Disseminating a health information website to teens using a three-pronged approach with social media outreach

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ABSTRACT

Objective: To disseminate iuveo.org, a new health information website, primarily to teens in the United States using a three-pronged approach of social media, in-person, and emails.

Methods: Dissemination methods included a combination of in-person, email, and social media campaigns starting in August 2022 to reach teens and stakeholders focused on teen health. Following the Social Marketing Theory framework, a social media campaign was implemented utilizing Instagram and X (formerly Twitter). Website analytics, including monthly usage of iuveo, was measured utilizing Google Analytics. The intrinsic analytics from X and Instagram were also tracked.

Results: From August 2022–July 2023, iuveo attracted 1338 unique users to the website. In the same time frame, 1085 accounts were reached on Instagram, and 14,367 impressions were received on X. Most website users (84.8%) were classified as 'direct' acquisition, meaning that they directly typed in the URL or clicked on a link, and 7.3% of users visited iuveo from a social media platform.

Conclusion: A three-pronged dissemination strategy is beneficial when disseminating a new health information website.

Innovation: Utilizing a three-pronged approach with a social media campaign based on Social Marketing Theory, a health information website was disseminated to youth in the United States.

1. Introduction

Chronic conditions can be difficult for teens to manage, in part due to their limited involvement during medical visits [1,2]. Additionally, in a study assessing teens' perception of their asthma symptoms, it was found that teens may have a different perception of symptom severity and undertreat asthma symptoms [3]. That study found that those differences may be attributed to poorer long-term asthma control [3]. Teens may be less engaged in their healthcare visits than adults due to three main barriers: feeling intimidated, uncertainty of what questions to ask, and their caregiver controlling their health management [2,4]. It is imperative to provide teens with education regarding their chronic conditions to promote understanding of their condition and prevent potential long-term consequences [3].

Teens today are part of the digital native generation, as internet and social media use has become a part of their everyday life [5-8]. About 95% of American teens have access to a smartphone, and 89% report being online at least several times a day [5]. When teens have questions, their instinct is to turn to the internet first for answers, especially for health conditions and topics that may be awkward or difficult to discuss with others [1,6-8]. They use technology to help support their health, including gathering information through apps and websites [6,9]. E-health technology can potentially influence teens to change their health behaviors and find answers to questions that arise between provider visits [10]. The benefits of using technology for health information identified by teens include that it is nonjudgmental, convenient, and can be anonymous [10]. Through collaboration with two youth advisory boards in North Carolina (NC), "Information for the Evolving Teenager"

(iuveo.org), a website with content about various health topics, was created for teens ages 11–17 [11]. The goal of the website was to improve teen-provider communication and teen self-management of chronic conditions by including tools for teens to use during appointments [1,6]. The thirteen conditions currently on the website are: asthma, ADHD, vaping/smoking, diabetes, seizures, anxiety, panic disorder, depression, substance use, stimulants, bullying, eating disorders, and sexually transmitted infections (STIs) [1,11]. Originally, the website was going to solely focus on were asthma and ADHD, and the additional conditions were added based on youth advisory board input [11]. On the website, each condition has relevant information about symptoms, treatment options, tips for better managing the condition, and helping their friends with the condition [11]. Other resources on the website include 13 question prompt lists, 12 videos, and links to other references [11]. The question prompt lists were designed to help teens overcome barriers to asking questions during their visits by giving them a list of standard questions to check off during healthcare appointments [12]. Based on the feedback from the youth advisory boards, the website was found to be appealing, interactive, and useful [11]. Further details of website development are described in Wright, et al. Prior to this project, the website had not been shared with the general public.

Social media has previously been used as a tool to disseminate health information messages to teens, although prior work has mostly focused on decreasing the use of e-cigarettes and vapes [13-15]. However, the effects of social media interventions on health behaviors are still being discovered as the social media landscape is constantly changing [16,17]. As such, the research and literature lag behind current trends, creating a need for research to investigate how to overcome barriers to using social media platforms as a health education resource [16-19]. A significant barrier is that teens generally do not view social media as a credible source of health information [18]. The objectives of this project were to design a three-pronged framework for in-person, email, and social media dissemination strategies, and examine the impact on the website's usage.

2. Methods

The purpose of the dissemination strategy was to share the website with as many teens as possible, with a primary focus on the Southeastern United States, but understanding that reach may include national and international audiences. The strategy had three main approaches. The first was utilizing social media to reach health-related organizations and teens. The second approach was in-person dissemination, which included attending conferences or community events and distributing promotional materials. The final approach was to email relevant health-related organizations. Relevant health-related organizations were defined as those that advocate for advancing teen health. The three-pronged approach was designed to have synergistic effects to increase the reach of iuveo. The dissemination period started in August 2022 with the launch of the social media campaign. The in-person meetings and email outreach started in October and November, respectively. Data collection continued through July 31, 2023. This study was approved (#19–1409) by the Institutional Review Board at the University of North Carolina at Chapel Hill.

2.1. Social media dissemination

In order to ensure all aspects of a social media campaign were considered, the social media campaign was designed utilizing the framework of Social Marketing Theory [16]. Social Marketing Theory is applicable when there is a specific and voluntary behavioral goal to change [20-23]. The overarching mission of iuveo is to empower teens to be an advocate for their health, by increasing communication with their providers. As such, Social Marketing Theory was identified as an appropriate framework to design the social media campaign.

Following the framework of Social Marketing Theory, a social media

campaign was designed, implemented, and evaluated [20]. The specific steps and how they were addressed are delineated in the following sections, with a brief overview in Table 1. The social media campaign launched August 8, 2022.

Preliminary Planning/Audience analysis. Preliminary ideas were developed through a comprehensive literature review, and then discussed with the two youth advisory boards involved in the website's development [11]. Youth advisory boards were initially recruited through flyers distributed at local clinics, school nurses, and at community recreation centers in NC [11]. Participants had at least one self-reported chronic medical condition, were between the ages of 11–17 years, spoke English, and were from Western and Central NC [11]. Further characteristics of the youth advisory boards are detailed in Wright, et al. [11] Throughout the various steps of designing the social media campaign, the research team met with the youth advisory boards three times. Participants were compensated with a $50 Amazon gift card after each advisory board meeting.

Market analysis. The research team and youth advisory boards identified key characteristics of the website that differentiated iuveo from other health information websites. Differentiating traits include iuveo being co-designed by teens for teens and videos and question prompt lists to encourage participation in healthcare appointments. These unique characteristics were highlighted throughout the campaign.

Channel analysis. The social media platforms utilized were chosen based on what the youth advisory boards stated they used most often and whether platforms were feasible for a university research team. The youth advisory boards noted that currently, the most used social media platforms by teens were Instagram, X, TikTok, and Snapchat. Snapchat was not utilized as the content on the platform is short-lived. While TikTok is popular amongst teens, the platform is more time-intensive to create captivating videos and requires more frequent posting than X or Instagram to maintain views, which was beyond the scope of the project. Instagram and X were ultimately chosen as the platforms for the social media campaign.

Development/Content Design. During the content creation process, the content went through multiple rounds of feedback from both the research team and youth advisory boards. The youth advisory boards

Table 1
Application of Social Marketing Theory steps to dissemination of iuveo.org.

Step	Definition	Tools Used
Preliminary Planning	Identification of health problem, desired behavioral change, and goal setting	Literature review
Audience Analysis	Segmentation of general target audience to specific target group and studying that group's needs, wants, and preferences.	Literature review, two youth advisory boards
Market Analysis	Assessing potential partners, competitors, and other components of the marketing mix.	Review of other social media campaigns and e-health interventions targeting teens
Channel Analysis	Identify best ways to communicate with the target audience through channels such as printed materials, mass media, websites, social networks, and other mobile applications.	Two youth advisory boards, literature review
Development	Creating materials to be disseminated to the target audience	Two youth advisory boards, research team
Implementation	Execution of planned interventional materials	Posting on X (formerly Twitter) and Instagram
Evaluation	Continuous and final assessments of the intervention(s)	Google Analytics, Instagram, and X analytical platforms

provided key input about content design and posting frequency for each platform. Teens emphasized the importance of using language that is easy for them to understand but does not infantilize them. The research team provided input on the wording of the post.

Implementation. The social media campaign launched August 8, 2022 on X and Instagram; [X: @iuveo_health, Instagram: @iuveo.health]. The social media posting strategy was coordinated by three designated researchers and tailored to each platform. Content was shared on Instagram as 'posts' at least three times a week, and 'stories' were posted at least twice a week. Captions were designed to draw users to the website and popular hashtags related to the post were included to promote views. For X, tweets were posted 2–3 times a day, 5 days a week in August and September, and subsequently reduced to 1–2 times a day, as the higher volume of content posting would not be sustainable given the limited website content.

Evaluation of Social Media Dissemination. Data were collected monthly utilizing Instagram's and X's intrinsic analytical report. Instagram's key measures were the number of accounts reached, number of unique accounts that have viewed any content, total followers, and top performing topics. X's analytics were total number of impressions, which is defined as how many times the content was viewed, total followers, and top performing topics.

2.2. In-person dissemination

The goal of the in-person dissemination efforts was to connect with various stakeholders in teen healthcare and inform them about the website's resources. In-person events focused on teen health were identified accordingly by the research team, based on the reach of the conference and attendees present. Key conferences attended were the 2022 American Academy of Pediatrics (AAP) National Conference & Exhibition on October 8-10th, 2022 in Anaheim, California, and the 37th Annual North Carolina School Nurse Conference on December 8-9th, 2022 in Greensboro, NC. At conferences, team members educated attendees about iuveo and how they can incorporate the tools into interactions with their teen patients. A team member was then invited to provide education to a county board of school nurses. Other in-person dissemination methods included networking with NC Area Health Education Centers (AHECs) and having an information booth to interact with teens at a community day in Eastern NC. Finally, a team member led a class session about teen healthcare for third year pharmacy students and discussed iuveo in March 2022. Informational rack cards with a QR code linked to the website were distributed at all in-person events.

2.3. Emailing organizations

The purpose of using emails was to connect with stakeholders in teen healthcare. Organizations included youth advocacy organizations, recreation centers, libraries, school systems, after school programs, summer camps, healthcare providers, religious groups, and grant funding organizations. Other organizations were targeted if they focused on a health condition on iuveo, namely local sects of national advocacy organizations. Organizations were identified either through team members' professional networks or through searching the internet for teen health organizations across the United States. Four hundred relevant organizations were emailed once from November 2022 – August 2023. Contacting organizations was spread over nine months to provide a sustained impact and create a manageable workload for the research team. The email included a general description about iuveo.org and an electronic version of the flyer about the website. The email encouraged organizations to share the website and flyer with teens, and to respond to the email if they wanted more information.

2.4. Evaluation of in-person dissemination

The number of times the QR codes on the informational rack cards

distributed at in-person meetings were scanned throughout the research period was recorded.

2.5. Evaluation of overall dissemination

Website traffic was recorded monthly using Google Analytics, a free web analytics service. Key measures recorded include number of users, sessions, acquisition method, and location from which the website was accessed. The users metric tracks how many people accessed the website, sessions are defined as any interaction with the website, and acquisition is how users found the website.

3. Results

3.1. Results from planning stage

Interactive feedback in the planning stages culminated in the content shared on social media. Fig. 1a is an example of a post shared on the Instagram account, @iuveo.health, and Fig. 1b is an example of a post shared on the X account @iuveo_health. Fig. 1c is the electronic flyer emailed to organizations. These posts and materials reflect key feedback from the youth advisory board and research team, including using teen-friendly language, and promoting how to use iuveo.

3.2. Social media

X Engagement. The main data point recorded on X's intrinsic analytical platform was the number of impressions, which defines the total number of times the tweet is seen. The number of impressions on X from August 2022–July 2023 is displayed in Fig. 2. From August–September, the posting frequency was 2–3 times a day Mondays-Fridays. Starting in October, the posting frequency was reduced to 1–2 times a day. At the end of August 2022, the follower count was 1, and by the end of July 2023, 24 accounts followed @iuveo_health. Notable followers included teens, academic professors who promote teen health, and other teen health advocacy organizations. The categories of the top performing social media posts by month were: General (August 2022), Depression (September 2022), Panic Disorders (October 2022), Vaping (November 2022), Mental Health (December 2022), Diabetes (January 2023), and STIs (February 2023), General (March–May 2023), STIs (June 2023), Eating Disorders (July 2023). The general category refers to a social media post that was not related to a specific health condition, but rather about the resources found on iuveo or other messages encouraging teens to actively engage in their healthcare.

Instagram Engagement. Fig. 3 demonstrates the accounts reached by month from August 2022–July 2023. The Instagram follower count was also tracked, at the end of August 2022, it was 18, and grew to 246 by the end of July 2023. Notable followers of the account included teens, various AHECs throughout the country, accounts focusing on at least one health condition, and other teen-led advocacy groups. Top performing posts by month were: General (August 2022), STIs (September 2022), General (October 2022), Asthma (November 2022), Diabetes (December 2022), General (January 2023), Eating Disorders (February 2023), General (March 2023), Vaping (April 2023), General (May 2023), General (June 2023) Mental Health (July 2023).

3.3. In person

A common theme of the feedback received from conference attendees, who were predominately healthcare providers, was on the usefulness of the question prompt lists. Their ideas on using the question prompt lists in their practice sites varied, where some wished to have the QR code in the waiting room for teens to peruse at their convenience. Although attendees worked in a variety of practice settings, many found value in the website's resources. One example of how attendees imagined incorporating the resources on iuveo is quoted here, "I have no idea
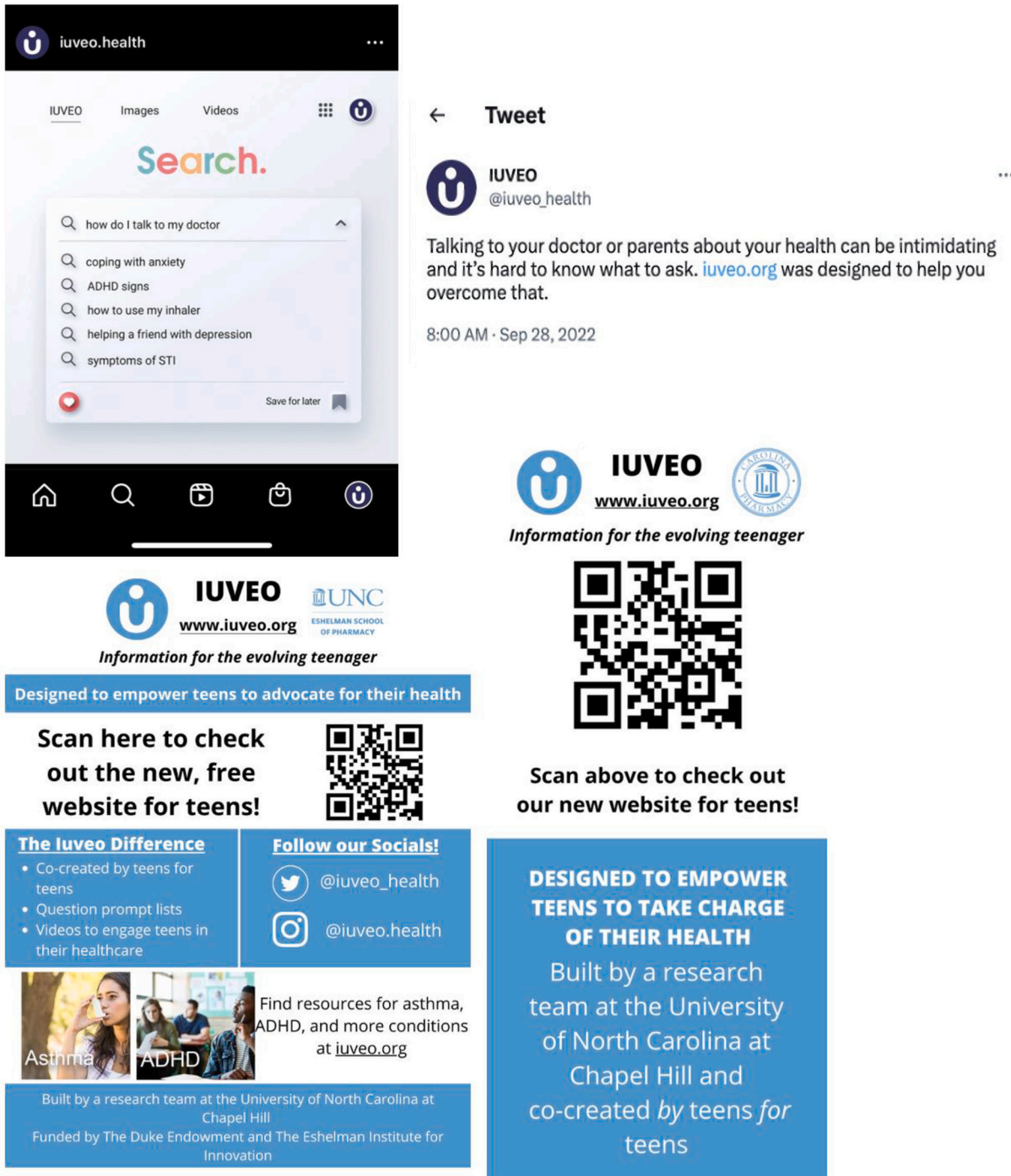
Fig. 1. Sample of distributed materials.
Figure 1a (top left). Example of Instagram post shared to @iuveo.health.
Figure 1b (top right). Example of X posts shared to @iuveo_health.
Figure 1c (bottom left). Electronic flyer shared with organizations through email.
Figure 1d (bottom right). Front page of informational rack card given out at in-person events.

how to talk to the teens I see about vaping, this could be a resource for them to start the conversation." About 1000 rack cards were distributed at the AAP National Conference, and about 200 were distributed at the NC School Nurse Conference. QR codes were scanned 150 times from August 2022–July 2023.

3.4. Email outreach

Of the 400 emails sent to relevant organizations encouraging them to share iuveo with teens, 17 organizations responded to the email asking for more information about the website. Nineteen emails could not be delivered due to a faulty email address.
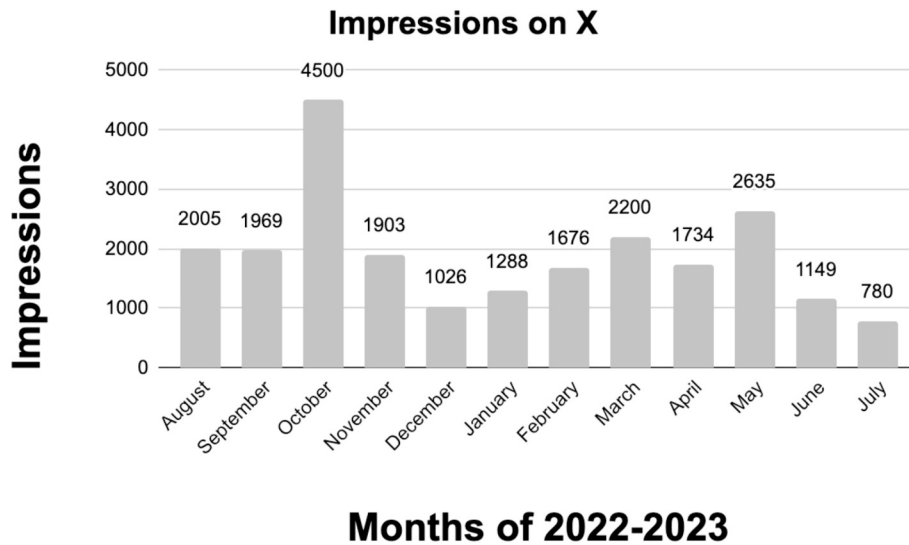
Impressions on X

Fig. 2. Monthly X reach from August 2022–July 2023 measured by number of impressions.
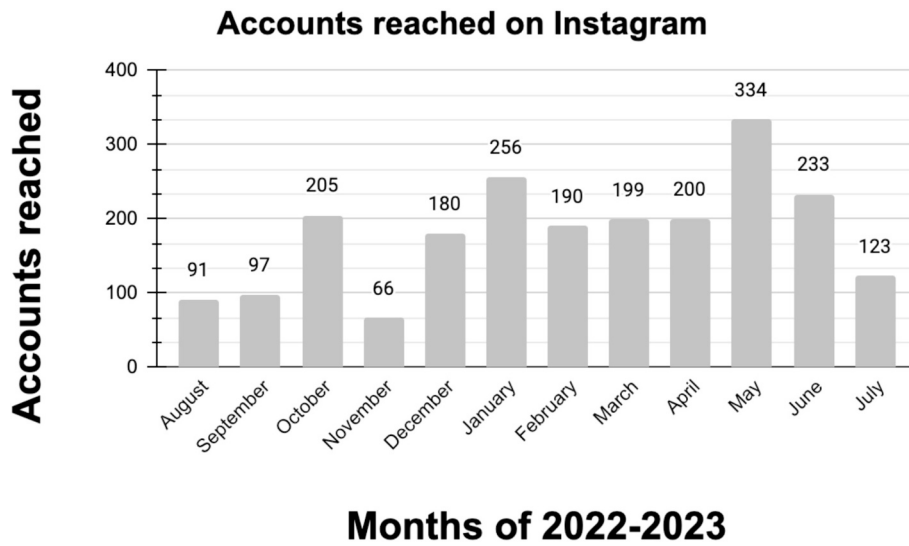
Accounts reached on Instagram

Fig. 3. Monthly Instagram Reach from August 2022–July 2023.

3.5. Website engagement

'Direct' acquisition accounted for 1135 (84.8%) of the users, meaning that they either clicked on a link to the website, directly typed the URL into their browser, or originated from an unknown source. The 'Social' acquisition mode was the second most popular, bringing in 97 users (7.3%). Instagram directly led 63 users to iuveo, and X directly led 31 users. The third most popular mode was 'Search', which brought in 85 (6.4%) of users, meaning users found iuveo through a search engine. Engagement within the website is detailed in Fig. 4, which details the total users by month for the year after the launch of the social media campaign. October and December 2022 show a spike in website users, which is when the research team attended the AAP and NC School Nurse conferences, respectively. From the launch of the social media campaign in August 2022 to July 2023, the total number of users was 1338. The total number of sessions was 13,439. The top five most visited conditions on the website by percentage of page views were ADHD (6.8%), depression (6.7%), diabetes (6.7%), anxiety (6.7%), and asthma (6.53%). Most users were in the United States (76%), followed by China (13.8%), India (2%), Ireland (1.2%), Philippines (<1%), Netherlands (<1%), United Kingdom (<1%), Canada (<1%), Russia (<1%), and United Arab Emirates (<1%).

4. Discussion and conclusion

4.1. Discussion

The framework developed for dissemination showed a synergistic effect between the three dissemination prongs of in-person, emailing, and social media campaigns. Website engagement trends reflected in-person and email efforts, meaning that there were peaks around the time the team attended events or sent emails. However, in the months without the in-person events or emails, there was still engagement with the website, which could be attributed to the effect of the social media campaign. The slow increase in iuveo's social media followers and engagement is in line with prior findings that it can be difficult for new social media accounts to gain popularity as a reliable and credible source for health information in today's social media landscape [18].

The peaks in engagement associated with in-person events indicate that the ability to educate stakeholders is a valuable tactic to establish credibility. By attending conferences, team members educated attendees about iuveo's utility in practice. The social media campaigns then
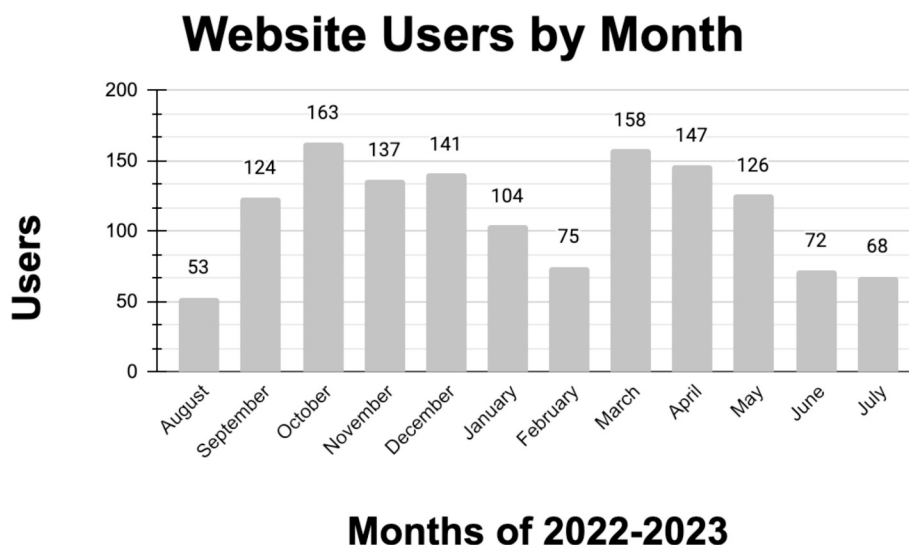
Website Users by Month

Fig. 4. Website Users by Month from August 2022–July 2023 as measured through Google Analytics.

sustained engagement after in-person meetings had taken place. There were several months where no other dissemination efforts took place, such as February, June, and July, which were months with fewer users than other months. This demonstrates the utility of a three-pronged approach of physical, email, and social media campaigns in disseminating a health information website, and how the three approaches have a synergistic effect to create and maintain website usage.

The uptick in usage of the website after launching the social media platform supports prior research on the utility of social media campaigns for communicating health information [13,15,17]. The three-pronged approach also led to forming connections with other potential external disseminators of the website, who are individuals or organizations outside of the research team and affiliated institution who share or repost content [13]. External disseminators generally consisted of youth advocacy groups. Leveraging these disseminators increases the reach of iuveo without requiring extra effort from the research team. External dissemination may help contribute to the reach and credibility of the website amongst other social media users.

A similar website, SteppingUp.ie was created and disseminated by Coyne et al. in Ireland, in December 2013 [6]. At the end of one year, their website accumulated 6202 visitors [6]. After one year, iuveo accumulated 1338 users. There were significant differences between the dissemination of SteppingUp.ie and iuveo that may have contributed to the differences in website uptake. Alan Southern, an international hockey player with type one diabetes and many social media followers, helped advertise the launch of SteppingUp.ie and subsequent posted on social media [6]. Whereas iuveo launched a social media campaign from new social media accounts with no preexisting followers. Iuveo was briefly highlighted by the University of North Carolina Eshelman School of Pharmacy through a story on the school's website and social media. In contrast, SteppingUp.ie, was highlighted on Irish national and international websites, television, print, and social media [6]. The external disseminators' pre-existing media presence likely helped contribute to the widespread promotion and dissemination of the SteppingUp website compared to iuveo. However, the framework followed by iuveo may be utilized by groups that do not have access to such high-profile external disseminators.

Other teen-focused social media campaigns used paid approaches such as influencers, micro-influencers, and paid advertisements to increase views [15,19]. A social media campaign, *Fresh Empire*, employed all of the mentioned paid strategies and achieved 30 million digital video completions in three months [15]. Between Instagram and X, iuveo's social media campaign totaled 24,149 impressions in one year.

As contracting with an influencer for a single post can cost over $500, iuveo did not commission any paid approaches due to funding constraints [15]. Although this approach was less successful than paid strategies, iuveo's social media campaign still accumulated over 24,000 impressions. This suggests that the social media approach used to promote iuveo can be utilized as a framework for other organizations with funding constraints who are intending to utilize social media. The framework utilized was also applied to more than one social media platform, in comparison to other published social media campaigns have primarily focused on Instagram, or other social media platforms such as Facebook that teens do not use as frequently anymore [15,18,21].

X gained substantially more views than Instagram, with 22,865 and 1284 views respectively. However, Instagram directed more users to the website than X did. This suggests that Instagram may be a more efficient platform at converting views to website usage. Throughout 2022–2023, X had challenges retaining users due to issues such as service disruptions, banning links to external websites, and other glitches, which resulted in more users leaving the platform [22,23]. These challenges may have played a role in why X had less of a contribution in user acquisition. As Google Analytics only reports users that directly clicked a link on social media, users could have seen posts and visited the website later, potentially underestimating the impact of social media. A strength of using social media is that all posts contain information from iuveo. org, so social media users still see evidence-based knowledge before visiting the website [15,19,24]. Overall, this study demonstrated how to adapt posting strategies and content for two separate social media platforms, Instagram and X.

As seen throughout the course of one year, it is evident that the social media landscape and trends are ever-changing. This warrants further work to continue discovering optimal ways to communicate health information and disseminate a health information website, especially to teens [17].

4.2. Innovation

This project is innovative as it provides insight into how to develop a multi-pronged dissemination plan to share a health information resource with teens. Overall, this project found that each arm worked synergistically to create and maintain website usage. The combination of the different prongs is innovative as it targets both teens and stakeholders in teen healthcare by adapting each prong to engage both groups. This project demonstrates how to adapt the Social Marketing Theory framework to engage teens on social media, especially for

organizations with limited resources that do not have the means to pay for ways to boost social media views [20]. Other areas of innovation stem from the fact that research surrounding teens' use of social media lags behind trends. This project offers insight into the importance of obtaining teen input while designing a social media campaign. Technology and social media platforms are ever-changing, as seen throughout the project duration with the changes with X (Twitter). This framework specifically prioritizes social media, which is where many teens spend their time. This is also innovative as the social media campaign included information and resources from the website, so that even by viewing the content shared on social media and not visiting the website, teens could still see information that is on iuveo.org.

Another area of innovation is that while several anti-vaping and smoking campaigns have been implemented to prevent teens from smoking and vaping or encourage cessation, there are not any well documented social media campaigns empowering teenagers to take charge of their overall physical and mental health [15]. In this way, this project is innovative as it served a dual purpose of disseminating a tool to improve teens' engagement in their healthcare and developing and evaluating a three-pronged framework consisting of a social media campaign, email outreach, and in-person efforts for future organizations to adapt.

5. Conclusion

Each arm of the three-pronged approach contributed to disseminating a co-designed health information website to teens and stakeholders involved in teen healthcare. While the initial uptake of the website was slower in the beginning, usage increased as followers of social media increased, and in-person connections were made. This project expands on the previous work on how to effectively convey evidence-based health information in social media posts by implementing a social media campaign in a low-cost manner. The in-person and email campaigns were useful for establishing connections with potential external disseminators and informing stakeholders in teen healthcare about the utility of iuveo.org. The social media campaign was beneficial in connecting with teens and teen-led organizations.

CRediT authorship contribution statement

McKenna Knock: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Delesha M. Carpenter:** Writing – review & editing, Supervision, Project administration, Funding acquisition, Conceptualization. **Kathleen C. Thomas:** Writing – review & editing, Supervision, Project administration, Funding acquisition, Conceptualization. **Charles Lee:** Writing – review & editing, Software, Resources, Project administration, Funding acquisition, Conceptualization. **Abena Adjei:** Writing – review & editing, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jeremy Lowery:** Writing – review & editing, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Imelda Coyne:** Writing – review & editing, Visualization, Supervision, Methodology. **Nacire Garcia:** Writing – review & editing, Resources, Project administration, Formal analysis. **Betsy Sleath:** Writing – review & editing, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. Funders of the project are The Dogwood Grant and The Duke Endowment.

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