [0.33, 1.10]	0.101
Trust or sometimes trust information about the virus on social media[4]									
Unadjusted OR	Reference	2.40 [1.63, 3.53]	0.000	Reference	1.52 [1.04, 2.21]	0.029	Reference	1.23 [0.84, 1.81]	0.291
Adjusted OR	Reference	2.27 [1.53, 3.37]	0.000	Reference	1.39 [0.94, 2.06]	0.098	Reference	1.34 [0.90, 2.01]	0.151

[1]Presented as odds ratio [Confidence interval]. [2]Adjusted model included categories of race, SNAP-Ed eligibility, and age. [3]Odds of responding *no*. [4]Odds of responding *sometimes* or *yes*.

be advantageous to provide outreach and research-based information to SNAP-Ed and other low-income audiences through multiple social media platforms, including Instagram, Snapchat, TikTok, and others. African American participants were more likely to trust information provided via social media compared to white participants but were also more likely than white participants to trust information provided by the government or in the news.

This study had several limitations. The survey was conducted in the Deep South, so it would be inappropriate to generalize the results to other regions. Future studies should include more diverse audiences (male, Hispanic, Asian) and audiences outside Louisiana. Greater generalizability would allow the development of best practices for virtual learning among low-income audiences and infection prevention behavior adherence strategies and support in nutrition education settings. The study was also based on self-reported data, which may have resulted in a social desirability bias. Because the survey responses were anonymous, we feel this bias was minimized. This study did not investigate the types of social media platforms trusted by participants; however, that was not the original intent of the study and should be subsequently investigated.

A strength of this study is its timeliness. The study was conducted in the summer of 2020 during a time of great uncertainty that necessitated quick adaptation to new organizational and government policies affecting nutrition education programming and outreach. To our knowledge, this is the first study to investigate COVID-19 infection prevention behaviors in CES and SNAP-Ed eligible audiences and preferred methods of nutrition education delivery in times of a pandemic or crisis.

CONCLUSION

Our study provides preliminary evidence to suggest that nutrition educators and Cooperative Extension professionals working with marginalized populations should consider using different communication and recruitment methods with different audiences. Results indicated that attitudes toward COVID-19 prevention behaviors, sources of trusted information, and preferences for delivery format differed across categories of race, SNAP-Ed eligibility, and age in our sample. There are also implications for the rollout of the vaccination education campaigns. The CDC and CES have launched a new partnership to promote the uptake of COVID-19 vaccinations. The project, Extension Collaborative on Immunization Teaching & Engagement (EXCITE), will use the CES to target communities of color and rural and medically underserved audiences. The messaging campaign, Vaccinate with Confidence, can be adapted by each land grant university for use in their state to meet outreach and communication needs of the state population (Vaccinate with Confidence, 2021) For example, messaging and communication targeting some segments of the population may want to include the CDC logo, while others may want to use the state CES logo. Future research should also assess preferred social media platforms for dissemination of various public health information to white, African American, and other racial groups served by SNAP-Ed and CES programs.

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