Check for updates

An in-depth exploration into college students' information acquisition and evaluation behaviors during the COVID-19 infodemic

Nien-Tsu Nancy Chen[1]*, Kimmy Kee[2], Bianca T. Villalobos[3], Miriam Ortiz[4] and HyeSun Lee[2]

[1]Department of Communication Studies, California State University Channel Islands, Camarillo, CA, United States, [2]Department of Psychology, California State University Channel Islands, Camarillo, CA, United States, [3]Department of Psychology, California State University Northridge, Northridge, CA, United States, [4]Department of Psychological Science, University of Texas Rio Grande Valley, Edinburg, TX, United States

Introduction: This study examines how vaccination-inclined and vaccination-hesitant U.S. college students acquired and evaluated COVID-19 vaccination information.

Methods: In 2021, we conducted 26 focus group discussions and used thematic analysis to identify patterns in information acquisition behaviors and trust in information sources.

Results: Findings revealed mismatches between frequently used and most trusted sources. Public health agencies were highly trusted but not commonly consulted first. In contrast, social media were frequently used for information scanning despite being the least trusted. Interpersonal sources (e.g., family) were identified as both a most and least trusted source. They were trusted for their good intention but questioned for their expertise and perceived reliance on biased sources like social media.

Discussion: Given the identified gap between information acquisition and trust, public health communication must address how college students weigh convenience, familiarity, and credibility when obtaining and evaluating health information in an environment flooded with misinformation and disinformation.

KEYWORDS

COVID-19 vaccination, infodemic, health information seeking, health information scanning, trust in information sources, distrust in information sources, health information acquisition, health information evaluation

1 Introduction

Information is integral to the health decision-making process (Anker et al., 2011). Obtaining accurate health information presents many challenges in an "infodemic" where misleading information abounds and spreads rapidly (WHO, 2024a), making it ever more difficult to make sound decisions. The current study focuses on U.S. college students' information acquisition and evaluation behaviors regarding COVID-19 vaccination when the vaccines first became available to them in the spring of 2021. The COVID-19 pandemic was an infodemic (WHO, 2024b), where an abundance of myths circulated online and offline, including many about the COVID-19 vaccines (Lee et al., 2022). As a population, many college students belong to the age group of 18–24 year-olds that consistently register the lowest rate

of COVID-19 vaccination among all adults in the U.S. (Diesel et al., 2021). It is thus important to better understand how college students gather and assess COVID-19 vaccination information to develop more tailored strategies that promote vaccination against COVID-19 and other infectious diseases among these young adults.

Extant literature suggests that health information acquisition is associated with health behavior (Anker et al., 2011), with some positioning information acquisition as an antecedent of behavior while others consider information acquisition preferences as an outcome of preexisting behavioral inclination (Anker et al., 2011; Charron et al., 2020). Research also suggests that trust in a source can influence how the information obtained is factored into health decision-making (Bautista et al., 2023). With fast-evolving communication technology, however, the cues for determining the original source and assessing the credibility of information have become increasingly obscure (Schwarzenegger, 2020), necessitating more research on how people decide to place trust in certain information sources but not others.

In the following sections, we start by defining information scanning and information seeking, two behaviors that are relevant and consequential to college students' vaccination decision-making during the COVID-19 pandemic. We then review existing literature on the most and least trusted sources of COVID-19 vaccination information. Next, we examine the underlying reasons why certain sources are trusted or distrusted. While summarizing relevant literature, we also present our own research questions to address gaps in the literature that warrant further exploration.

1.1 Scanning and seeking information on COVID-19 vaccination

Information acquisition can occur in many ways. For example, "information scanning" is a way in which individuals acquire information incidentally during everyday interactions with communication channels (Niederdeppe et al., 2007). In contrast, "information seeking" involves the deliberate effort to search for specific information beyond one's routine interactions with communication sources. It is noteworthy that information scanning, while unintentional, requires active attention to information and the ability to recall it (Ruppel, 2016). Consequently, both information scanning and information seeking can impact health decision-making, sometimes in productive ways and other times in maladaptive manners (Piltch-Loeb et al., 2021; Zhang et al., 2024; Zheng et al., 2022).

Research has explored the antecedents of health information scanning and seeking. According to the comprehensive model of information seeking (CMIS), health information acquisition preferences are influenced by "health-related factors" (e.g., sociodemographic characteristics, salience, efficacy beliefs) and "carrier-related factors" (e.g., type of source, trust in information sources) (Ruppel, 2016). Regarding health-related factors, U.S. college students typically share many similarities. For example, they tend to belong to a younger generation and are well educated, and these characteristics are associated with a higher likelihood of using online channels for health information scanning and seeking (Lustria et al., 2011). Regarding "salience" (i.e., perceived personal threat from an illness), young adults often feel less susceptible to diseases. However, the threat from a

pandemic disease like COVID-19 transcends age and is felt by everyone (Koskan et al., 2012; Tandoc and Lee, 2022). Therefore, the current study aims to uncover how a predominantly young and digitally savvy population acquires and evaluates information when confronted with an omnipresent health threat and an infodemic.

Research suggests that young adults acquire information about a pandemic from multiple types of sources, including interpersonal, scientific/medical, campus-based, online, and mass-mediated sources (Koskan et al., 2012; Qiao et al., 2022). These categories of sources, however, rank differently across studies in terms of how frequently they are used to obtain information (Charron et al., 2020; Qiao et al., 2022). Furthermore, each broad category of source can be broken down into more specific channels. For instance, Ali et al. (2020) found that when analyzing broad categories, traditional mass media (e.g., television, radio, and newspapers) constituted the primary source of COVID-19 information among U.S. adults. However, when more specific channels within each broad category were considered, government websites emerged as the most widely used source of COVID-19 information.

Notably, the primary sources that individuals rely on for scanning vaccination information do not align fully with their main sources for information seeking. For example, Koskan et al. (2012) found that during the H1N1 pandemic, U.S. college students used interpersonal channels as a primary source for both scanning and seeking pandemic information, while online search engines were identified as a primary source for information seeking but not for information scanning. Qiao et al. (2022) focused on vaccination and found that during the COVID-19 pandemic, public health agencies, mass media, and personal social networks were the primary sources for receiving vaccination information among college students. However, they were more likely to actively seek vaccination information from healthcare providers and scientists.

Building upon existing research, our study sought to acquire a more nuanced understanding of "people's own meanings" (Wilkinson, 1998, p. 331) and experiences with acquiring COVID-19 vaccination information through semi-structured focus group discussions:

> *RQ1:* Overall, what are the most frequently utilized sources for (a) information scanning, and (b) information seeking regarding COVID-19 vaccination among college students?

Furthermore, we explored if vaccination-inclined and vaccination-hesitant individuals differed in their information gathering behaviors. Vaccination-inclined individuals are generally supportive of vaccination and likely to get vaccinated, whereas vaccination-hesitant individuals are doubtful or resistant toward vaccination (MacDonald and the SAGE Working Group on Vaccine Hesitancy, 2015). Research suggests that certain information channels are more likely to carry misinformation (Kisa and Kisa, 2024; Malik et al., 2024; Piltch-Loeb et al., 2021), and exposure to misinformation is a predictor of vaccine hesitancy (Neely et al., 2022). Focusing on college students, we therefore investigated:

> *RQ2:* Do vaccination-inclined and vaccination-hesitant college students rely on similar or different sources for (a) information scanning, and (b) information seeking regarding COVID-19 vaccination?

1.2 Trusted and distrusted sources of COVID-19 vaccination information

According to the CMIS, trust in information sources is a "carrier-related factor" that helps determine which sources would be used for information scanning and seeking (Ruppel, 2016). Research also suggests that trust in a source can influence subsequent processing and engagement with the information obtained, where information from a trusted source is more likely to generate congruent attitudes, intention, or behavior, and such information is also more likely to be shared with others (Bautista et al., 2023; Peng and Yang, 2022).

During the COVID-19 pandemic, scientific/medical sources, and governmental sources were identified as some of the most trusted sources of pandemic information among U.S. college students (Kecojevic et al., 2021; Qiao et al., 2022). Trust in scientific/medical sources was subsequently found to enhance COVID-19 vaccination intention among college students (Geng et al., 2022). The relationship between trust in governmental sources and vaccine acceptance, however, is more complex. For instance, research found that trust in the U.S. Centers for Disease Control and Prevention (CDC) was positively associated with COVID-19 vaccination intention (Latkin et al., 2021b), whereas trust in the White House under former president Trump was negatively correlated with vaccine acceptance (Latkin et al., 2021b; Latkin et al., 2021a).

Despite social media's popularity among young adults as a general information source (Auxier and Anderson, 2021), they were identified as a less trusted source for COVID-19 vaccination information (Kecojevic et al., 2021) and was negatively associated with COVID-19 vaccine acceptance among U.S. college students (Qiao et al., 2022). Some researchers explain this association as a result of exposure to misinformation and antivax activities on social media (Qiao et al., 2022), whereas others argue that the choice to rely on social media for vaccine information stems from individuals' preexisting beliefs against vaccine and their pursuit of an "echo chamber" online (Jennings et al., 2021).

Taken together, extant research suggests that trust in information sources is related to health decision-making, but such a relationship tends to be context-dependent and channel-specific. Therefore, we focused on the context of the COVID-19 infodemic and at a time when the COVID-19 vaccines first became available to U.S. college students in 2021 and explored:

RQ3: What are the (a) most trusted sources, and (b) least trusted sources for COVID-19 vaccination information among college students?

RQ4: How similar or different are vaccination-inclined and vaccination-hesitant college students in terms of their (a) most trusted sources, and (b) least trusted sources for COVID-19 vaccination information?

1.3 Reasons for trust or distrust in information sources

Tsfati and Cappella (2003, p. 505) defined trust as "the expectation that the interaction with the trustee would lead to gains, rather than losses, for the trustor." In other words, trust is based on not only the perceived competence of the trustee but also their perceived motivation. As an example, trust in a media outlet depends on both the perceived accuracy of reporting (i.e., professional competence) and the perceived absence of bias (i.e., motivation). Similarly, Mayer et al. (1995) use the terms "ability," "benevolence," and "integrity" to capture the major dimensions of trust. Ability refers to domain-specific knowledge and skills that make a trustee competent in a technical area. Benevolence is based on the perception that the trustee "want[s] to do good to the trustor" (Mayer et al., 1995, p. 718). Integrity refers to the trustor's perception that the trustee adheres to a set of agreeable principles (e.g., ethical standards).

More recent research has extended our understanding of trust to the digital realm. As Metzger and Flanagin (2013) point out, there are multiple layers of cues for evaluating the trustworthiness of digital information, such as website-level cues (e.g., reputation of the site itself), content-level cues (e.g., believability of specific information within the site), and author-level cues (e.g., perceived character of the author of particular information). These different cues were captured in a review study by Sbaffi and Rowley (2017), which identified authority, objectivity, references, statistics, currency, familiarity, relevance, and empathy as major cues leading to trust in web-based health information. In contrast, inappropriate information, irrelevant information, complex information, and biased information were some major factors associated with distrust.

Building upon extant research, the current study aimed to explore the main reasons for trusting or distrusting various sources of COVID-19 vaccination information among U.S. college students. The COVID-19 pandemic presents a novel context for re-examining how online and offline information sources are evaluated, given the unprecedented levels of health (mis)information in our environment (Gisondi et al., 2022) and the increasing obscurity of cues for determining source credibility (Schwarzenegger, 2020):

RQ5: What are the main reasons for (a) trusting, and (b) distrusting various sources of COVID-19 vaccination information among college students?
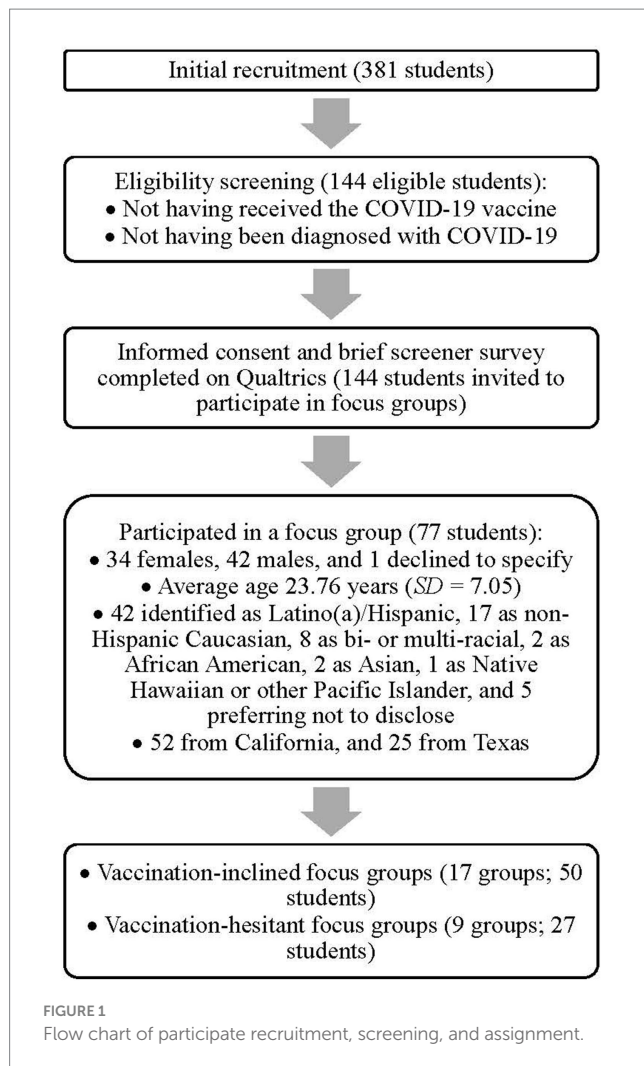
RQ6: Do vaccination-inclined and vaccination-hesitant college students have similar or different reasons for (a) trusting, and (d) distrusting various information sources?

2 Methods

2.1 Participants and procedure

The current study was part of a larger research project on college students' decision-making process regarding COVID-19 vaccination. A total of 381 undergraduate students were recruited from two universities – one in California and the other in Texas – where the five investigators were based. Recruitment was conducted through flyers posted on campus and the online SONA participant pool management software. Figure 1 presents the flow of participant recruitment, screening, and assignment into focus groups, with 77 students who eventually took part in a focus group discussion.

To be eligible for participation, students had to meet two criteria: not having received the COVID-19 vaccine and not having been

FIGURE 1
Flow chart of participate recruitment, screening, and assignment.

procedure). Inclined and hesitant individuals were invited to participate in separate online focus groups conducted through Zoom between March 31 and April 28, 2021.

We chose to use focus group discussions rather than surveys or other quantitative methods to gain a deeper understanding of individuals' own meanings and lived experiences related to the COVID-19 pandemic and vaccination (Wilkinson, 1998, p. 331). This format provided participants with more space to articulate their thoughts and feelings, enabling the exploration of emerging patterns. It also allowed the moderator to probe further into particularly interesting or unexpected comments shared during the discussion.

The sample size for each type of focus group discussion (17 inclined versus 9 hesitant groups) closely adhered to the recommendation of 10 + focus groups as outlined in Braun and Clarke (2006). All participants were assigned a pseudonym during the focus group discussions, which were video recorded. Each discussion lasted from 40 to 60 min and included two to five participants and a moderator who was one of the study's investigators.

The moderator's guide included the following questions on participants' information acquisition and evaluation behaviors regarding COVID-19 vaccination:

(1) Think about three sources from which you have most frequently received information about the vaccine. These can be sources that you either agree or disagree with, and they can range from mainstream media outlets to social media platforms or from specific persons to certain organizations. Please enter them in the chat.[2]
(2) Tell me your most trusted source for information related to the COVID-19 vaccine. Why do you trust this source of information?
(3) Share with me a source that you have little or no trust in when it comes to information related to the COVID-19 vaccine. Why do not you trust this source of information?
(4) Last but not least, can I have a show of hands to see how many of you have tried to find out more information or get advice about the COVID-19 vaccine? For those who have sought information: What did you do to get more information or advice about the COVID-19 vaccine?

The first question focused on information scanning behavior (RQ1a and RQ2a), while the fourth question explored information-seeking behavior (RQ1b and RQ2b). The second question inquired about participants' most trusted sources for COVID-19 vaccination information (RQ3a and RQ4a) and the reasons behind this trust (RQ5a and RQ6a). The third question focused on participants' least trusted information sources (RQ3b and RQ4b) and the reasons for this distrust (RQ5b and RQ6b). Video recordings of the focus group discussions were subsequently transcribed by a team of six undergraduate research

diagnosed with COVID-19.[1] Participants who met these eligibility criteria were asked to provide their informed consent via Qualtrics before proceeding to a short screener survey online. The survey included items related to sociodemographic characteristics and COVID-19 vaccination intention (see Appendix 1 for the screener survey). For vaccination intention, respondents were asked to choose what they would do when the COVID-19 vaccines became available to them from six Likert-scale options adapted from the KFF COVID-19 Vaccine Monitor (Kaiser Family Foundation, 2021), ranging from "get any vaccine as soon as you can" to "definitely not get it." Those selecting the first three options were subsequently classified as vaccination-inclined, and the remaining participants were classified as vaccination-hesitant (see Appendix 2 for details of the classification

---

1 Research suggests that having been vaccinated against a disease can change individuals' evaluation of their disease risk and inclination to engage with preventive behavior (Brewer et al., 2007). Similarly, having received a diagnosis might considerably change how a person assesses the benefits and risks of COVID-19 vaccination. Therefore, a decision was made to focus on those who have been neither vaccinated nor diagnosed to avoid complexity in interpreting the research findings.

---

2 To avoid contamination among participants' responses, focus group moderators were instructed to make sure that everyone has finished writing, and then ask all participants to enter the words into the chat box using the "3, 2, 1 – type your words at the same time" cue.

assistants. After each focus group, participants were provided extra credit or were granted research credits via SONA.

2.2 Analysis

For the answers entered as text via chat in response to the first focus group question, their succinct nature did not necessitate extensive interpretation. Therefore, one of the investigators grouped these responses under 16 initial categories. These categories were subsequently collapsed into 12 categories after an extensive discussion among all five investigators (see Appendix 3 for initial and final categories, and sample text responses under each).

For the other focus group questions, thematic analysis of the transcripts followed the process proposed by Braun and Clarke (2006). To begin, three investigators collectively analyzed all 26 transcripts. They first familiarized themselves with the content and subsequently generated preliminary coding items for each focus group question. Once the three coders agreed on an initial codebook,[3] a facilitator with expertise in methodologies assigned two randomly selected transcripts to the three coders to check: (1) whether all coders were interpreting the codebook identically (i.e., intercoder reliability), and (2) whether there was any further need to revise coding schemes.

After the three coders reached an agreement on the initial coding results from the two transcripts, the main coding process was subsequently conducted by four coders. The inclusion of the fourth coder was undertaken to enhance analytical rigor and reduce the potential for investigator bias, aligning with recommendations by Elliott (2018). The fourth coder remained uninformed about the purpose of the focus group discussions and did not participate in them.

The final coding results were reached through extensive discussions about discrepancies in coding among the four coders. In instances where agreement was not obtained, averaged frequencies for corresponding coding items from all coders were used. An evaluation of intercoder reliabilities through Fleiss' Kappa coefficients indicated fair to almost perfect agreement, consistent with the criteria established by Landis and Koch (1977). Positive Kappa coefficients ranged from 0.31 to 1.00, with an overall average of 0.81 across the 324 items coded for the larger project of which the current study was a part.[4] In cases where Kappa coefficients were unavailable due to near-perfect or perfect agreement, simple agreement rates were also reported. All intercoder reliability values and agreement rates for items coded for the current study are provided in Appendix 4, with all analyses being conducted using the R package '*irr*' (Gamer et al., 2019) (see Appendix 5 for the R code).

---

3   The initial codebook included definitions of all coding items, instructions on relevant/irrelevant statements, and detailed examples for all coding items.

4   Approximately 3% of coding items yielded negative Kappa values, which often occurred when only one coder identified a relevant case while others did not. These negative Kappa values do not constitute a procedural flaw but underscore the value of researcher subjectivity within qualitative research. They also underscore that coder consistency should not be equated with "accuracy" in coding, a point emphasized by Braun and Clarke (2006).

3 Results

3.1 Scanning information on COVID-19 vaccination

RQ1a explored information scanning behavior among college students. Analysis of chat responses entered by participants suggested that overall, they most frequently received COVID-19 vaccination information from the news media (24.76%), followed by social media (22.33%), and social contacts (18.93%). Among vaccination-inclined participants, news media remained the most mentioned source (27.08%), followed by social media (22.92%), and social contacts (15.28%) (see Table 1 for a tally of all 12 categories coded). Among vaccination-hesitant participants, social contacts received the greatest number of mentions (27.42%), followed by social media (20.97%), and news media (19.35%). In summary, while inclined and hesitant participants drew upon similar sources for COVID-19 vaccination information, the ranking of these sources differed between the two groups (RQ2a).

3.2 Seeking information on COVID-19 vaccination

For the coded transcripts, the average frequencies for the three most common themes coded under each coding category per focus group are presented first in the sections below, followed by the average frequencies per inclined focus group vis-à-vis per hesitant focus group to facilitate comparison (see Appendix 6 for a table summarizing average frequencies for all themes coded and by vaccination inclination). Selected quotations from focus group participants are also provided to help contextualize the quantitative results.

TABLE 1 Sources for COVID-19 vaccine information scanning.

Sources	Overall	Inclined	Hesitant
Domestic public health agencies	25 (12.14%)	17 (11.81%)	8 (12.90%)
International public health agencies	3 (1.46%)	3 (2.08%)	0 (0.00%)
Other governmental organizations	2 (0.97%)	2 (1.39%)	0 (0.00%)
Non-governmental health organizations	3 (1.46%)	3 (2.08%)	0 (0.00%)
News media	51 (24.76%)	39 (27.08%)	12 (19.35%)
Social media	46 (22.33%)	33 (22.92%)	13 (20.97%)
Word of mouth	3 (1.46%)	3 (2.08%)	0 (0.00%)
Healthcare professionals	7 (3.40%)	6 (4.17%)	1 (1.61%)
Social contacts	39 (18.93%)	22 (15.28%)	17 (27.42%)
School or workplace	9 (4.37%)	5 (3.47%)	4 (6.45%)
Online other than social media	11 (5.34%)	8 (5.56%)	3 (4.84%)
Other	7 (3.40%)	3 (2.08%)	4 (6.45%)
Total number of text entries	206 (100.00%)	144 (100.00%)	62 (100.00%)

RQ1b explored information-seeking behavior. Among participants actively seeking information on COVID-19 vaccination (*n* = 61), interpersonal communication with social contacts (e.g., family, friends, co-workers, professors) emerged as the most prevalent source (1.45 mentions per group overall). This was followed by interpersonal communication with healthcare professionals (0.85 mentions per group), and online sources other than social media (e.g., "Google searches," "reputable websites," "blogs") (0.65 mentions per group).

Subgroup analysis revealed that among those inclined toward COVID-19 vaccination, interpersonal communication with social contacts remained the top source for information seeking (1.29 mentions per inclined group), followed by interpersonal communication with healthcare professionals (0.82 mentions per group) and online channels other than social media (0.79 mentions per group). Among vaccination-hesitant individuals, interpersonal communication with social contacts was also the most frequently mentioned source (1.74 mentions per hesitant group), followed by interpersonal communication with healthcare professionals (0.89 mentions per group) and domestic public health agencies (0.59 mentions per group), which represented a key discrepancy between inclined and hesitant participants in their information-seeking behavior (RQ2b).

3.3 Most trusted sources for COVID-19 vaccination information

Overall, interpersonal communication with social contacts was the most trusted source (1.06 mentions per group overall). Closely behind were domestic public health agencies (e.g., CDC, NIH, county public health agencies) (1.04 mentions per group). Mass media (e.g., newspapers, radio, television) ranked third with a considerably lower average mention (0.64 mentions per group). These findings provide insights in response to RQ3a.

Upon examination of subgroups, domestic public health agencies constituted the most trusted source of COVID-19 vaccination information among vaccination-inclined individuals (1.24 mentions per inclined group), followed by interpersonal communication with social contacts (0.82 mentions per group), and mass media (0.67 mentions per group). Vaccination-hesitant individuals displayed a different pattern of trust, with interpersonal communication with social contacts being the most trusted source (1.52 mentions per hesitant group), followed by domestic public health agencies (0.67 mentions per group), and mass media (0.59 mentions per group). These findings addressed RQ4a.

3.4 Reasons for trust in information sources

In response to RQ5a, the predominant reason for trusting interpersonal communication with social contacts was personal experience or testimonial (0.49 mentions per group across all groups). As one participant articulated, "most people I know believe in [the COVID-19 vaccine] and have gotten it, and have let me know about their experience…so it made me feel less nervous because most of their reactions were not too bad." Following closely, personal

relationships constituted the second most mentioned reason (0.33 mentions per group), exemplified by statements such as "I would say my uncle…and the reason is…he's family." Expertise constituted the third most cited reason (0.23 mentions per group), indicating that social contacts with knowledge in medicine or science were especially trusted for vaccination information (e.g., "I would say my parent, because she works in the medical field so they kind of have to be kept very up to date with everything going on").

Regarding domestic public health agencies, trust was predominantly grounded in expertise (0.33 mentions per group overall). As explained by a participant, "because they are the people that basically know what's in the vaccines and stuff like that…I would say that they are educated individuals." The second most cited reason was government affiliation (0.31 mentions per group), underscored by statements such as "yeah, CDC, I mean they are government sanctioned, they are the leaders." The provision of scientific evidence constituted the third most cited reason (0.21 mentions per group), with participants perceiving public health agencies as primarily seeking to be informative rather than persuasive: "they are gonna give you more of the stats and the numbers rather than telling you oh do this or do that."

Regarding trust in the mass media, unbiased information emerged as the most cited reason (0.21 mentions per group overall). However, endorsement of mediated information often came with qualifications, reflecting a discerning approach to media consumption (e.g., "I choose my news sources very carefully, so the two that I generally get my information from are NPR and PBS, and I think they are very middle"). Expertise and timeliness both garnered an average of 0.08 mentions across all groups and constituted the next most cited reasons for trusting the mass media. Notably, expertise was typically explained in terms of the scientific experts featured in the media rather than the expertise of the journalists themselves: "I would say the news, just seeing different doctors go up and vouch for [the vaccine] and preach about how safe it is…really comforted me".

Subgroup analysis revealed both overlaps and discrepancies in why vaccination-inclined and vaccination-hesitant participants trust various sources (RQ6a). Regarding trust in interpersonal communication with social contacts, personal experience or testimonial was the most frequently cited reason by both subgroups (0.39 mentions per inclined group, 0.67 mentions per hesitant group). Among inclined individuals, expertise was the second most common reason (0.22 mentions per group), followed by personal relationships (0.18 mentions per group). Conversely, personal relationships constituted the second most cited reason for trust among vaccination-hesitant individuals (0.63 mentions per group), followed by expertise (0.26 mentions per group).

In terms of trust in domestic public health agencies, government affiliation was the most frequently cited reason among inclined individuals (0.47 mentions per group), followed by expertise (0.39 mentions per group) and the provision of scientific evidence (0.25 mentions per group). Hesitant individuals exhibited a different pattern, with expertise and timeliness receiving equal mentions (0.22 mentions per group) as the most common reasons for trust, followed by the provision of scientific evidence (0.11 mentions per group). Notably, government affiliation was not cited as a reason for trust among hesitant individuals.

Regarding trust in the mass media, unbiased information was the most frequently cited reason by inclined participants (0.25 mentions

per group), followed by timeliness (0.12 mentions per group) and expertise (0.06 mentions per group). Hesitant individuals nominated unbiased information, expertise and the provision of scientific evidence with equal frequencies (0.11 mentions per group) as the most common reasons for trust.

3.5 Least trusted sources for COVID-19 vaccination information

In response to RQ3(b), social media emerged as the least trusted source of COVID-19 vaccination information (1.58 mentions per group overall), followed by mass media (1.04 mentions per group) and interpersonal communication with social contacts (0.42 mentions per group).

Subgroup analysis revealed consistent trends among inclined individuals, where social media, mass media, and interpersonal communication with social contacts constituted their least trusted sources (1.53, 1.00, and 0.53 mentions, respectively, per inclined group). Among hesitant individuals, the three least trusted sources were social media, mass media, and online channels other than social media (1.67, 1.11, and 0.44 mentions, respectively, per hesitant group). This divergence suggested that inclined participants tended to be more critical and less trusting of COVID-19 vaccination information from their social contacts compared to hesitant individuals (RQ4b).

The results discussed above are summarized in Figures 2–4, which present the overlaps among the most common sources for COVID-19 vaccination information seeking, the most trusted sources for such information, and the least trusted information sources.

3.6 Reasons for distrust in information sources

RQ6b explored reasons for distrusting COVID-19 vaccination information sources. Regarding social media, the least trusted source by all, unregulated information was the most prevalent reason for distrust (1.21 mentions per group overall). The lack of regulation was often discussed in the context of misinformation (e.g., "you know, it's been proven countless times that that Facebook is not going to regulate the ads on their platform…they are not gonna…try to stop misinformation on their platform"), or disinformation (e.g., "social media has so many corruptive things and so many fake lies that you cannot really trust anything that's posted nowadays"). Several participants also discussed the unregulated nature of social media in terms of the absence of fact-checking (e.g., "most people just share things that they see without fact checking…because they want other people to share them again so sometimes maliciously spreading misinformation").

The second most cited reason for distrusting social media was a lack of expertise (0.36 mentions per group). Participants often regarded the information on social media as personal opinions rather than facts, expressing reservations due to the absence of professional qualifications (e.g., "it's just a bunch of people talking about their own opinions, and usually do not have any training or maybe they are speaking from a place of fear"). Biased information constituted the third most mentioned reason for distrust (0.31 mentions per group). Many expressed the concern that social media were inclined towards

promoting specific agendas (e.g., "social media does tend to be like really biased towards some subjects…I've seen a lot of posts that are like oh if you do not get the vaccine, then you are like a horrible person").

Regarding mass media, biased information was the most cited reason for distrust (0.42 mentions per group overall). Discussions of media bias often revolved around the perceived ideological orientation of media outlets (e.g., "the mainstream media [are] very uhm democrat-biased;" "I mentioned Fox News, which is horrifically right-leaning, um, I do not lean right, my parents do, so I'm exposed to it often"). The second most mentioned reason for distrust was unregulated information (with 0.31 mentions per group). Participants expressed the view that mass media have become increasingly similar to social media in terms of the lack of oversight (e.g., "those are both really on the same level. I do not think…one is less than the other because you can get fake news from both of them"). Sensationalized information was the third most cited reason for distrust (0.15 mentions per group). Participants perceived a tendency in the media to exaggerate and dramatize stories to elicit emotional reactions, potentially at the expense of balanced reporting.

Regarding interpersonal communication with social contacts, the most common reason for distrust was a lack of expertise (0.32 mentions per group). Participants expressed reservations about family and friends who conveyed information without conducting thorough research or possessing relevant expertise (e.g., "my least trusted source would be friends or family who I know have not done any research on it and maybe have just seen like a commercial…and then them coming up with their own like theory"). The second most cited reason for distrust was unregulated information (0.12 mentions per group). Participants explained that the unregulated information received from their social contacts often originated from social media, suggesting that distrust in one source can spill over to distrust in another:

> I put a like my family, but I mean, like where they talk. They usually talk around on Facebook and stuff like that…And they are usually very, I do not know, like very wrong. But they take it and spread it around…like the things that my family pass around in group chats or anything like that, because they are mostly falsified or it's something like a conspiracy theory that cannot be proven.

Biased information constituted the third most cited reason for distrust (0.04 mentions per group). Again, participants highlighted how reliance on social media for information led their social contacts to communicate biased and exaggerated information.

Subgroup analysis revealed overlaps and discrepancies between vaccination-inclined and hesitant individuals regarding why they distrusted various information sources (RQ6b). For both subgroups, unregulated information remained the most common reason for distrusting social media (1.20 mentions per inclined group; 1.22 mentions per hesitant group). Among inclined individuals, the second most cited reason for distrusting social media was a lack of expertise (0.43 mentions per group), followed by biased information (0.24 mentions per group). Among hesitant individuals, biased information was the second most commonly cited reason (0.44 mentions per group), with a lack of expertise ranking third (0.22 mentions per group).

Regarding mass media, unregulated information was the primary reason for distrust among inclined individuals (0.41 mentions per
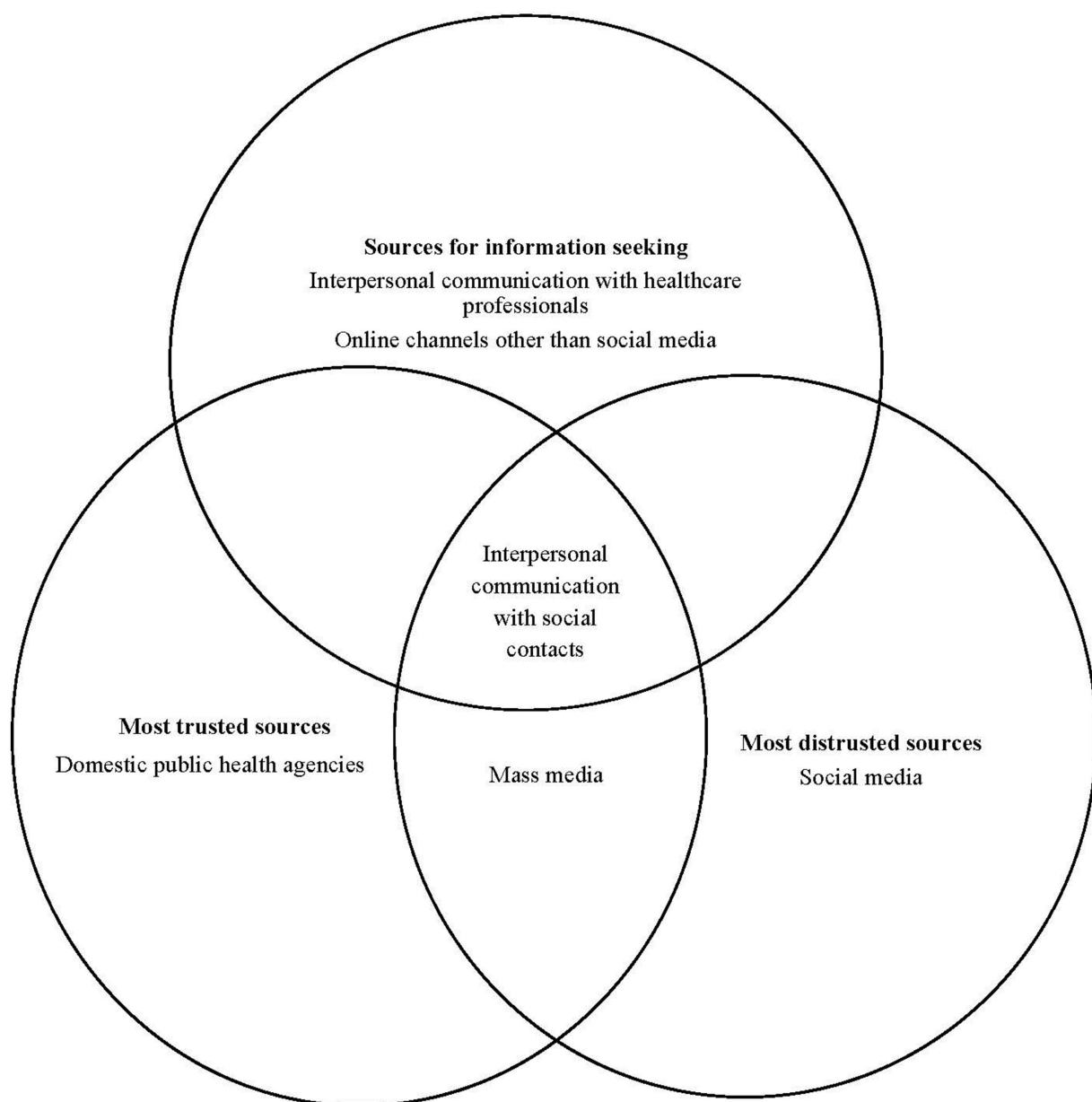
FIGURE 2
Most common sources for COVID-19 vaccination information seeking, most trusted sources, and most distrusted sources across all groups.

group), followed by biased information (0.27 mentions per group) and a lack of expertise (0.14 mentions per group). Among hesitant individuals, biased information was the most cited reason for distrusting mass media (0.70 mentions per group), followed by sensationalized information (0.22 mentions per group), and unregulated information (0.11 mentions per group).

Regarding interpersonal communication with social contacts, a lack of expertise was the most cited reason for distrust among inclined individuals (0.37 mentions per group), followed by unregulated information (0.18 mentions per group) and biased information (0.06 mentions per group). For hesitant individuals, a lack of expertise was the sole reason cited (0.22 mentions per group). It is worth noting that biased information and unregulated information both received no mention among hesitant individuals, indicating an interesting

difference in their evaluation of information from social contacts compared to inclined individuals.

4 Discussion

The current study underscores the centrality of social contacts as an important source for COVID-19 vaccination information among college students in the United States. Social contacts were identified as a primary source for both information scanning and information seeking, and as a most trusted source for COVID-19 vaccination information, among both vaccination-inclined and vaccination-hesitant college students. College students trusted interpersonal communication with their social contacts because personal experience
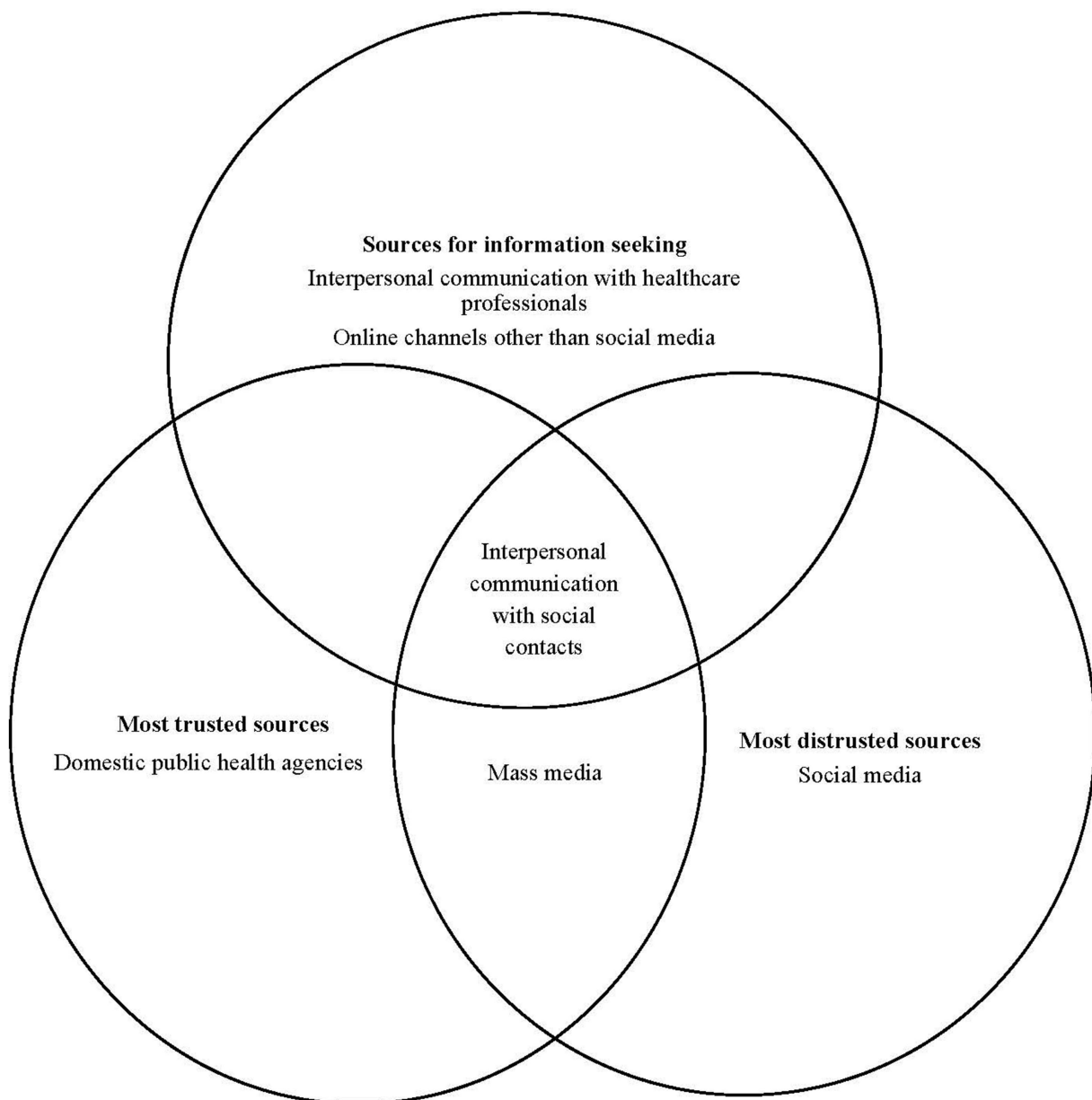
FIGURE 3
Most common sources for COVID-19 vaccination information seeking, most trusted sources, and most distrusted sources among vaccination-inclined participants.

and testimonials were perceived as credible, and the personal bond they shared with social contacts strengthened the credibility of information. Furthermore, social contacts with scientific expertise or high levels of education were especially trusted by college students, aligning with the theory that benevolence (or perceived motivation) and ability (or perceived competence) are two primary dimensions of trust in communication sources (Mayer et al., 1995; Tsfati and Cappella, 2003).

Notably, interpersonal communication with social contacts was also identified by a considerable number of college students as a least trusted source for COVID-19 vaccination information. Distrust in social media appears to drive distrust in social contacts. To elaborate, college students often mentioned that their social

contacts received a lot of biased or unregulated information from social media and then spread it within their social circles. It is thus a lack of perceived expertise (i.e., competence) rather than the absence of benevolence that drives college students' distrust in their social contacts. These findings have several theoretical and practical implications. For example, they illuminate the complex and interconnected nature of college students' assessments of different information sources. It appears that college students are cognizant of the two-step or multi-step flow of health communication, and when evaluating the trustworthiness of information received, they do not take it at face value and carefully consider the origin of information. Our findings also raise the possibility that while trust in a source is considered an antecedent
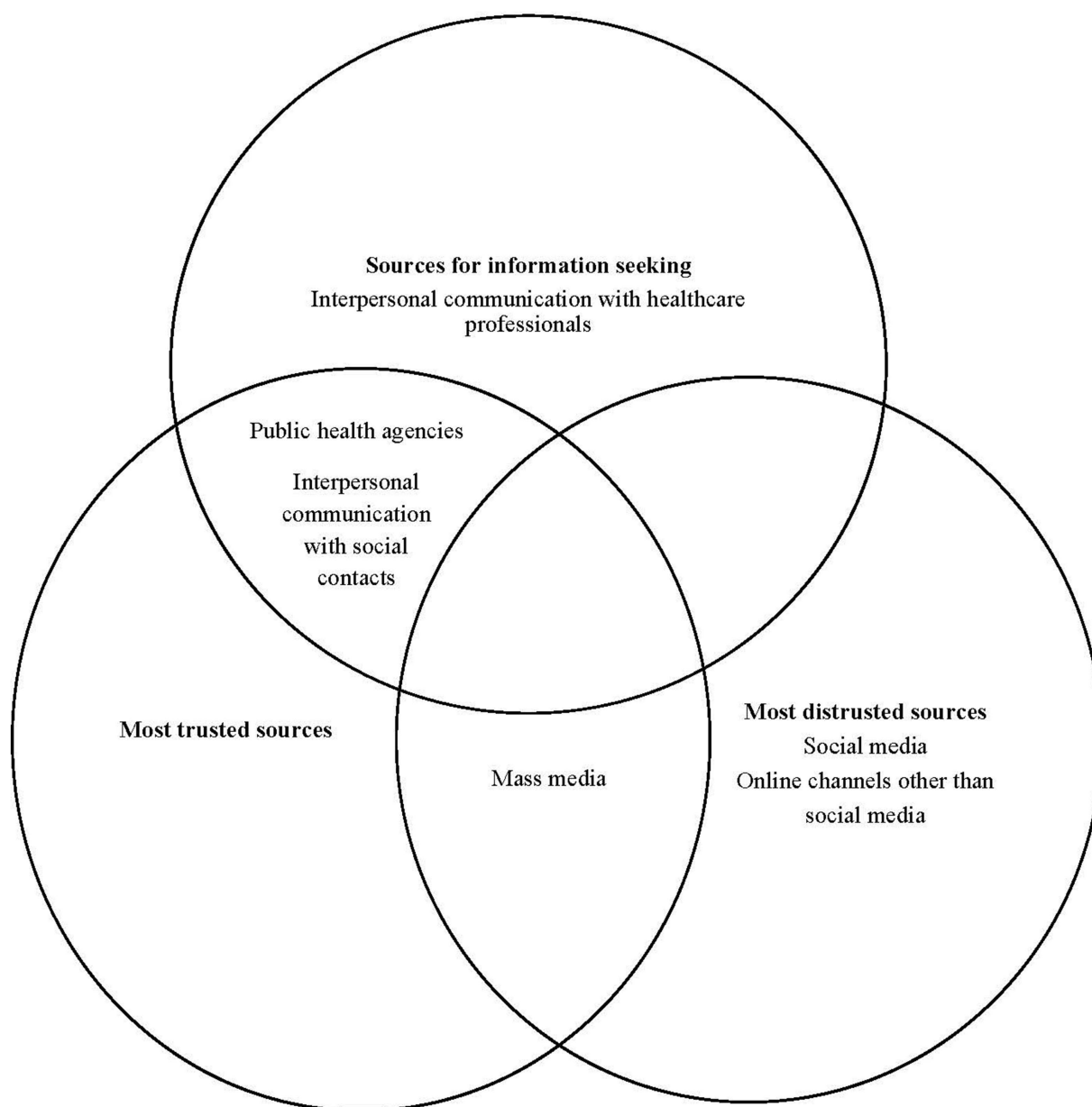
FIGURE 4
Most common sources for COVID-19 vaccination information seeking, most trusted sources, and most distrusted sources among vaccination-hesitant participants.

to seeking information from that source according to the CMIS (Ruppel, 2016), individuals might seek information from a source that they do not trust fully but do perceive as benevolent to cope with their health information needs during a highly uncertain situation.

Social media, despite being a primary source for information scanning, was identified as the least trusted source for COVID-19 vaccination information by both vaccination-inclined and vaccination-hesitant participants in our study. It is of interest to note that while previous studies did not find social media as a major source for information seeking among college students during a pandemic (Koskan et al., 2012; Qiao et al., 2022), they did report that social media constituted one of the least trusted sources for pandemic

information (Kecojevic et al., 2021; Qiao et al., 2022). Extending extant research, our study delved into the reasons behind this distrust. The lack of regulation on social media platforms and the proliferation of misinformation and disinformation were the most common reasons reported by college students for distrust. They considered much content on social media as opinion-based and politically biased, thus undermining its trustworthiness. In other words, while social media are integral to college students' daily communication routine, they are not considered a reliable source of health information. However, it is possible that social media can still influence individuals' vaccination beliefs and behavior due to psychological mechanisms such as the "sleeper effect" (Ruggieri et al., 2023). This topic merits further research.

In terms of practical implications, the centrality of social media as a primary source for information scanning highlights the importance of integrating digital media literacy programs in higher education institutions. For instance, providing training on fact-checking and source evaluation, which can empower students to navigate and identify complex information sources during health crises similar to the COVID-19 pandemic (Sánchez-Reina and González-Lara, 2022). Moreover, health agencies bodies and policymakers can prioritize and invest in digital health literacy that focuses on the different cultural, political, and demographic factors that influence individuals' information evaluation behaviors (Tram et al., 2022).

In terms of policy implications, universities can serve as an intermediary for college students by amplifying information from public health bodies via channels students already use, including learning management systems, email communications, and student life portals. Universities can also establish peer ambassador programs that train students to share public health information within their own networks, which could mitigate distrust by combining social familiarity with trained expertise. Public health bodies can also work with universities to integrate health communication principles into general education courses or during student orientations and to co-produce content with student content creators and student organizations. Another potential avenue for public health bodies is to increase their presence on social media. For example, in September 2024, the World Health Organization announced their partnership with TikTok to disseminate knowledge about health-related decision-making, leveraging the agency's credibility (CITE) (WHO, 2024c).

Mass media constitute another source of vaccination information that is both trusted and distrusted by a considerable number of college students. In explaining their trust, college students took a more qualified approach, stating that they only trusted specific media outlets because they were perceived as unbiased or "in the middle." On the other hand, unregulated information and biased content were common reasons for distrusting the mass media. Several participants also indicated that they considered mass media and social media to be similar, both carrying significant amounts of misinformation and disinformation. Clearly, many college students no longer buy into the notion that the mass media acts as a gatekeeper of high-quality information. This is not surprising given the increasingly fragmented and polarized media environment that today's young adults grew up in Jurkowitz et al. (2020).

Consistent with previous research findings, the primary sources individuals relied on for scanning vaccination information did not align fully with their main sources for information seeking (Koskan et al., 2012; Qiao et al., 2022). Extending this line of research, we found that individuals' primary sources for information seeking also do not align entirely with their most trusted sources. It is commonsensical that individuals would be inclined to seek information from their most trusted sources. However, this was not the case in our study. Overall, college students reported trusting interpersonal communication with social contacts, domestic public health agencies, and the mass media the most for COVID-19 vaccination information. However, they most frequently sought such information from interpersonal communication with social contacts and healthcare professionals, and from online channels other than

social media. There are several potential explanations for these discrepancies. For example, online searches and interpersonal communication tend to be interactive and iterative processes that are more aligned with the active nature of information seeking. It is plausible that public health agencies and mass media are less frequently utilized due to the more one-way nature of their communication, suggesting the need for these sources to consider strategies to engage in more interactive communication with the public.

When comparing vaccination-inclined with vaccination-hesitant college students, we identified both shared and distinctive patterns in their information acquisition and evaluation behaviors. Both subgroups relied on interpersonal communication with social contacts and healthcare professionals for information seeking, emphasizing the importance of these sources. However, online channels other than social media were more frequently utilized for information seeking by inclined individuals, while hesitant individuals turned more to domestic public health agencies. This suggests that vaccination hesitancy may be linked to how information from public health agencies is processed, rather than a lack of exposure to information from these agencies. Further research is necessary to understand this selective processing of vaccination information given its impact on health decision-making.

Trust in information sources also varied between the subgroups. Domestic public health agencies constituted the most trusted source for COVID-19 vaccination information among vaccination-inclined college students, whereas social contacts were identified as the most trusted source among hesitant individuals. These findings are in line with research findings on the positive association between trust in scientific and medical sources and COVID-19 vaccination willingness (Geng et al., 2022). In explaining their trust in domestic public health agencies, the most cited reason by our inclined participants was the fact that these agencies have a governmental affiliation, but this reason was not cited by any hesitant participant for trusting public health agencies. These findings indicate the possibility that vaccination-inclined individuals tend to engage in heuristic processing of information from public health agencies, whereas hesitant individuals tend to critically scrutinize the same information (Trumbo, 1999). This hypothesis requires further testing.

Regarding the least trusted sources of COVID-19 vaccination information, social media and mass media were the most frequently mentioned sources by both vaccination-inclined and hesitant college students. However, interpersonal communication with social contacts was the third most frequently reported source by inclined individuals, whereas for hesitant individuals, it was online channels other than social media. These findings are consistent with other findings from our study (e.g., interpersonal communication with social contacts was one of the three most trusted sources for COVID-19 vaccination information among hesitant individuals, but not inclined individuals). Hesitant individuals' tendency to place greater trust in vaccination information from their social contacts could be problematic, given that individuals often associate with others who share their resistance towards vaccination in their close social circle (i.e., "birds of the same feather flock together"). In promoting vaccination to college students, it is thus important to leverage the influence of the "weak ties" (Granovetter, 1973) or those individuals in our social network with

whom we have less frequent interactions, and from whom our viewpoints are more likely to differ. That is, individuals who are inclined towards vaccination or have already been vaccinated can make a deliberate effort to share their personal experiences with their weak ties (e.g., classmates, co-workers, other acquaintances). As found in our study, both vaccination-hesitant and inclined individuals consider such firsthand accounts trustworthy.

In conclusion, our study provides an in-depth understanding of the information acquisition and evaluation behaviors of U.S. college students in the context of COVID-19 vaccination information. The centrality of interpersonal communication with social contacts as a trusted and frequently utilized source underscores its importance in health communication, especially during an infodemic. We also found differing patterns of trust and distrust between vaccination-inclined and vaccination-hesitant individuals that called for more tailored approaches to communicating vaccination information to different subgroups based on their behavioral inclination. Last but not least, our research underscores the need for higher education institutions to implement digital media literacy programs that equip students with skills to critically evaluate health information encountered on social media. Policymakers and public health agencies can enhance message trust and reach by collaborating with universities to integrate health communication into student-centered platforms and peer networks.

5 Limitations and future directions

Even though our study's findings advance understanding of college students' information acquisition and evaluation behaviors during the COVID-19 pandemic, there are several limitations. First, our sample included college students from only two universities in the U.S. Therefore, further research is needed to determine whether our findings can be generalized to other college student populations nationwide. Future studies should also compare college students with individuals from other age groups and with varying levels of educational attainment, particularly in terms of their use of and critical evaluation of information from social media. Second, our focus groups were conducted online due to pandemic-related restrictions. However, this method may have excluded students with limited internet access, potentially limiting the representativeness of our sample. Finally, data collection took place during the early phase of the COVID-19 pandemic, when the information environment was highly politicized. As the pandemic evolved, the sociocultural context also shifted, making it necessary to examine if and how individuals' information acquisition and evaluation practices have changed over time. For example, emerging research suggests that individuals' experiences with the COVID-19 vaccine are influencing their trust in future vaccines and vaccine-related information sources (Lazarus et al., 2024), highlighting the importance of tracking whether these effects persist.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the Institutional Review Board at California State University Channel Islands. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

Funding

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcomm.2025.1529161/full#supplementary-material

References

Ali, S. H., Foreman, J., Tozan, Y., Capasso, A., Jones, A. M., and DiClemente, R. J. (2020). Trends and predictors of COVID-19 information sources and their relationship with knowledge and beliefs related to the pandemic: nationwide cross-sectional study. *JMIR Public Health Surveill.* 6:e21071. doi: 10.2196/21071

Anker, A. E., Reinhart, A. M., and Feeley, T. H. (2011). Health information seeking: a review of measures and methods. *Patient Educ. Couns.* 82, 346–354. doi: 10.1016/j.pec.2010.12.008

Auxier, B., and Anderson, M. (2021). Social media use in 2021. Pew research center. Available online at: https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021/ [Accessed June 1, 2023].

Bautista, J. R., Zhang, Y., and Gwizdka, J. (2023). Correcting vaccine misinformation on social media: effect of social correction methods on vaccine skeptics' intention to take COVID-19 vaccine. *New Media Soc.* 26, 7412–7438. doi: 10.1177/14614448231169697

Braun, V., and Clarke, V. (2006). Using thematic analysis in psychology. *Qual. Res. Psychol.* 3, 77–101. doi: 10.1191/1478088706qp063oa

Brewer, N. T., Chapman, G. B., Gibbons, F. X., Gerrard, M., McCaul, K. D., and Weinstein, N. D. (2007). Meta-analysis of the relationship between risk perception and health behavior: the example of vaccination. *Health Psychol.* 26, 136–145. doi: 10.1037/0278-6133.26.2.136

Charron, J., Gautier, A., and Jestin, C. (2020). Influence of information sources on vaccine hesitancy and practices. *Med. Mal. Infect.* 50, 727–733. doi: 10.1016/j.medmal.2020.01.010

Diesel, J., Sterrett, N., Dasgupta, S., Kriss, J. L., Barry, V., Esschert, K. V., et al. (2021). COVID-19 vaccination coverage among adults — United States, December 14, 2020–may 22, 2021. *MMWR* 70, 922–927. doi: 10.15585/mmwr.mm7025e1

Elliott, V. (2018). Thinking about the coding process in qualitative data analysis. *TQR* 23, 2850–2861. doi: 10.46743/2160-3715/2018.3560

Gamer, M., Lemon, J., Fellows, I., and Singh, P. (2019). IRR: Various coefficients of interrater reliability and agreement. Available online at: https://CRAN.R-project.org/package=irr (Accessed March 1, 2023).

Geng, H., Cao, K., Zhang, J., Wu, K., Wang, G., and Liu, C. (2022). Attitudes of COVID-19 vaccination among college students: a systematic review and meta-analysis of willingness, associated determinants, and reasons for hesitancy. *Hum. Vaccin. Immunother.* 18:e2054260. doi: 10.1080/21645515.2022.2054260

Gisondi, M. A., Barber, R., Faust, J. S., Raja, A., Strehlow, M. C., Westafer, L. M., et al. (2022). A deadly infodemic: social media and the power of COVID-19 misinformation. *J. Med. Internet Res.* 24:e35552. doi: 10.2196/35552

Granovetter, M. S. (1973). The strength of weak ties. *Am. J. Sociol.* 78, 1360–1380. doi: 10.1086/225469

Jennings, W., Stoker, G., Bunting, H., Valgarðsson, V. O., Gaskell, J., Devine, D., et al. (2021). Lack of trust, conspiracy beliefs, and social media use predict COVID-19 vaccine hesitancy. *Vaccine* 9:593. doi: 10.3390/vaccines9060593

Jurkowitz, M., Mitchell, A., Shearer, E., and Walker, M. (2020). U.S. media polarization and the 2020 election: A nation divided. Pew Research Center. Available online at: https://www.pewresearch.org/journalism/2020/01/24/u-s-media-polarization-and-the-2020-election-a-nation-divided/ (Accessed July 30, 2023).

Kaiser Family Foundation. (2021). KFF COVID-19 vaccine monitor: Topline and methodology. Available online at: https://files.kff.org/attachment/Topline-KFF-COVID-19-Vaccine-Monitor-January-2021.pdf (Accessed February 3, 2021)

Kecojevic, A., Basch, C. H., Sullivan, M., Chen, Y. T., and Davi, N. K. (2021). COVID-19 vaccination and intention to vaccinate among a sample of college students in New Jersey. *J. Community Health* 46, 1059–1068. doi: 10.1007/s10900-021-00992-3

Kisa, S., and Kisa, A. (2024). A comprehensive analysis of COVID-19 misinformation, public health impacts, and communication strategies: scoping review. *J. Med. Internet Res.* 26:e56931. doi: 10.2196/56931

Koskan, A., Foster, C., Karlis, J., Rose, I., and Tanner, A. (2012). Characteristics and influences of H1N1 communication on college students. *Disaster Prev Manag* 21, 418–432. doi: 10.1108/09653561211256134

Landis, J. R., and Koch, G. G. (1977). An application of hierarchical kappa-type statistics in the assessment of majority agreement among multiple observers. *Biometrics* 33, 363–374. doi: 10.2307/2529786

Latkin, C., Dayton, L., Miller, J. R., Yi, G., Jaleel, A., Nwosu, C. C., et al. (2021a). Behavioral and attitudinal correlates of trusted sources of COVID-19 vaccine information in the US. *Behav. Sci.* 11:4. doi: 10.3390/bs11040056

Latkin, C., Dayton, L. A., Yi, G., Konstantopoulos, A., Park, J., Maulsby, C., et al. (2021b). COVID-19 vaccine intentions in the United States, a social-ecological framework. *Vaccine* 39, 2288–2294. doi: 10.1016/j.vaccine.2021.02.058

Lazarus, J. V., White, T. M., Wyka, K., Ratzan, S. C., Rabin, K., Larson, H. J., et al. (2024). Influence of COVID-19 on trust in routine immunization, health information sources and pandemic preparedness in 23 countries in 2023. *Nat. Med.* 30, 1559–1563. doi: 10.1038/s41591-024-02939-2

Lee, S. K., Sun, J., Jang, S., and Connelly, S. (2022). Misinformation of COVID-19 vaccines and vaccine hesitancy. *Sci. Rep.* 12:1. doi: 10.1038/s41598-022-17430-6

Lustria, M. L., Smith, S. A., and Hinnant, C. C. (2011). Exploring digital divides: an examination of eHealth technology use in health information seeking, communication and personal health information management in the USA. *Health Informatics J.* 17, 224–243. doi: 10.1177/1460458211414843

MacDonald, N. E.the SAGE Working Group on Vaccine Hesitancy (2015). Vaccine hesitancy: definition, scope and determinants. *Vaccine* 33, 4161–4164. doi: 10.1016/j.vaccine.2015.04.036

Malik, M., Bauer-Maison, N., Guarna, G., and D'Souza, R. D. (2024). Social media misinformation about pregnancy and COVID-19 vaccines: a systematic review. *Med. Princ. Pract.* 33, 232–241. doi: 10.1159/000538346

Mayer, R. C., Davis, J. H., and Schoorman, F. D. (1995). An integrative model of organizational trust. *Acad. Manag. Rev.* 20, 709–734. doi: 10.2307/258792

Metzger, M. J., and Flanagin, A. J. (2013). Credibility and trust of information in online environments: the use of cognitive heuristics. *J. Pragmat.* 59, 210–220. doi: 10.1016/j.pragma.2013.07.012

Neely, S. R., Eldredge, C., Ersing, R., and Remington, C. (2022). Vaccine hesitancy and exposure to misinformation: a survey analysis. *J. Gen. Intern. Med.* 37, 179–187. doi: 10.1007/s11606-021-07171-z

Niederdeppe, J., Hornik, R. C., Kelly, B. J., Frosch, D. L., Romantan, A., Stevens, R. S., et al. (2007). Examining the dimensions of cancer-related information seeking and scanning behavior. *Health Commun.* 22, 153–167. doi: 10.1080/10410230701454189

Peng, Y., and Yang, T. (2022). Anatomy of audience duplication networks: how individual characteristics differentially contribute to fragmentation in news consumption and trust. *New Media Soc.* 24, 2270–2290. doi: 10.1177/1461444821991559

Piltch-Loeb, R., Savoia, E., Goldberg, B., Hughes, B., Verhey, T., Kayyem, J., et al. (2021). Examining the effect of information channel on COVID-19 vaccine acceptance. *PLoS One* 16:e0251095. doi: 10.1371/journal.pone.0251095

Qiao, S., Friedman, D. B., Tam, C. C., Zeng, C., and Li, X. (2022). COVID-19 vaccine acceptance among college students in South Carolina: do information sources and trust in information matter? *J. Am. Coll. Heal.* 72, 859–868. doi: 10.1080/07448481.2022.2059375

Ruggieri, S., Bonfanti, R. C., Santoro, G., Passanisi, A., and Pace, U. (2023). Fake news and the sleeper effect in social media posts: the case of perception of safety in the workplace. *Cyberpsychol. Behav. Soc. Netw.* 26, 554–562. doi: 10.1089/cyber.2022.0199

Ruppel, E. K. (2016). Scanning health information sources: applying and extending the comprehensive model of information seeking. *J. Health Commun.* 21, 208–216. doi: 10.1080/10810730.2015.1058438

Sánchez-Reina, J. R., and González-Lara, E. F. (2022). The COVID-19 infodemic among young people and adults: the support of critical media literacy. *Comunicar* 30, 71–81. doi: 10.3916/C73-2022-06

Sbaffi, L., and Rowley, J. (2017). Trust and credibility in web-based health information: a review and agenda for future research. *J. Med. Internet Res.* 19:e218. doi: 10.2196/jmir.7579

Schwarzenegger, C. (2020). Personal epistemologies of the media: selective criticality, pragmatic trust, and competence–confidence in navigating media repertoires in the digital age. *New Media Soc.* 22, 361–377. doi: 10.1177/1461444819856919

Tandoc, E. C., and Lee, J. C. B. (2022). When viruses and misinformation spread: how young Singaporeans navigated uncertainty in the early stages of the COVID-19 outbreak. *New Media Soc.* 24, 778–796. doi: 10.1177/1461444820968212

Tram, K. H., Saeed, S., Bradley, C., Fox, B., Eshun-Wilson, I., Mody, A., et al. (2022). Deliberation, dissent, and distrust: understanding distinct drivers of coronavirus disease 2019 vaccine hesitancy in the United States. *Clin. Infect. Dis.* 74, 1429–1441. doi: 10.1093/cid/ciab633

Trumbo, C. W. (1999). Heuristic-systematic information processing and risk judgment. *Risk Anal.* 19, 391–400. doi: 10.1111/j.1539-6924.1999.tb00415.x

Tsfati, Y., and Cappella, J. N. (2003). Do people watch what they do not trust: exploring the association between news media skepticism and exposure. *Commun. Res.* 30, 504–529. doi: 10.1177/0093650203253371

WHO. (2024a). Infodemic. WHO. Available online at: https://www.who.int/health-topics/infodemic (Accessed July 13, 2024).

WHO. (2024b). Managing the COVID-19 infodemic: Promoting healthy behaviours and mitigating the harm from misinformation and disinformation. Available online at: https://www.who.int/news/item/23-09-2020-managing-the-covid-19-infodemic-promoting-healthy-behaviours-and-mitigating-the-harm-from-misinformation-and-disinformation (Accessed July 13, 2024).

WHO. (2024c). WHO and TikTok to collaborate on more science-based information on health and well-being. Available online at: https://www.who.int/news/item/26-09-2024-who-and-tiktok-to-collaborate-on-more-science-based-information-on-health-and-well-being (Accessed June 19, 2025).

Wilkinson, S. (1998). Focus groups in health research: exploring the meanings of health and illness. *J. Health Psychol.* 3, 329–348. doi: 10.1177/135910539800300304

Zhang, Y., Chen, L., and Zhu, G. (2024). Taking a peek matters: surveying the role of information scanning on COVID-19 vaccination intentions. *Health Lit. Commun. Open* 2:1, 2431014. doi: 10.1080/28355245.2024.2431014

Zheng, H., Jiang, S., and Rosenthal, S. (2022). Linking online vaccine information seeking to vaccination intention in the context of the COVID-19 pandemic. *Sci. Commun.* 44, 320–346. doi: 10.1177/10755470221101067