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Young adults' preferences for influenza vaccination campaign messages: Implications for COVID-19 vaccine intervention design and development



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ABSTRACT

Background: Health campaign interventions, particularly those tailored to the target audience's needs and preferences, can cost-effectively change people's attitudes and behaviors towards better health decision-making. However, there is limited research on how to best tailor seasonal influenza vaccination campaigns for young adults. Vaccination is vital in protecting young adults and their social circles (vulnerable populations like older adults) from the influenza virus and critical in shaping these emerging adults' vaccination habits in the long run. However, amid the prevalence of easily-accessible, attention-grabbing, and often malicious false and misinformation (e.g., COVID-19 vaccine conspiracy theories), it may be more challenging to develop vaccination messages that resonate with young adults well enough to attract their attention. Therefore, to bridge the research gap, this study examines young adults' preferences for seasonal influenza vaccination campaigns to inform effective intervention design and development.

Methods: Qualitative survey questions were developed to gauge young adults' preferences for seasonal influenza vaccination campaigns. A total of 545 young adults (73.9% female, Mage = 19.89, SD = 1.44) from a large University offered complete answers to a cross-sectional online survey. Braun and Clarke's thematic analysis procedures were adopted to guide the data analysis process.

Results: Thematic analysis revealed that young adults prefer seasonal influenza vaccination campaigns that rely on (1) quality and balanced information from (2) credible information sources, positioned in the (3) relevant health contexts, (4) emphasize actionable messages, and incorporate (5) persuasive campaign design. Interestingly,

Abbreviations: HPV, Human papillomavirus; COVID-19, The coronavirus 2019.

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while many participants underscored the importance of fear-appeal messages in persuading them to take health actions, some young adults also suggested avoiding fear campaigns due to discomfort.

Conclusions: Insights of the study can inform seasonal influenza vaccination design and development, and have the potential to shed light on vaccination messaging in other vaccine contexts, such as COVID-19 vaccines. Results also underscore the need for health experts and government officials to adopt a more nuanced approach when selecting persuasive campaign appeals. While some young adults may resonate well with fear appeals, others may not. Future research could examine the underlying mechanisms that drive young adults' preference for vaccination campaign intervention to enrich the literature further.

1. Background

Health campaigns are a form of public health interventions (Wakefield et al., 2010). Health campaigns could be understood as communication endeavors that leverage persuasive techniques to facilitate or guide better health decision-making (Kreuter et al., 1999; Kreuter and Wray, 2003; Atkin and Wallack, 1990). The unique advantages of health campaigns, compared to other health interventions, are that they are (1) cost-effective in achieving desired health attitude and behavior changes, and (2) often indispensable to unleash the potentials of other other Interventions—regardless of whether they are non-pharmaceutical (e.g., vaccine consultations) or pharmaceutical (e.g., vaccines) in nature (Catalan-Matamoros and Peñafiel-Saiz, 2019; Pereira da Veiga et al., 2020; Su et al., 2020a; Noar, 2006; Kim and Yoo, 2015). Mounting evidence suggests that health campaigns can effectively introduce positive changes in people's health outcomes in various research contexts, especially those tailored to individuals' health needs and preferences (Merrill and Telford, 2018; Huchko et al., 2018; Yoo et al., 2018; Sadeghi et al., 2019; Bustamante et al., 2019; Anker et al., 2016; Cates et al., 2011; Costantino et al., 2019a, 2019b; Bonnevie et al., 2020). Findings from a tailored Danish social media campaign promoting human papillomavirus (HPV) vaccines, for instance, show that the campaign elicited 127 comments per post, engaged over 8 million people, and stimulated positive conversations online about the vaccines (Pedersen et al., 2020). Further insights using national data from Israel found that carefully developed poliovirus vaccine campaign messages, disseminated via television, effectively increased the adoption of poliovirus and non-poliovirus (e.g., measles-mumps-rubella-varicella or MMRV) vaccines in the target populations (Sagy et al., 2018). These findings, overall, not only underscore the far-reaching impacts of health campaigns, but also emphasize these campaigns' abilities to induce and improve audience participation and engagement.

However, while useful insights are available, there is a shortage of research on tailoring seasonal influenza vaccination messages for young adults. Drawing insights from the literature, in this study (Moos, 2014; Monaghan et al., 2015), young adults could be understood as individuals between 18 and 39 years of age. Overall, worldwide, seasonal influenza claims approximately 3–5 million severe illnesses and 290,000 to 650,000 deaths annually (World Health Organization, 2018). Across the United States (U.S.), it is estimated that 35.5 million people developed severe symptoms of seasonal influenza, resulting in 490,600 hospitalizations and 34,200 deaths between the 2018–2019 influenza season alone (World Health Organization, 2018; Centers for Disease Contr, 2020a). It is important to note that young adults are vulnerable to seasonal influenza infections and deaths as well. Among all age groups, 5–17 and 18–49 years olds constitute 7,663,310 (21.57% out of 35, 520, 883 for all ages) and 11, 913, 203 (33.54% out of 35, 520, 883 for all ages) symptomatic illnesses, 3,984,921 (24.12% out of 16, 520, 350 for all ages) and 4,407,885 (26.68% out of 16, 520, 350 for all ages) medical visits, as well as 21,012 (4.28% out of 490,561 for all ages) and 66,869 hospitalization cases (13.63% out of 490,561 for all ages) (Centers for Disease Contr, 2020a).

It is estimated that should the vaccination rates be increased, 62.6% and 34.9% for the 5–17 and 18–49 years olds' morbidity and mortality rates could be prevented (Centers for Disease Contr, 2019). Analyses

further revealed that the average annual economic burden of seasonal influenza is \$11.2 billion, with the average direct medical costs being \$3.2 billion and indirect costs \$8.0 billion (Putri et al., 2018). Overall, these numbers not only underscore the human consequences that vaccine adoption could help prevent, they also highlight the economic losses the public health officials should strive to avoid. However, while vaccination remains one of the best mechanisms in fighting the seasonal influenza epidemic, vaccination rates in young adults are suboptimal (Centers for Disease Contr, 2019). Seasonal influenza vaccination among young adults is not only crucial in protecting these communities and their social circles, potentially involving vulnerable populations, it also shapes these emerging adults' vaccination habits for other vaccines, such as the COVID-19 vaccines. Factors, such as these above, also become relevant when considering the shared underlying health technologies and dissemination processes across vaccine communication (Centers for Disease Contr, 2020b; World Health Organization, 2020; Centers for Disease Contr, 2012).

The urgency to vaccinate young adults and foster healthy vaccination habits in this population is particularly pronounced in light of the rising negative media surrounding vaccination, as seen amid the COVID-19 pandemic (Su et al., 2020a,b, 2021a,b,c) (Szabo, 2021). Both fact-based (e.g., legitimate reports on side effects) and fake news powered (e.g., vaccine conspiracy theories), which could not only compromise both the effectiveness of vaccination promotion campaigns but also people's vaccination intentions (Mason and Donnelly, 2000; Rosselli et al., 2017; Nyhan et al., 2014; Meyer et al., 2016; Su et al., 2020b,c). It is important to note that young adults are more likely to be social media users—according to a Pew Research Center report, in 2020, over half of U.S. adults (53%) consume news on social media, among which, 48% are 18–29 years old and 40% are aged between 30 and 49 (Pew Research Center and News, 2020). These numbers suggest that young adults might be more susceptible to fake news prevalent on social media compared to other age groups. The rising prevalence of the algorithm-powered, attention-grabbing, and almost-unavoidable false and misinformation about vaccination means that it becomes increasingly more challenging to develop vaccination messages that could resonate with young adults to court their attention and behavioral changes. Therefore, to bridge the research gap, this paper aims to investigate young adults' preferences for seasonal influenza vaccination messages to inform effective intervention design and development.

2. Methods

2.1. Participants and procedure

This study was approved by the University's Institutional Review Board (IRB) (2015-02-0120). Participants were recruited from the University of Texas at Austin's participant pool, all of whom were asked to read and consent prior to participation. The consent form was presented to the participants in a digital form, as the IRB office waived a written consent form. All participants were fully briefed about their rights as participants, including the right to withdraw from the research at any point. The survey was developed drawing insights from the literature (Petty et al., 1986; Higgins, 1997; Kahneman and Tversky, 2012), pilot-tested, and subsequently distributed online between March to April

Table 1
Details of thematic analysis procedures.

Stage	Details of the procedure
Familiarize with the data (Stage 1)	<ul style="list-style-type: none"> Carefully examine the data to gain a comprehensive overview Write down initial ideas while investigating the data Reflect on these ideas while (re)examining the data
Generate initial codes (Stage 2)	<ul style="list-style-type: none"> Reorganize ideas generalized in Stage 1 into preliminary codes Review initial codes based on the raw data Refine these codes based on re-emerging data points
Identify preliminary themes (Stage 3)	<ul style="list-style-type: none"> Organize existing codes into preliminary themes Refine themes while analyzing data Categorize data in accordance with existing themes
Review emergent themes (Stage 4)	<ul style="list-style-type: none"> Read and re-read the raw data to investigate the validity of the themes Further examine the preliminary themes with initial ideas generated at Stage 1 Map out all structured ideas and themes as an additional review procedure
Define and name themes (Stage 5)	<ul style="list-style-type: none"> Define the finalized themes Name the themes based on data and their preliminary definitions Finalize themes' definitions and names
Produce the report (Stage 6)	<ul style="list-style-type: none"> Organize existing finding into a structured report Review the validity and soundness of the report Finalize the report

2015, coinciding with the University Clinics' free vaccination program. Participants received course credit for completing the survey. Considering that the participant pool only consists of college students, no screening measures were utilised in the research. Using the Qualtrics survey platform, the survey consisted of both open-ended questions (including questions about participants' preferences for seasonal influenza vaccination campaigns) and fixed questions (including questions about sociodemographic background) that examine young adults' attitudes towards seasonal influenza vaccination campaigns.

2.2. Data analysis

The thematic analysis approach was utilised as the primary analytical framework to analyze participants' qualitative input about their preferences for seasonal influenza vaccination campaigns. Specifically, drawing insights from the literature (Braun and Clarke, 2006, 2020; Tong et al., 2018; Terry et al., 2013), we adopted Braun and Clarke's thematic analysis methods to investigate the qualitative data (Braun and Clarke, 2006). Overall Braun and Clarke's thematic analysis has six procedures: (1) familiarize with the data, (2) generate initial codes, (3) identify preliminary themes, (4) review emergent themes, (5) define and name themes, and (6) producing the report (Braun and Clarke, 2006). Overall, these procedures were closely followed in the data analysis process. Data were first coded and interpreted by ZS and subsequently examined by DMD. Detailed information on these procedures can be found in Table 1. The coding process was conducted with the help of NVivo version 12 (QSR International, Doncaster, Australia).

3. Results

A total of 545 young adults from the University of Texas at Austin offered complete answers (73.9% female, Mage = 19.89, SD = 1.44). The sample consisted of 345 White (63.4%), followed by 93 Hispanic (17.1%), 72 Asian (13.2%), 25 African American (4.5%), and 10 people identified with the "Others" racial/ethnicity identification (1.8%). In terms of school classification, most of the participants were in their junior years ($n = 188$, 34.5%), followed by sophomore ($n = 170$, 31.2%), freshman ($n = 94$, 17.2%), senior ($n = 92$, 16.9%), and those enrolled in graduate programs ($n = 1$, 0.2%).

Table 2
Themes and direct quotes.

Theme	Example Quote
Quality and balanced information	<p>"I expect to receive information regarding both pros and cons of the product. A lot of health posters can be biased and neglect to share certain information. Testimonials would help claims be believable but it is difficult to determine the validity of testimonials."</p> <p>"I expect more information of the risks related to diseases and risks of not getting the proper medication or treatment beforehand. More detail would be helpful and utilizing fear appeals while providing accurate information could also affect my decision to pay attention and trust a health poster."</p>
Relevant health contexts	<p>"I expect to get a warning against something that could harm my health that I could possibly get, but I usually don't. They're usually just warnings that I don't take notice of or respond to."</p> <p>"I expect to get information about current health problems that may become applicable to me, as well as what I can do to prevent these health problems or fix them. I also might expect to see statistics on how likely it is that I would get that certain health problem."</p>
Credible information source	<p>"I expect to get information but I would prefer them to be government-sponsored and not company sponsored. If I see a company I feel like it's just a ploy versus if it's [the] government I feel like they're promoting public health for the general welfare of society."</p> <p>"I expect to get credible and helpful information from health posters. I would like to know how I benefit from the health poster and the sponsor [information] should also be bigger to validate the credibility."</p>
Actionable messages	<p>"Short but precise information about what the health issue is and how I can prevent it. I would also like to see where I can find the solution to what the health poster is promoting and not only talk about the issue in hand."</p> <p>"I expect a call to action that shows some benefit to me 'not getting sick' and not too many scare tactics going on, since that typically turns me off to the message. I also want some easily identified information on what I can do to take that action."</p>
Persuasive campaign design	<p>"I expect them to tell me why I should do something in the time it takes me to walk by it. I didn't look at the fine print though; I never do."</p> <p>"I expect them to persuade me to become healthier in some sort of way. They should be accurate and have [the] correct information."</p>

*note: Square brackets are used to add words that are missing.

3.1. Themes identified

All participants were asked to respond to and elaborate on an open-ended question that aims to gauge their preferences for health campaigns in a seasonal influenza context: "In general, what do you expect to get from health posters? The participants were also asked to elaborate on their responses to the question. Thematic analysis revealed five overarching themes: quality and balanced information, relevant health contexts, credible information source, actionable message, and persuasive campaign design (see Table 2).

3.2. Quality and balanced information

One key aspect of young adults' preferences for seasonal influenza vaccination campaigns centers on the quality of the information provided by these campaigns. With several participants arguing that "more information of the risks related to diseases and risks of not getting the proper medication or treatment beforehand" (Participant 101), more detail would be helpful in utilizing fear appeals while providing accurate information could also affect my decision to pay attention and trust a health poster. Most of the participants indicated that they expect to see high-quality and balanced information from health campaigns. Overall, participants expected to be fully "informed over the issue they are

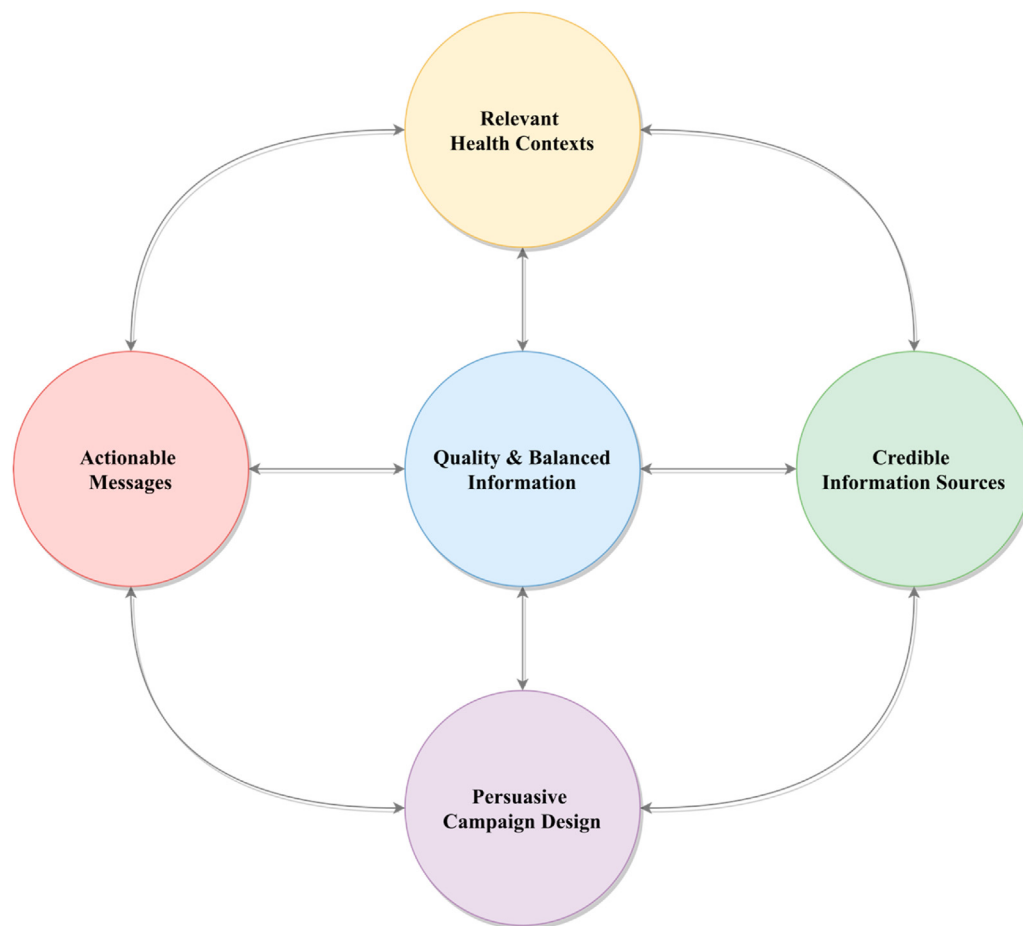


Fig. 1. A schematic presentation of the themes identified.

publicizing” (Participant 107) and for health campaigns to be factual, accurate, balanced, and up-to-date, rather than reading only partial or biased information about the highlighted or selective benefits of adopting the influenza vaccine without understanding the full picture.

3.3. Relevant health context

Relevant health context refers to the conditions and circumstances in which the health campaigns are occurring, such as at a university health center or in a health clinic. Participants revealed that seasonal influenza vaccination campaigns only matter to them when these campaigns are framed in health contexts that are relevant to them. For example, some participants mentioned wanting “important concise information which is relevant to me and gives me instructions on exactly how to take better care of myself” (Participant 22). Being able to be informed about how the campaigns might be pertinent to their health is a preference shared by most of the respondents. Overall, participants indicated that they were more interested in campaigns that could address health concerns or have the potential to advance their overall health, compared to those that lack a personal relevance to them. It is worth noting that some participants view the health context in which the campaign is presented as the only reason they paid attention to seasonal influenza vaccination campaigns.

3.4. Credible information source

Participants frequently mentioned that the information source’s perceived credibility influenced their engagement with the messages. Most respondents suggested that they prefer the vaccination campaigns’ sponsor to be in a neutral position, such as nonprofit government agencies, rather than for-profit organizations such as pharmaceutical

companies. Although some participants reported parental influence in vaccines, such as “My mom tells me I should and I trust her” (Participant 507), other participants mentioned “trust [ing] a health poster or ad more if there is some kind of professional in the medical field because they know what they are talking about” (Participant 114). Participants suggested that they favor seasonal influenza vaccination campaigns that were not aimed at gaining a profit. Overall, the information source’s perceived intent and trustworthiness played an important role in whether the participants deemed the campaign sponsor credible enough to be heard.

3.5. Actionable messages

Another widely endorsed campaign preference was the inclusion of actionable messages in seasonal influenza vaccination campaigns. Participants suggested that vaccination campaigns should offer detailed information on “what to expect” should they choose to adopt the vaccine and “what to do” to get vaccinated. Specifically, respondents suggested seasonal influenza vaccination campaigns should include actionable information such as when and where they can get the vaccines to ease the adoption process.

3.6. Persuasive campaign design

In general, participants held a range of beliefs about persuasive campaigns, with some perceptions being for “health posters should persuade students to take care of their bodies” (Participant 394). Persuasive intervention design was also a frequently evaluated aspect of the seasonal influenza vaccination campaigns among the participants. While some participants mentioned the expectation for health posters to



I am 18 years old
I'm healthy, strong, well-informed, and intelligent
I know getting the flu can make me more **vulnerable to COVID-19**
I also know COVID-19 can cost my **sense of smell**
And I love my coffee
I'm willing to trade a shot in the arm for my **ability to enjoy**
****expresso shots in the long run****
Don't get me wrong—I don't trust the government either
But then, this is not about them
This is about me and my coffee
I will take the flu shot

#WillTaketheFluShot4myCoffee

Fig. 2. An example seasonal influenza vaccination campaign (low-level fear appeal).

be informative, without “a lot of persuasion or other advertising tactics” (Participant 35), most participants expected some persuasive components such as appealing visual design and attention-grabbing health messages. In addition to some preferences being “attention grabbing, with a brief but powerful message” (Participant 302), respondents also suggested that they wish to be persuaded with fear appeals to be

motivated enough to take the vaccine. Interestingly, while some participants indicated that they prefer to be warned and scared by the campaign messages, others suggested that fear-oriented messages made them uncomfortable and less likely to pay any attention to the campaign messages.



I am 18 years old
I am healthy, strong, and happy as a camper when my coffee allows it
I took the flu shot yesterday at the local clinic
 Getting the flu will make me more susceptible to COVID-19
And between 50% and 90% of COVID-19 patients lose their sense of smell
 I don't need to trust the government to protect my ability to enjoy my coffee
I took the flu shot for my black coffee
 Pure black
 Well, maybe a tiny bit of sugar...and a freshly-baked croissant
#TooktheFluShot4myCoffee

I am 18 years old
I am healthy, strong, and happy as a camper when my coffee allows it
I took the flu shot yesterday at the local clinic
 Getting the flu will make me more susceptible to COVID-19
And between 50% and 90% of COVID-19 patients lose their sense of smell
 I don't need to trust the government to protect my ability to enjoy my coffee
I took the flu shot for my black coffee
 Pure black
 Well, maybe a tiny bit of sugar...and a freshly-baked croissant

#TooktheFluShot4myCoffee

Fig. 3. An example seasonal influenza vaccination campaign (moderate-level fear appeal).

4. Discussion

This study's main research objective is to investigate young adults' preferences for seasonal vaccination promotion messages. To our knowledge, this is one of the first studies that investigated young adults' preferences for vaccination promotion campaigns from their perspectives. Findings from thematic analysis reveal that young adults prefer

seasonal influenza vaccination campaigns that rely on (1) quality and balanced information from (2) credible information sources, positioned in the (3) relevant health context, (4) emphasize actionable messages, and incorporate (5) persuasive campaign design (see Fig. 1). These findings are important, as they underscore the importance of both "what to say" and "how to say it" in shaping young adults' evaluation of vaccination campaigns (Kahneman and Tversky, 1979, 1984; Tversky

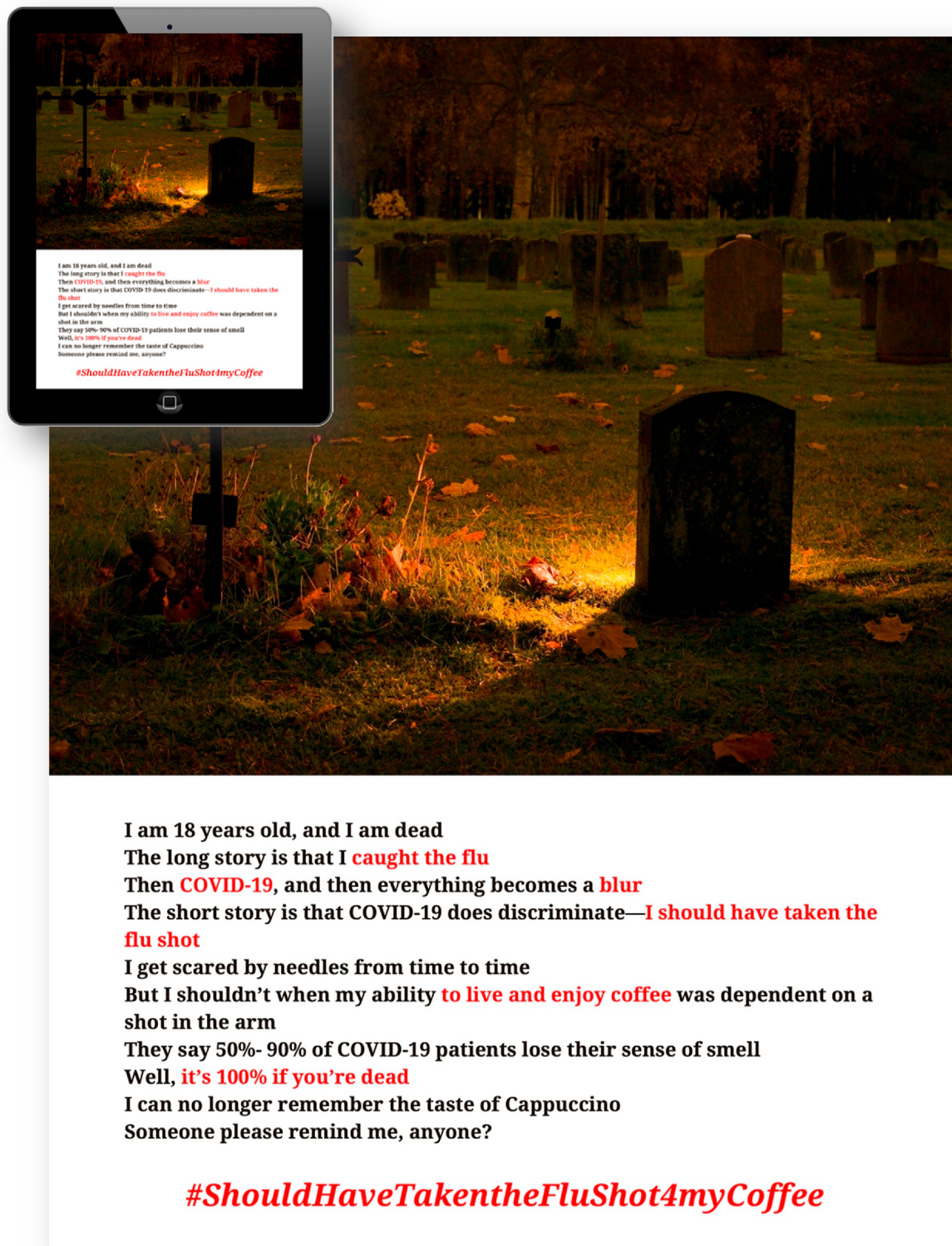


Fig. 4. An example seasonal influenza vaccination campaign (high-level fear appeal).

and Kahneman, 1986, 1992). In a study of 158 undergraduates who majored in public health, for instance, findings show that though 88% of the participants have been previously encouraged to adopt the seasonal influenza vaccine, only 43% of the young adults actually took action to get vaccinated (Rogers et al., 2018). This finding, overall, underscores the importance of developed tailored messages to promote young adults'

vaccination intention.

Interestingly, results show that while many participants indicated the importance of fear-appeal messages in persuading them to take health actions, some young adults also suggested that they avoid fear campaigns due to discomfort. The study's results add novel insights to the literature by finding that young adults are conscious of what messages resonate

with them the best, which suggests that gauging young adults' attitudes and behaviors towards seasonal influenza vaccination in a qualitative lens may further extend our current understanding on the research topic. Overall, this finding is in line with the literature, suggesting that different participants may have varying responses towards fear campaigns (Carter et al., 2012; Chapman, 2018; Puhl and Suh, 2015; Brewis et al., 2018; Couch et al., 2018; Bayer and Fairchild, 2016). Our study's findings further enrich the literature by suggesting that young adults who share similar sociodemographic characteristics also hold a varied view towards persuasive techniques such as fear appeals, and in turn, underscore the importance of taking a nuanced perspective in vaccination campaign design and development. Based on findings of the study, along with insights from the literature (Blasi et al., 2015; Shropshire et al., 2013; Prati et al., 2012), we developed example vaccine campaigns that are integrated with varying levels of fear appeals, to shed light on ways this study can inform vaccination intervention design and development (See Figs. 2–4).

Overall, one way to address the variability in young adults' preferences for persuasive techniques is via involving them in the message design process, using mechanisms such as focus groups or in-depth interviews. As previous research suggests, seeking feedback from the audience on their evaluation of the campaign messages can improve campaign outcomes (Mulugeta et al., 2018). Furthermore, health organizations and governments can also adopt technology-based solutions, such as social listening technologies (Das, 2020), to timely and cost-effectively monitor and manage young adults' acceptance and sentiments towards the vaccination campaigns. Take social listening technologies for instance. Social listening technologies could be defined as "a means of attaining interpersonal information and social intelligence" (Stewart and Arnold, 2018), which in turn, can help broaden research insights into human behaviors such as vaccination adoption.

With advances in technologies, such as machine learning, it is becoming more realistic to collect big data from social media that could shed light on people's sentiments and behaviors towards immunization (Stewart and Arnold, 2018). In an online preprint study, researchers collected and coded 12,886 social media posts, which is a form of social listening technologies, to evaluate global COVID-19 vaccine hesitancy (Hou et al., 2021). Findings of this study showed that negative social media posts had the most corrosive effects on vaccine confidence compared to other types of social media posts (Hou et al., 2021)—insights that could help identify ways to improve vaccine adoption. Similar studies could also be found in the literature (Karafillakis et al., 2021; Kamiński et al., 2020; Puri et al., 2020). To further shed light on the research topic, future studies could also use rigorous and robust methods, such as randomized controlled trials, to shed light on young adults' preferences for persuasive techniques.

4.1. Limitations

While this study bridges essential gaps in the literature, it is not without limitations. First, research data are self-reported, which indicates that the findings of this study are subject to participants' social desirability and recall biases. Second, the study's cross-sectional design indicates that no causal inferences could be drawn from the findings. Furthermore, while the use of qualitative research methods in the current study is justified, it is important to note that limitations inherent to qualitative studies are present in this study (e.g., limited generalizability). Another potential limitation of this study is that university students inherently have a high level of completed education and potentially high socioeconomic index scores compared to the general population—these demographics may influence these young adults' vaccine adoption rates. Addressing these limitations, future research could adopt a mixed-methods research design, such as longitudinal studies, to further examine young adults' preferences for vaccination campaigns.

5. Conclusions

This study identified young adults' five overarching preferences of seasonal influenza vaccination campaigns: quality and balanced information, relevant health contexts, credible information source, actionable messages, and persuasive campaign design. Insights of the study can inform seasonal influenza vaccination design and development, and have the potential to shed light on vaccination messaging in other vaccine contexts, such as COVID-19 vaccines. Results also underscore the urgent need for health experts and government officials to utilise a more nuanced and evidence-based approach when designing and developing persuasive campaign appeals (e.g., fear appeals), as while some young adults may resonate positively with these appeals, others may not. Future research could examine the underlying mechanisms that drive young adults' preferences for vaccination campaign interventions to enrich the literature further.

Ethics approval and consent to participate

The University of Texas at Austin Institutional Review Board Exempt Protocol 2015-02-0120.

Consent for publication

Not applicable.

Availability of data and materials

Data are available upon request.

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Authors' contributions

ZS conceived the work, reviewed the literature, drafted, and edited the manuscript. DMD, JW, AC, JA, EG, XL, SS, MM, YTX, and PW reviewed the literature and edited the manuscript. All authors approved the manuscript for submission.

Declaration of competing interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.bbih.2021.100261>.

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