

**Analysis of Facing Our Risk of Cancer Empowered (FORCE)'s Digital Health Literacy
Improvement Program BOAST**

by

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Abstract

Health literacy—typically defined as an individual's ability to access, understand, and use health information—is generally low globally, which can impede individuals from making informed health decisions and maintaining their good health. The World Health Organization has named the improvement of global health literacy as an essential factor in promoting good public health practices around the world. Digital health literacy, a facet of broader health literacy, refers to the individual's capacity to apply the principles of health literacy to digital contexts. It works to help individuals discern if a piece of digital health-related information is reliable. Digital health literacy is also generally low in the United States. To remedy this, effective digital health literacy improvement programs can potentially help improve this literacy and better promote healthier personal behaviors that contribute to good health.

Facing Our Risk of Cancer Empowered (FORCE) is an organization focused on hereditary cancers that aims to improve the lives of those with cancer and their families through education, support, advocacy, and research. FORCE's digital health literacy improvement program, titled BOAST, aims to improve people's digital health literacy by providing participants with tools to help them evaluate if a piece of digital health-related information is reliable. This program includes a one-hour presentation that explains the "BOAST" tools, their relevance, and usage. This presentation is followed by a survey, which asks participants to provide information about how useful and confident they felt using the tools to evaluate this information, how well they remember

elements of the presentation, and their demographic information. This essay analyzed the participants' survey responses after participating in a presentation. From this analysis, findings include that most participants felt the BOAST tools were useful, they could remember them after the presentation, and they felt confident using them to discern if a piece of digital health-related information was reliable. However, many participants also reported feeling unsure if the BOAST tools were useful and they could not recall how to use them. This disparity between the responses could suggest that improvements to the language of the survey questions may help with clarity and improve BOAST's messaging.

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Preface

I would like to sincerely thank Dr. Eleanor Feingold for her incomparable guidance throughout the writing of this essay. I additionally would like to thank Dr. Lisa Rezende and Dr. Jaime Sidani for their patience and flexibility throughout this project. I am extremely grateful to FORCE for allowing me to participate in their organization during my practicum experience and allowing me to write this essay on their digital health literacy improvement program.

1.0 Introduction

Health literacy is typically defined as an individual's ability to gain access to, understand, and use health information provided to them to maintain good health. While lower health literacy is associated with individuals engaging in riskier behaviors, poorer health, increased hospitalization and associated costs, and overall worse health outcomes, higher health literacy is associated with improved health and well-being, increased addressing of health inequities, and overall better health outcomes (Kickbusch et al., 2013). As an indication of the importance of health literacy in improving public health, the U.S. Department of Health and Human Services' Healthy People 2030 includes improving health literacy in the U.S. population in its overarching goal to "Eliminate health disparities, achieve health equity, and attain health literacy to improve the health and well-being of all" ("Health Literacy in Healthy People 2030", n.d.).

Digital health literacy is an additional facet of health literacy that is becoming increasingly important. The improvement of health literacy is hindered by the ever-changing landscape of information available to the average individual in the US. The internet holds a wealth of information with only a few clicks of a keyboard. It is a place where anyone can put their thoughts and opinions for others to see without much regulation. This leads to inaccurate sources of health-related information that are often widely distributed and consumed ("Can You Tell Which Health Information is Trustworthy?", n.d.). While some of this inaccurate information may be harmless, some information is not. This false information can be further broken down into misinformation and disinformation. For the purposes of this paper, misinformation refers to information that is false but not necessarily spread intentionally and may be "changing" depending on new research and disinformation refers to information that is intentionally misleading and spread intentionally

(Swire & Lazer, 2020). Within the world of health-related information, these inaccuracies can affect an individual's health decisions. Thus, digital health literacy skills are a necessary part of overall health literacy in helping individuals make well-informed health decisions.

With low overall health literacy and digital health literacy in the U.S., health literacy improvement programs can help increase overall health literacy. However, the scientific literature is limited on what elements of different these improvement programs help increase individuals' health literacy. This then makes tackling this issue difficult. To address this, examining a specific health literacy improvement program and its impacts can help provide more information on which elements of the program help increase individuals' health literacy.

To improve digital health literacy and thus the health of cancer patients, Facing Our Risk of Cancer Empowered (FORCE) has designed and implemented one of these improvement programs. FORCE is an advocacy organization focused on hereditary breast, ovarian, pancreatic, prostate, colorectal, and endometrial cancers. The organization aims to improve the lives of all those with hereditary cancer and their families through education, support, advocacy, and research. FORCE provides expert-reviewed information and resources to help people make informed medical decisions. Additionally, they provide support to their nationwide community and advocate for awareness, access to care, and better treatment and prevention options.

FORCE's digital health literacy improvement program is titled "BOAST," which is an acronym for "Biased, Overblown, Amateur, Sales-Focused, Taken Out of Context / Too Early to Be Useful" ("Can You Tell Which Health Information is Trustworthy?", n.d.). After noticing that their constituents struggled to assess online information, they developed this program to better address this issue. This program aims to improve an individual's digital health literacy by providing the tools they need to distinguish reliable from unreliable health information ("Can You

Tell Which Health Information is Trustworthy?”, n.d.). The goal is for the program’s participants to make better-informed personal health decisions. FORCE provides these tools to these individuals through a one hour-long presentation session. Other resources available through the FORCE website are also provided for the participants to access on their own time. The participants are asked at the end of the presentation to take a survey, which asks questions regarding the presentation’s content. The questions include whether the participant can recall the acronym for “BOAST,” whether they feel that the BOAST presentation was useful, and whether they feel confident in their ability to use the tools provided to them in the presentation in discerning health-related information they will come across in their own life, as well as demographic information.

1.1 Specific Aims

The goal of this essay is to evaluate the effectiveness of FORCE’s digital health literacy improvement program BOAST by analyzing responses to the participant survey. More specifically, the goal is to assess how confident individuals feel navigating digital health-related information on their own after being provided with the BOAST tools and to examine which methods included in the BOAST initiative these participants found were the most useful in improving their own digital health literacy.

The longer-term goal of this essay is to add to the health literacy improvement knowledge base to aid in the further development of effective health literacy improvement programs. By assessing the strengths of the BOAST initiative in improving individual digital health literacy and what elements of the initiative can be improved on, this essay can help further develop FORCE’s BOAST program. Additionally, this information can inform the development of other digital

health literacy programs on a larger scale, such as the creation of programs to teach children early in life about digital health literacy and how to effectively navigate health information available to them on the internet.

2.0 Background on Health Literacy

Health literacy's definition has changed over the years as it has received more attention (Cutilli & Bennett, 2009). While "health literacy" started off as simply the individual's ability to read health information, this definition evolved to the degree to which an individual can obtain, process, and understand the basic health information and services that they need to make health decisions (Cutilli & Bennett, 2009; Ratzan & Parker, 2000).

The individual's experience with their personal health and broader healthcare systems can be compromised if they cannot obtain, process, and understand basic health information and services. In the United States, individuals take on most of the burden of this disconnect between their own health literacy and the services they need to access within the healthcare system (Nielson-Bohlman et al., 2004). If an individual cannot understand the information given to them by a healthcare provider this requires the individual to ask their provider more questions to clarify or requires them to seek out other resources that can answer their questions. Consequently, this requires individuals to take on additional responsibilities to advocate for their health (Nielson-Bohlman et al., 2004). While individuals interacting with the healthcare system are required to advocate for their own health, numerous barriers exist to exercising their health literacy skills (Nielson-Bohlman et al., 2004). Factors that can influence the presence of these barriers include increased age, low educational attainment, low socioeconomic status, and a reading level at or below 6th grade (Qi et al., 2021, Haun et al., 2012).

Health literacy is generally low for both developed and developing countries ("Health literacy", n.d.; Qi et al., 2021). In the U.S. population, low health literacy is also prevalent. In data from the U.S. Department of Education's National Center for Education Statistics's 2003 National

Assessment of Adult Literacy, 53% of American adults have “intermediate health literacy” while about 22% have “basic health literacy” and 14% have “below basic health literacy” (Kutner et al., 2006).

From a global perspective, the World Health Organization has noted the improvement of health literacy around the world as an essential element of health promotion to contribute to better health (“Health Literacy”, n.d.). The COVID-19 pandemic provided numerous examples of how low global health literacy impacts health and the rapid spread of infectious disease, leading to overall worsening health for billions of people (Qi et al., 2021; Spring, 2020).

2.1 The Impact of Low Health Literacy

Lower health literacy is associated with riskier behaviors, poorer health, and more hospitalization and its associated costs (Kickbusch et al., 2013). It also exacerbates health inequities by further barring those who already experience systemic challenges from accessing health services (Nielson-Bohlman et al., 2004). Those with lower educational attainment, lower socioeconomic status, rural residence, or racial or ethnic minority status generally have lower health literacy (Davis & Arnold, 2021; Nielson-Bohlman et al., 2004). Additionally, those who do not speak English as their first language are at a disadvantage and thus experience greater difficulty maintaining their good health within the U.S. health system (Nielson-Bohlman et al., 2004). According to Davis and Arnold (2021), individuals belonging to one or more of these groups tend to be underrepresented in research and clinical trials, which leads to both an incomplete knowledge base coming from this research and inadequate efforts to improve the health outcomes of those in these populations.

An additional complication involves healthcare educators' and providers' assumptions about their patient's health literacy and their ability to comprehend health information. If the provider makes an incorrect assumption that their patient's health literacy is higher than it is, this can lead to confusion on the patient's side. Nielson-Bohlman et al. (2004) note that these assumptions regarding the patient's level of health literacy are often wrong and many of these patients cannot understand the health information provided to them. This demonstrates how organizations and institutions within the U.S. healthcare system require individuals to have high health literacy skills to understand health information from their providers and then make informed health decisions (Nielson-Bohlman et al., 2004). Consequently, health literacy is a social determinant of health (Spring, 2020).

2.2 The Impact of High Health Literacy

High health literacy in individuals and groups is associated with more positive health outcomes and improved health and well-being. It also helps address health inequities (Kickbusch et al., 2013). Qi et al. (2021) have also stated that high health literacy also helps people and their communities more actively participate in their healthcare. High health literacy is associated with higher educational attainment and higher socioeconomic status (Nielson-Bohlman et al., 2004). However, certain situations can override these associations between higher health literacy skills and higher educational attainment and socioeconomic status. Spring (2020) has noted that during the height of the COVID-19 pandemic when novel health information was introduced to the public constantly, those with both higher educational attainment and higher socioeconomic status

exhibited low health literacy in the face of experiencing something new. In this way, an individual's health literacy is not intrinsic but learned.

2.2.1 A Health-Literate Society

“Organizational health literacy,” or the effort organizations exhibit to improve their delivery of health-related information to make it easier for individuals to navigate, understand, and use to maintain their good health, pushes for a more health-literate society (Brach et al., 2012; Farmanova et al., 2018; Spring, 2020). Spring (2020) has argued that healthcare providers, who work as a part of these organizations delivering health information, could provide clear, simple, and easily-understood information to their patients. Additionally, Spring argues that hospitals and other healthcare organizations could ensure that the tools and resources they provide, such as informational brochures or their website, contain clear and accessible information (2020). For example, this information could be communicated at a 6th grade reading level or include infographics to increase clarity and accessibility. On a broader scale, the government, media, and educational systems also play an essential role in the delivery of health-related information to individuals so that they can develop their own health literacy skills (Spring, 2020). A health-literate society is defined by everyone—individuals and institutions—taking on the responsibility to provide and seek out reliable health information (Spring, 2020).

2.3 Digital Health Literacy

Digital health literacy—a facet of health literacy—refers to the capacity for individuals to apply the principles of health literacy to the digital environment and in digital contexts (van der Vaart & Drossaert, 2017; Dadaczynski et al., 2021). It includes the principles of traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy (Norman & Skinner, 2006; Lee & Tak, 2022). Most people currently obtain information about health from places other than their healthcare provider or from healthcare organizations, such as from media, the Internet, and from family and friends (Nutbeam, 2021). With the widespread use of digital technologies and the internet, healthcare providers and organizations can communicate instantaneously with many patients, and these patients can also obtain health information quickly and easily from a variety of sources (Nutbeam, 2021). In this way, these individuals can personalize their healthcare by personalizing what information they find and can apply it to their own health situation (Nutbeam, 2021; Liobikienė & Bernatoniene, 2018).

However, while this easy access to health information from a variety of sources through digital technologies offers benefits to individuals, the availability of this plethora of information requires individuals to have a certain set of skills that many simply do not have. According to Davis and Arnold (2021) older individuals may be particularly at risk. Much of the easily accessible digital health information found by the average individual can be an opinion rather than fact. It can even be disinformation, which is deliberately misleading and may be presented to get an individual to make a commercial decision. In this way, digital health information is not usually presented in ways that are easily understood by the average person (Swire & Lazer, 2020; Nutbeam, 2021). Additionally, those with lower health literacy are more likely to look to

television, social media, blogs, celebrity webpages, friends, or pharmaceutical company websites for health information rather than medical websites (Chen et al., 2018).

During the COVID-19 pandemic, much of the information about COVID-19 on the internet was inaccurate and conflicting, contributing to an “infodemic,” where both true and false information was being spread quickly (Spring, 2020). This fed the general panic surrounding the spread of the virus and what it could mean for people’s health (Spring, 2020). Additionally, this also led to the interruption of health communication from governments and public health authorities to the public, bringing about even more confusion and panic (Dadaczynski et al., 2021).

While the COVID-19 pandemic brought many of these health literacy issues to the surface, Swire and Lazer (2020) have stated that health misinformation and disinformation are not new challenges to society. Misinformation refers to information that is false but not necessarily spread intentionally and may be “changing” depending on new research, whereas disinformation relates to information that is intentionally misleading for some other outcome or action, such as commercial profits (Swire & Lazer, 2020). While the people and organizations behind misinformation and disinformation in digital spaces make seeking out accurate and reliable health information more difficult, even the way the online spaces are designed can further complicate this process. Algorithms embedded into the digital landscape influence what content an individual sees on the internet. These algorithms tailor the content to the individual user depending on their tracked interests and what content is sponsored, which is pushed for more views and digital traffic. In this way, Swire and Lazer (2020) have argued that sometimes online spaces can become “echo chambers,” as this design influences what it thinks the user wishes to see. This can impact what health information individuals see and interact with in their searches. The visibility of both reliable and unreliable health information are impacted by these designs.

Given how easily digital information can be manipulated by algorithms and by users, having sufficient digital health literacy skills is essential for individuals today to maintain their good health. To help improve digital health literacy, current efforts aim to develop accurate measurements for digital health literacy, which can be adapted for different countries (van der Vaart & Drossaert, 2017; Oh et al., 2021). These efforts also aim to improve digital health literacy through programs, such as through schools, and to improve the quality of health-related information available so that is clearer and more easily understood by the average person (Dadaczynski et al., 2021; Swire & Lazer, 2020).

3.0 Overview of Health Literacy/Digital Health Literacy Improvement Programs

Proposals for improving health literacy target various areas of different settings. Batterham et al. (2016) described how interventions in these different settings, such as in community-based and institution-based settings, can help improve individual health literacy from multiple fronts.

In community settings, targeting social networks can help optimize the effectiveness of health literacy interventions (Batterham et al., 2016). For these interventions to work, an understanding of the attitudes towards health topics in these communities should be placed as a central focus of the intervention (Batterham et al., 2016). This helps with tailoring the intervention to better meet their aims within the community they are working with. Erikson et al. (2019) noted how the Wisconsin Adult Literacy Coalition's Wisconsin Health Literacy (WHL) division developed a state-wide health literacy coalition that achieved its success by raising awareness and educating the healthcare providers in the state about health literacy as well as delivering educational workshops to their adult participants in small, community-based literacy organizations and other trusted settings. They found that their participants wanted to be involved in this education process within this trusted setting. In a health literacy self-help intervention targeting Korean Americans with Type 2 diabetes, Kim et al. (2020) found that involving role-playing and the teach-back method helped with improving their participants' health literacy skills.

Institution-based interventions can target multiple levels within the institution or organization. In hospital settings, these various levels include the organizational level, the healthcare personnel level, and the patient level (Batterham et al., 2016). On the organizational level, the creation of toolkit guides with easily understood resources for patients to use for reference can help increase their health literacy (Batterham et al., 2016). On the healthcare

personnel level, the education of all healthcare providers on the basics of their patients' health literacy needs and on strategies to deal with these needs can help with making information more accessible to their patients (Batterham et al., 2016). Vaillancourt and Cameron (2022) have identified some strategies providers can use to help address decreased health literacy to improve patient outcomes. These strategies include: the "universal precautions approach;" "active interventions;" "general counseling;" and "self-monitoring." The "universal precautions approach" entails using the clearest language possible for everything. "Active interventions," such as "Teach Back," "Show Back," and "Ask Me 3," all involve patients actively synthesizing provided health information. "General counseling" involves written, verbal, and visual aids to help patients' understanding and "self-monitoring" involves patients using a self-monitoring device to track their own symptoms. Some of these strategies were utilized in a health literacy intervention study at the University of Pittsburgh, which targeted physicians to address health literacy barriers in communication between physicians and patients (Allenbaugh et al., 2019). This intervention implemented strategies such as role-play, teaching physicians how to avoid jargon and communicate clearly, and how to use the teach-back method (Allenbaugh et al., 2019). On the patient level, the use of health literacy measurement tools can help assess where an individual's personal health literacy stands. This can help those implementing these interventions more clearly address where interventions are working (Batterham et al., 2016).

Some health literacy interventions are not strictly community- or institution-based. An intervention found in the literature includes the use of a social media-based, health literacy-sensitive diabetes management app, in which participants use an interactive "support" app that had features where participants could access, share, and view posts (Kim & Utz, 2019). Participants could also view uploaded diabetes self-management information in both video and short text

formats (Kim & Utz, 2019). This social media intervention was accessible to both low and high literacy participants (Kim & Utz, 2019). Another intervention found in the literature from Dadaczynski et al. (2021) involves a game-based health literacy intervention for adolescent students that promotes navigation health literacy at the intersection of schools and communities. They found that this intervention did help get their participants more involved in health literacy education and can help strengthen health literacy in adolescents (Dadaczynski et al., 2021).

While lower health literacy, and lower digital health literacy, negatively impacts the health outcomes of many people, numerous intervention efforts exist within the literature to address this problem at multiple levels. Digital health literacy improvement programs are currently being developed but are in their beginning stages.

4.0 Materials and Methods

The data set was collected from participants of FORCE's BOAST digital health literacy improvement presentations. Potential participants for these presentations were gathered through FORCE email newsletters, social media, and through FORCE's website. Additionally, these participants could have heard about these presentations at conferences where FORCE representatives were in attendance. These participants then had to sign up to attend one of these presentations, which was presented through Zoom. Each presentation used the same presentation slides and the same practice examples. The presenter may have differed. Each presentation provided information about the tools one would need to determine if a piece of digital health-related information is reliable or not. One of the main tools included in the presentation was the acronym "BOAST," which stands for "Biased, Overblown, Amateur, Sales-focused, and Taken Out of Context/Too Early to be Useful." This tool is provided as an easy way for participants to remember what elements to check when evaluating a piece of digital health-related information. Additionally, the presentation stresses the importance of examining the source and context of digital health information before deciding to trust what it says. Collectively, these tools were provided with the aim to improve these participants' digital health literacy skills. These presentations include examples and exercises so the participants can practice using these digital health literacy improvement tools themselves with guidance from the BOAST presenters.

At the end of the one-hour presentation, an online survey was shared with the participants through Survey Monkey. A total of 346 participants responded to the survey. The survey consisted of 12 questions (see Appendix B). Depending on the question, the participant had options to choose

the answer(s) that best fit their situation or to respond by filling in the box provided. The survey questions broadly covered:

- Which section(s) of the presentation the participant found most helpful
- Which resource(s) provided to the participant were the most helpful
- How the participant found out about the BOAST program
- If the participant could recall specific pieces of information from the presentation (i.e. what does “BOAST” stand for?)
- Demographic information (i.e. age, ethnicity, if they’ve been diagnosed with cancer, etc.)
- Suggestions for program improvement

This same survey is also linked through FORCE’s BOAST website, however the responses from the website were not included in this analysis. This analysis only included the participants’ responses from these BOAST presentations. The participants’ responses were collected in an Excel spreadsheet before the data analysis process began.

5.0 Results

Figure 1 presents the participants' racial/ethnic identification, showing that most participants (n=300; 86.7%) identified as white/non-Hispanic individuals. However, some participants marked themselves as more than one race/ethnicity or specified their identification in the "Other (please specify)" option (n=5; 1.4%). While almost all of the participants identified as female (n=310; 89.6%), 18 participants identified as male (5.2%) and 3 "differently identified" (0.9%) (see Figure 2). Notably, 15 participants (4.3%) did not answer this question on the survey. Most participants also belonged to the 55-64 (n=107; 30.9%) and 65+ (n=104; 3.0%) age groups (see Figure 3). Nine participants (2.6%) did not answer this question on the survey.

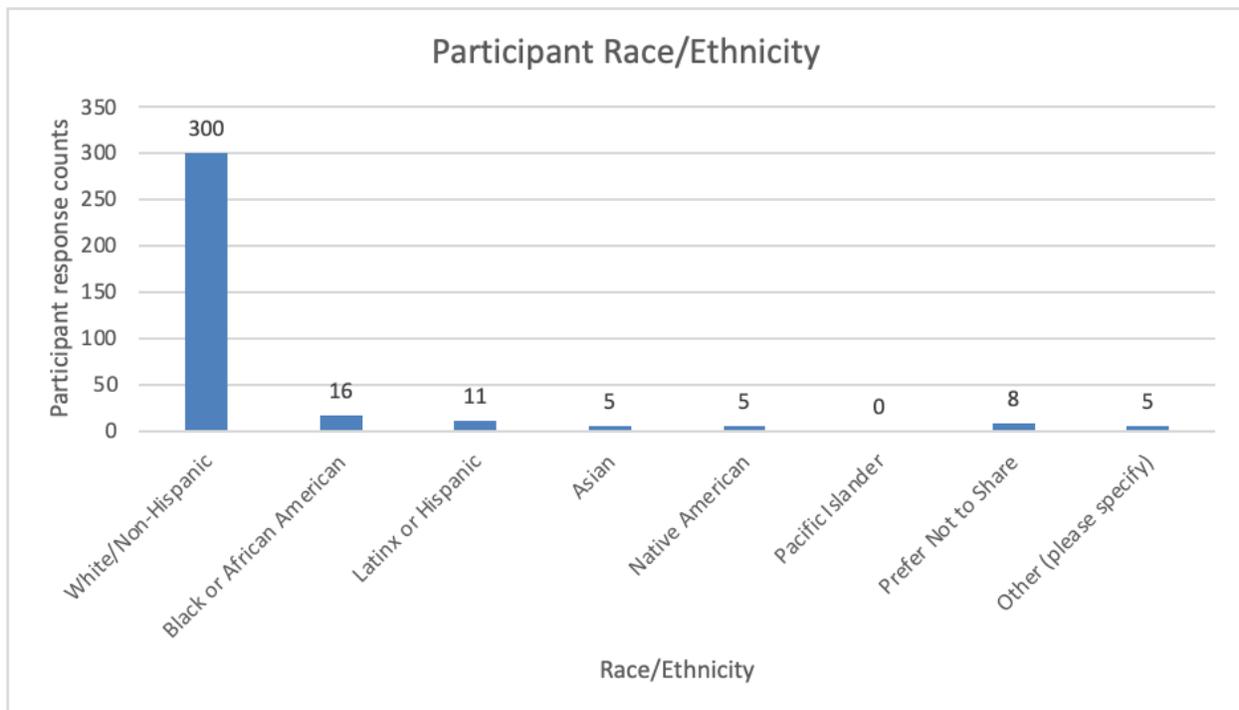


Figure 1 Participant Race/Ethnicity

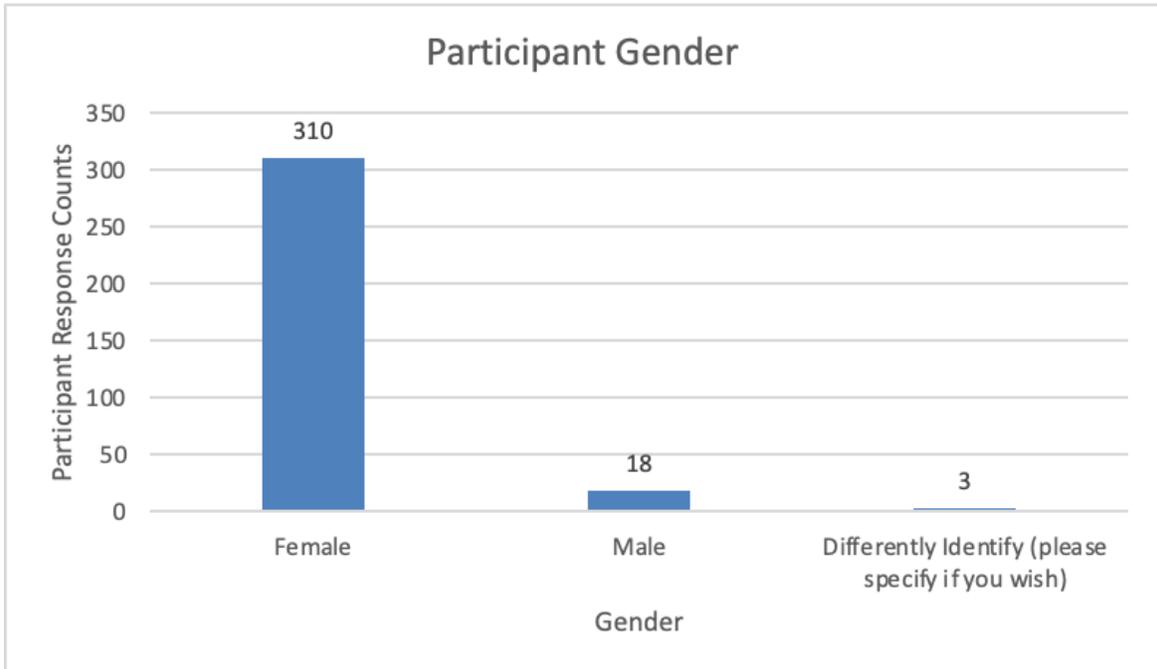


Figure 2 Participant Gender Identity

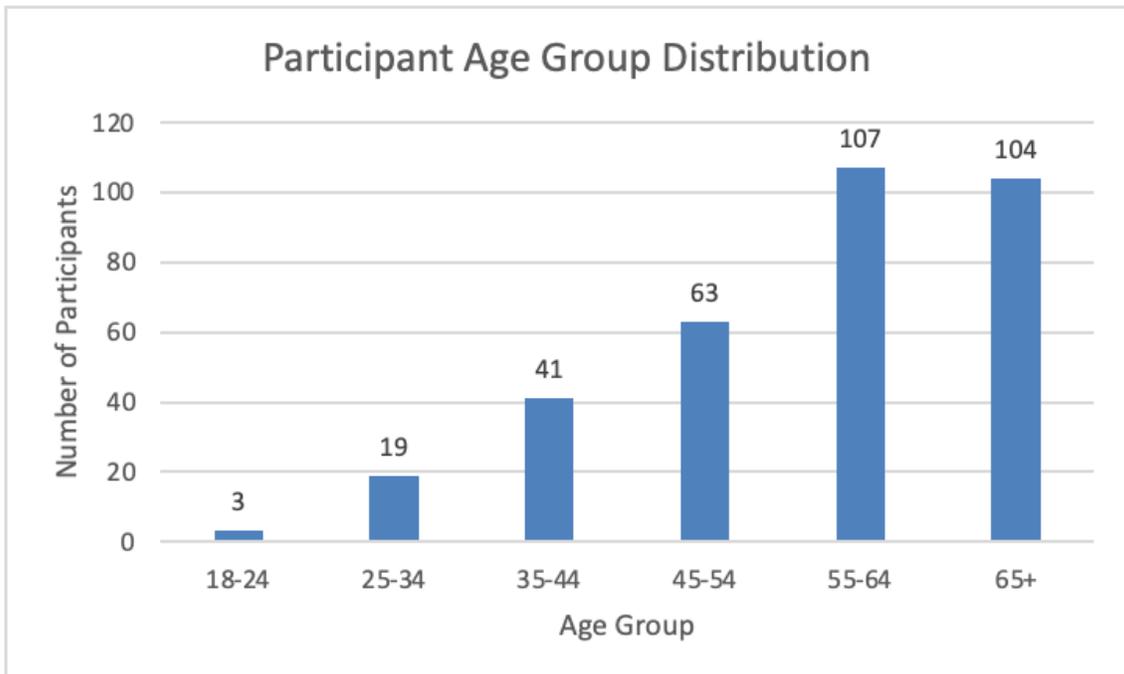


Figure 3 Participant Age Distribution

Figure 4 depicts why the participants may be interested in learning about how to check online health information by participating in this BOAST presentation. The participants could mark more than one category, if needed. Most respondents identified as “a person at high risk for cancer” (n=184; 53.1%) and “a person who was diagnosed with cancer that is not advanced” (n=107; 30.9%). Respondents in the 55-64 age group also had more respondents who “have a general interest in finding reliable health information” (n=39; 11.3%), compared to the other age groups.

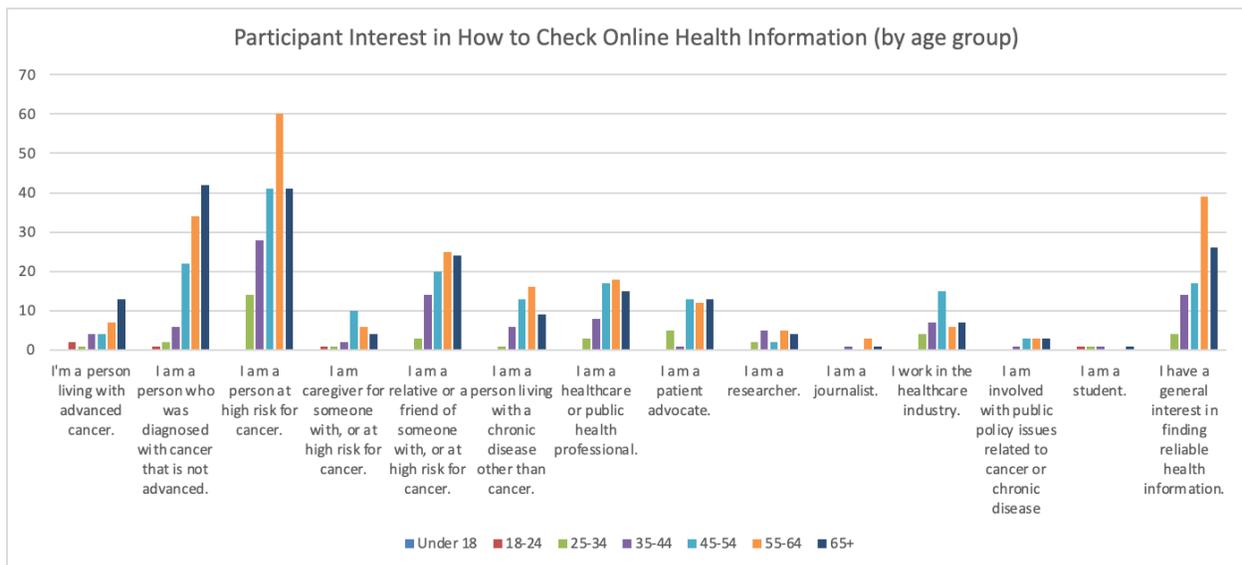


Figure 4 Participant Interest in How to Check Online Health Information

The first section of the survey focused on how well the participants could remember the material they learned during the one-hour BOAST presentation. While many participants (n=138; 39.9%) could correctly recall the terms included in the “BOAST” acronym—one of the main focuses of the presentation—most participants could not remember (n=183; 52.9%) (see Figure 5). Surprisingly, the second highest number of responses from this question was “I’m not sure”

(n=130; 37.6%). By age group, the most correct responses to this question were in age group 55-64 (n=46; 12.6%) and the most incorrect responses to this question were in age group 65+ (n=21; 18.8%) (see Figure 6).

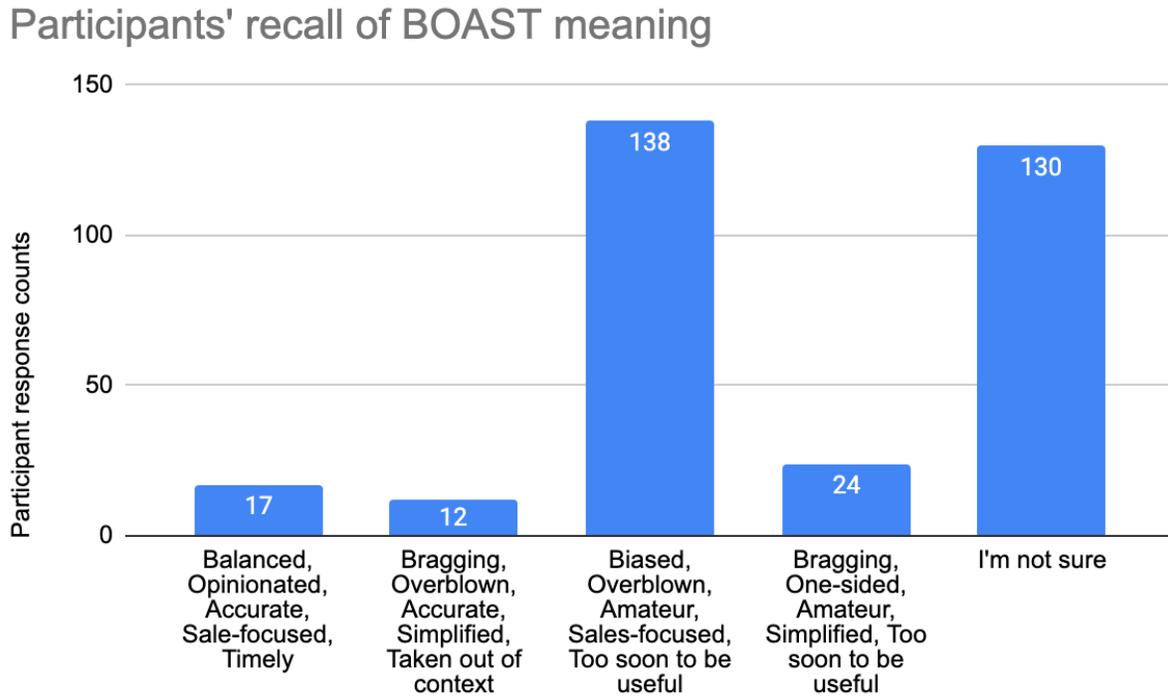


Figure 5 Participants' Recall of BOAST Meaning

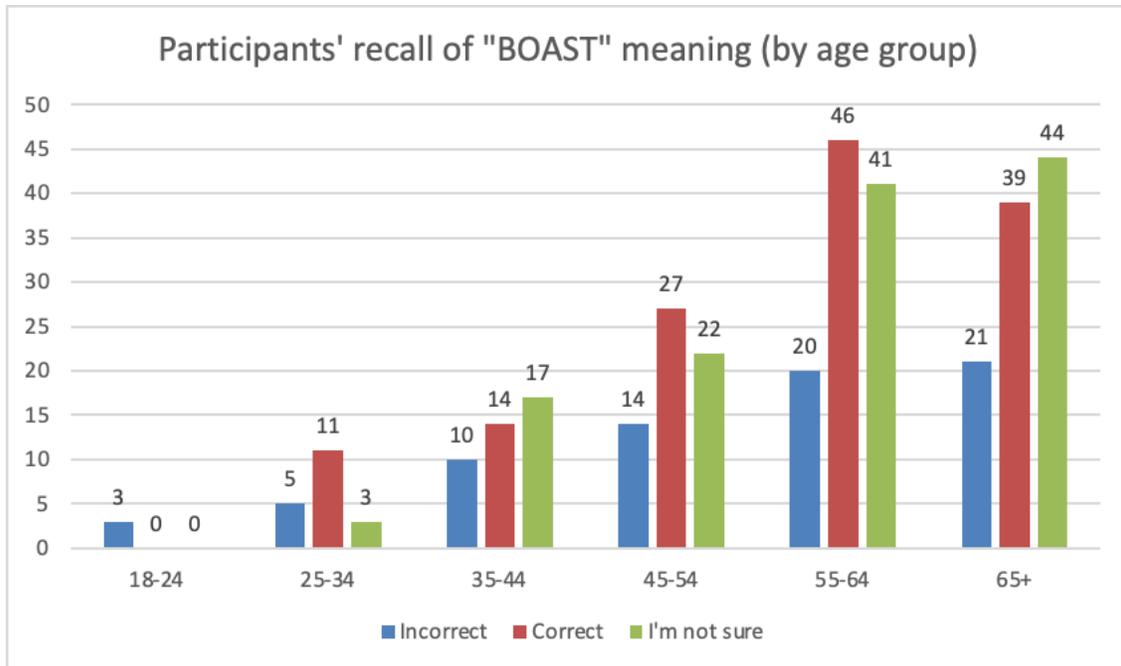


Figure 6 Participants' Recall of BOAST Meaning (by Age Group)

Additionally, another survey question asked the participants how helpful they found the section of the presentation that went over the meaning of “BOAST” and how to use this acronym when evaluating digital health-related information. This section of the presentation was titled “How to Spot the BOAST.” From the survey responses, many participants (n=138; 39.9%) found this section of the presentation “very helpful” (see Figure 7). However, many participants replied that this information was “not applicable or did not use” (n=84; 24.3%) and “somewhat helpful” (n=78; 22.5%).

How to Spot the BOAST

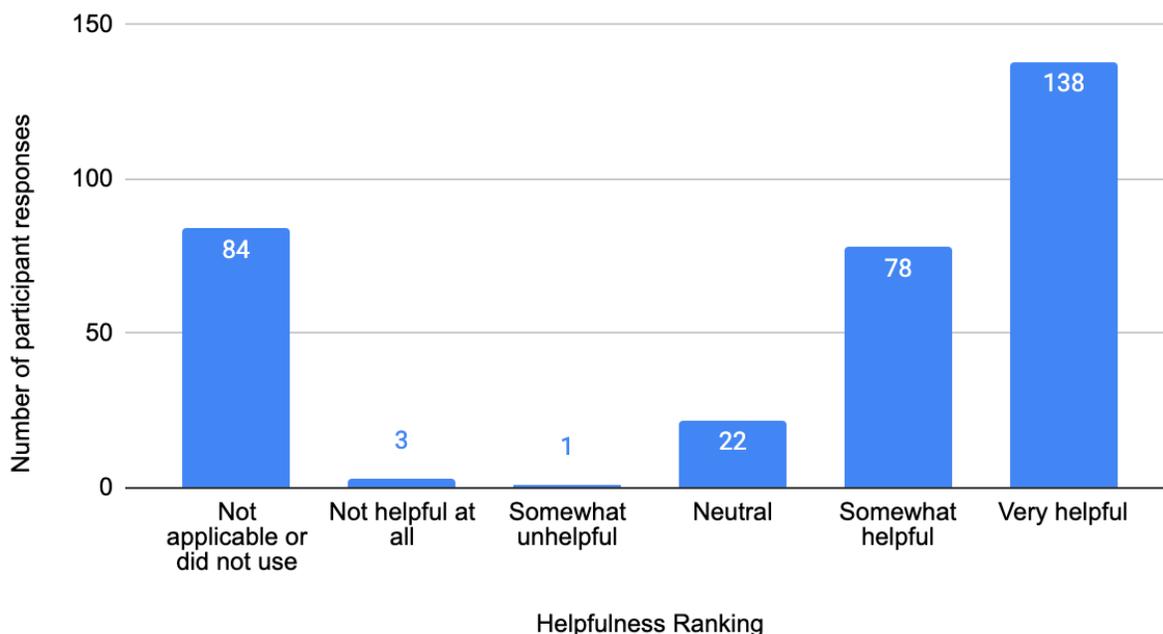


Figure 7 Responses to Question "How to spot the BOAST"

The participants also responded to the survey question that asked how they found information about participating in the BOAST presentation. Most participants (n=263; 76.0%) found this resource from FORCE's email announcements. A smaller number found it from social media (n=33; 9.5%) or from FORCE's website (n=37; 10.7%) (see Figure 8).

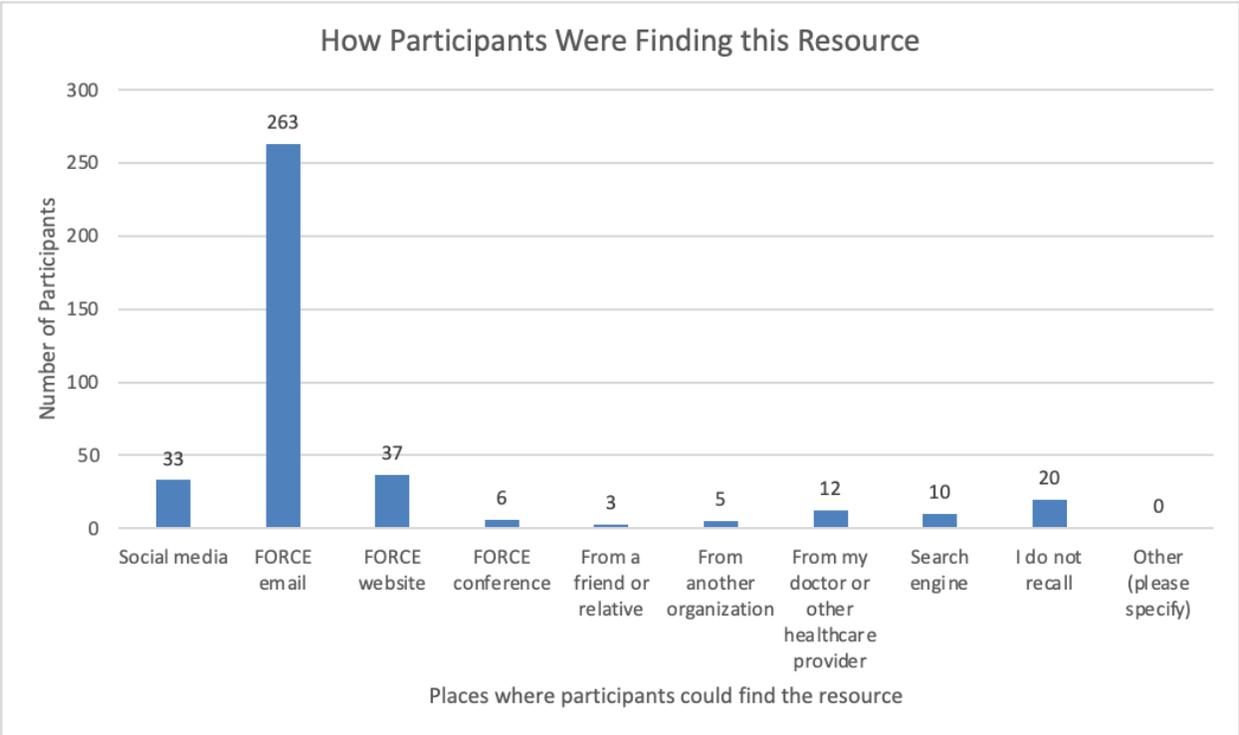


Figure 8 How Participants Were Finding This Resource

Multiple resources created for the BOAST program were provided through the presentation. Of these, the participants found that the “How to fact check information” guide (n=152; 43.9%) and the interactive quiz (n=122; 35.2%) were the most used by these participants (see Figure 9). While these were the most used, the participants did have the option to mark multiple resources that they used for this survey question. However, many participants marked “I’m not sure” for this question (n=78; 22.5%).

Resources Participants Used

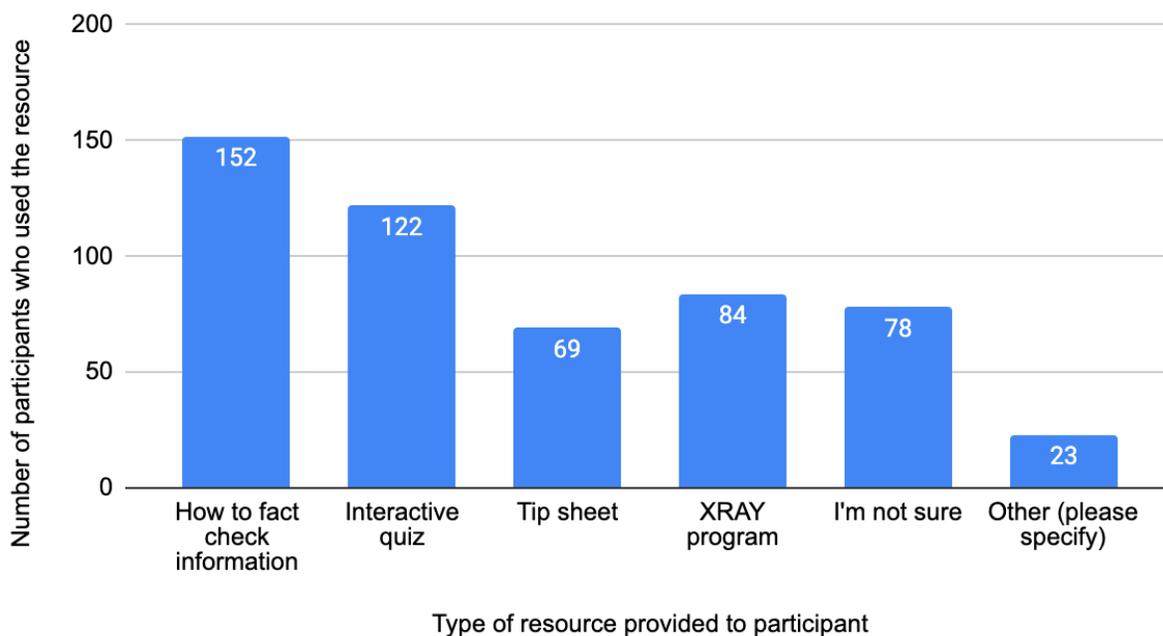


Figure 9 Resources Participants Used

The participants also responded to the question “I applied the information I learned to check new online health information” (see Figure 10). From the survey responses, most participants answered “strongly agree” (n=73; 21.1%), “agree” (n=93; 26.9%), or “neither agree nor disagree” (n=71; 20.5%). Many participants also replied “not applicable” to this question (n=77; 22.3%).

Participant Application of Provided Tools

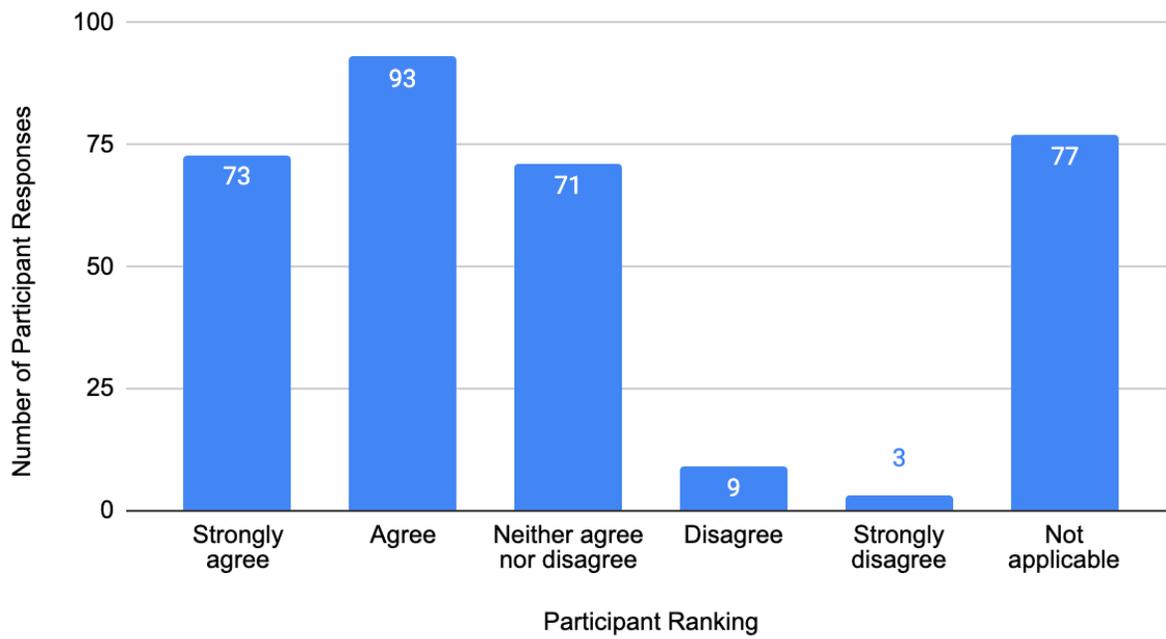


Figure 10 Participant Application of Provided Tools

6.0 Discussion and Conclusions

From this data analysis, most participants identified as white/non-Hispanic females. Most of the participants were finding the BOAST program from FORCE's digital networks, such as their email list, their social media, and their website. This could indicate that these participants already had at least some exposure to reading health-related information, as they had an interest in FORCE's work to sign up or follow their digital networks. While this data did not investigate each participant's baseline digital health literacy skills, these participants may have already been exposed to evaluating pieces of digital health-related information with their own digital health literacy skillset prior to this presentation. From the survey responses, the participants found that the BOAST resources provided in the presentation were helpful. Additionally, they agreed that they could apply the information from these resources to check digital health-related information on their own.

However, this analysis was surprising regarding the large number of responses that were some version of "not applicable" or "does not apply." These answers were in response to the questions about the meaning of the "BOAST" acronym tool and if the participants could apply it on their own. This was surprising given that the participants took this survey immediately after experiencing the one-hour presentation and the meaning and application of "BOAST" played a central role in the presentation itself. These same questions on the survey also had a high number of responses that indicate that the participants felt that the tool was useful and that they could apply it themselves.

This collection of responses could indicate that some of the participants felt that they already had adequate digital health literacy skills and did not feel the need to use the acronym tool

in their own life, but indeed felt that the tool was useful. In contrast, these responses could also indicate that there may be some confusion regarding the wording of these questions. Consequently, there could be efforts to improve the clarity of these survey questions. For example, to clarify the question about how helpful the participants found the section “How to Spot the BOAST,” instead ask how helpful they found the section about using the acronym “BOAST.” These small changes with the wording of the survey questions may help with improving clarity and avoiding confusion.

Multiple limitations exist in this preliminary research. Limitations include how many of the participants were individuals who were already familiar with cancer and cancer-related health information. Many of the participants were already involved to some degree with FORCE prior to attending a BOAST presentation, which can indicate that they already had some familiarity with evaluating cancer-related health information. While these individuals may have no exposure to digital health literacy, they may already have varying degrees of skill from prior experience navigating digital health-related information. Another limitation includes the fact that twelve questions do not show the depth of one’s digital health literacy, however, they could point to if one understood the information presented and where improvements can be made within the program. Future efforts may focus on using a validated measurement tool to measure the participants’ health literacy levels before and after the BOAST presentation. The free-response questions and questions where participants can answer more than one answer included in the survey could also be a place where limitations can arise. These answers can potentially lead to contradictory information if the survey questions are unclear. Finally, another major limitation identified during this analysis includes the potential confusion over the wording of some of the questions, which can lead to inaccurate reporting from the participants.

As this research develops, further examination of the wording of these survey questions could help ensure that the questions are clearer and easier to understand. This may potentially help with more accurately measuring how well the BOAST presentation's tools impact their participants' digital health literacy improvement.

Appendix A IRB Correspondence

Below are details regarding the correspondence with the University of Pittsburgh's IRB. They confirmed through this email that the data collected for use in this essay does not count as human subjects research, and IRB approval is not required in order to be included in this essay.

From: Barone, Jean Marie <baronej2@pitt.edu>
Sent: Tuesday, September 6, 2022 12:43 PM
To: Lee, Madison Isabelle <MIL170@pitt.edu>
Subject: Re: Question about if IRB Approval is Needed

Great. Good luck with the project.

Jeannie

From: Lee, Madison Isabelle MIL170@pitt.edu
Sent: Tuesday, September 6, 2022 12:10 PM
To: Barone, Jean Marie baronej2@pitt.edu
Subject: Re: Question about if IRB Approval is Needed

Hi Jeannie,

I hope you had a nice weekend! Thank you for the clarification. I was not part of the original data collection team so I will update my forms accordingly.

Thank you!

Madison

From: Barone, Jean Marie baronej2@pitt.edu

Sent: Tuesday, September 6, 2022 10:41 AM

To: Lee, Madison Isabelle MIL170@pitt.edu

Subject: Re: Question about if IRB Approval is Needed

Hi, Madison – Thank you for your message. Were you part of the original data collection team? If not, then we would not require a submission in order for you to perform the analysis.

Jeannie Barone

From: Lee, Madison Isabelle MIL170@pitt.edu

Sent: Friday, September 2, 2022 3:40PM

To: ASKIRB askirb@pitt.edu

Subject: Question about if IRB Approval is Needed

Good afternoon,

I hope you're having a lovely day! I am currently preparing to write my final essay for the MPH Human Genetics program, and I am wondering whether I need IRB approval before I am able to analyze the data I received from the organization where I did my practicum experience. The data itself was collection from an audience via survey during presentations on health literacy. Additionally, the data was de-identified before it came to me.

Please let me know if there is any other specific information you may need, or if there is somewhere else I should be directing my inquiry.

Thank you!

Madison Lee (*she/her*)

MPH Candidate, Public Health Genetics

Department of Human Genetics

University of Pittsburgh School of Public Health

mil170@pitt.edu

Appendix B FORCE Survey

1. Which of our resources on spotting reliable health information did you use? (select all that apply)

- How to fact check health information
 - Interactive quiz
 - Tip sheet
 - XRAY program
 - I'm not sure
 - Other (please specify)
-

2. How did you find out about our quiz and toolkit? (select all that apply)

- Social media (for example, Facebook, Twitter, Instagram, LinkedIn etc.)
- FORCE email
- FORCE website
- FORCE conference
- From a friend or relative
- Other (please provide additional details or comments on your selections above or other sources)
- From another organization
- From my doctor or other health care provider
- Search engine (for example, Google)
- I do not recall

3. Please tell us how helpful you found each of the following for finding trustworthy health information online.

	Very helpful	Somewhat helpful	Neutral	Somewhat unhelpful	Not helpful at all	Not applicable or did not use
How to spot a BOAST	<input type="radio"/>					
How to check the source of an article	<input type="radio"/>					
How to check the contents of an article	<input type="radio"/>					
How to check the relevance of an article	<input type="radio"/>					
The interactive quiz	<input type="radio"/>					
The downloadable guide	<input type="radio"/>					

4. Please indicate how much you agree with each of the following statements since you used our quiz and toolkit.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Not applicable
I found the quiz and toolkit easy to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I gained new information on how to check online health information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I applied the information I learned to check new online health information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It made me more aware of the importance of checking online health information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I shared the quiz and toolkit with a friend, colleague, relative or patient.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I shared the quiz and toolkit on social media.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like additional resources on spotting trustworthy online health information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please provide any details or comments

5. Do you recall the 5 red flags to watch for in a "BOAST"?

- Balanced, Opinionated, Accurate, Sale-focused, Timely
- Bragging, Overblown, Accurate, Simplified, Taken out of context
- Biased, Overblown, Amateur, Sales-focused, Too soon to be useful
- Bragging, One-sided, Amateur, Simplified, Too soon to be useful
- I'm not sure

6. Which of the following describes your interest in how to check online health information.
(select all that apply)

- | | |
|---|--|
| <input type="checkbox"/> I am a person living with advanced cancer. | <input type="checkbox"/> I am a patient advocate. |
| <input type="checkbox"/> I am a person who was diagnosed with cancer that is not advanced. | <input type="checkbox"/> I am a researcher. |
| <input type="checkbox"/> I am a person at high risk for cancer. | <input type="checkbox"/> I am a journalist. |
| <input type="checkbox"/> I am a caregiver of someone with, or at high risk for cancer. | <input type="checkbox"/> I work in the healthcare industry. |
| <input type="checkbox"/> I am a relative or friend of someone with, or at high risk for cancer. | <input type="checkbox"/> I am involved with public policy issues related to cancer or chronic disease. |
| <input type="checkbox"/> I am a person living with a chronic disease other than cancer. | <input type="checkbox"/> I am a student. |
| <input type="checkbox"/> I am a healthcare or public health professional. | <input type="checkbox"/> I have a general interest in finding reliable health information. |
| <input type="checkbox"/> Other (please specify) | |

7. Is there anything that you recommend we change about this program?

8. Were there any specific examples you would like to share of ways these resources helped you find trustworthy online health information or spot a BOAST?

9. What is your gender?

- female
 male
 differently identified (please specify if you wish)

9. What is your gender?

- female
- male
- differently identified (please specify if you wish)

10. What is your age?

- Under 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+

11. What is your race? Please check all that apply.

- White/Non-Hispanic
- Black or African American
- Latinx or Hispanic
- Asian
- Native American
- Pacific Islander
- Prefer not to share
- Other (please specify)

12. Have you been diagnosed with any of the following types of cancer?

- Breast
- Colorectal
- Endometrial or uterine
- Melanoma
- Other
- Ovarian, fallopian tube or primary peritoneal
- Pancreatic
- Prostate

13. If you are interested hearing from us about your comments on these tools, please provide your email address.

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