First-Generation Students and College: The Role of Facebook Networks as Information Sources

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ABSTRACT
Social network site (SNS) platforms have the potential to be effective information-seeking channels due to their technical and social affordances, such as the ability to broadcast content to a large group and to aggregate one's contacts. This study tests the impact of a Facebook app that allows users to visualize their network of Facebook Friends to see how it influences who adolescents identify as good sources of information about college. Comparing Friends selected by 24 high school seniors before and after viewing Facebook network visualizations reveals that first-generation students were more likely to select higher quality information sources among their Facebook Friends after exposure to the visualization. Our results suggest that social media can help users identify good human information sources by making hidden resources in one's network more visible.

Author Keywords
Social media; Facebook; social network sites; college access; first-generation; information seeking; network visualization.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
The rapid growth of social media tools has shaped communication patterns, including information-sharing and information-seeking practices. In recent years, there has been an increasing number of studies on social media question asking, investigating how and why people use various social media platforms such as Facebook and Twitter to access information [1, 23, 28, 38, 42].

Much of the research on question asking in social media has dealt with adult populations [e.g., 28, 38, 42]. By contrast, very few studies have focused explicitly on question asking among adolescents, despite their typically heavy use of social media. Although some studies have looked at how youth use social media in their everyday information seeking [20], relatively little is known about the role of social media in young people's information-seeking processes. In particular, given that youth have a tendency to turn to others to address their information needs [36], investigating how they use social media to reach out to *other people* in the process of information seeking is an important extension of this literature.

Research has consistently identified needs related to future plans (including education or careers) as some of the most important information needs of adolescents [3, 31]. Looking for information about college is a particularly important example of these future-related information needs, because whether one pursues post-secondary education or not has a large impact on one's future economic well-being [44]. Moreover, finding and assessing college information is a challenging information task, because students must consider a wide range of complex factors, ranging from college majors to specific courses to financial aid [26].

Those who are likely to have fewer resources within their immediate network tend to be at a disadvantage in the college application and selection process [17]. For instance, first-generation students (those without a parent who has graduated college) are less likely to be able to access college-related information from their parents. Recent work suggests that social media can serve as a useful tool that can help people more easily access resources buried within their social networks, especially in the context of college access [10, 24, 46]. Given the importance of accessing post-secondary education in today's economic climate and the difficulties associated with college-related information seeking, especially in the case of first-generation students, it is important to understand how social media interaction opportunities influence adolescents' strategies for locating and accessing social ties that might serve as sources of college information.

"College Connect" is a Facebook application created by the authors which provides users with a visualization of their Facebook network. The app highlights friendship clusters (which are color-coded) and whether or not each Facebook Friend has college or university information listed in their Facebook profile (in the "college" field). (Following Ellison and boyd [12], we capitalize Friends when we are referring to the connections on Facebook in order to distinguish them from the colloquial reference to friendship.) It also provides a pre-populated set of commonly asked and important questions about college and enables users to easily send these questions to selected ties using Facebook's Messenger feature. Previous research suggests that the affordances of Facebook, such as the ability to broadcast updates and the visibility of one's contacts, enable people to use this platform for information needs as well as social interaction [13]. The guiding motivation for this study was to examine how the visualization affordances offered by College Connect might shift adolescents' college information-seeking practices by highlighting the availability of useful sources of college information – some of whom may be weak ties hidden by the News Feed algorithm. The literature suggests that social network sites (SNSs) like Facebook might enable users to access resources held by their weak ties, but we also know that contents from one's weakest ties are often hidden by display algorithms or overlooked by users. In fact, there may be more value in social media networks than is currently offered by customized and personalized interfaces which seek to minimize distracting content and target attention to close ties. When only 16% of Friends see a new post, on average, it is clear that information exchanges on social media are also being shaped by filtering processes at the platform level [4]. Does having a comprehensive overview of one's network change this?

In the following section, we situate our study in the related work on question asking in SNSs, selection of human information sources, and young people's college information seeking before turning to methods and findings. Discussion and conclusions follow.

RELATED WORK

SNSs as a Venue for Information Seeking
A number of factors appear to facilitate the use of SNSs for information seeking. The first is their widespread use, which means the largest sites like Facebook can be used to connect to ties from different contexts (such as school, hobbies, family, and work or profession-related contexts). Individuals have large social networks that appear to still be increasing in size as more people join SNSs [11]. The second is the capacity of SNSs to be repurposed by third parties through application programming interface (APIs). For example, the site Quora uses Facebook Connect for user logins, explicitly linking itself to Facebook as an information resource. Consequently, an increasing number of studies have examined how people use various SNSs to ask questions of their friends in the process of seeking information in various contexts [7, 23, 28, 37, 38, 42].

Research on question asking in SNSs has identified a wide range of benefits including high-quality answers [38, 39], social awareness and fun [38], and cognitive benefits with regard to processing and managing information [18, 38]; these are all factors that motivate people to turn to their social networks to find answers to their questions. Moreover, researchers examining question asking in SNSs within the framework of social capital have found other relational benefits to answering questions from friends, including signaling attention to specific ties and social grooming [14, 16].

Prior work has shown that one's motivation to use SNSs to seek help appears to be influenced by individual factors such as one's activities on the site and perceptions of SNS norms. For instance, Lampe et al. [29] identified factors that contribute to a propensity for information seeking on Facebook, including perceiving the site as appropriate for non-social purposes, greater time spent on site, and a higher number of Friends.

The use of SNSs for information seeking is not surprising considering the affordances these sites offer. One key affordance of most SNSs is the ability to see a contacts or friends list. Typically SNSs allow users to post a broadcasted message that is distributed to these contacts via a "social awareness stream" [40; see also 12, 15]. On Twitter, this would be through tweeting, on LinkedIn, by posting to one's feed, and on Facebook, via a status update. However, not all contacts attend to this content equally. On Facebook, for instance, an information request might be viewed by a few close contacts but missed by weaker ties due to Facebook's EdgeRank-based News Feed. Those who happen to be reading only at the right time of the day would see the request on Twitter.

SNSs are also used as a collection of contacts that can be messaged directly. Affordances, such as the News Feed, remind people who is active on the site but do not necessarily signal to users which contacts are most relevant for a direct query about a specific topic (e.g., college applications). Other affordances for viewing friends may include an address book, useful for contacting a specific person, or a list of most recently contacted friends, useful for reaching regularly-messaged ties. However, in the case of specific information-seeking requests, the person with the best information (i.e., which university is the best fit for one's intended course of study) might not be easily recalled by the user, via either name or recent interaction. In this case, it is worth considering the value of other affordances for viewing contacts. Creating other pathways for accessing these data are often possible through the use of APIs, which is what College Connect seeks to do: with programmatic access to Facebook data, it is possible to create applications or 'social media apps,' such as the one used in this study, to

represent these data in different (and perhaps more useful) ways.

In this study, we seek to explore the use of a sociogram for information-seeking practices. An interactive sociogram affords a number of novel views, such as seeing friends-of-friends in context, highlighting which friends might have relevant knowledge, clustering friendships in meaningful groupings spatially, and denoting quasi-social groups through automatic "community detection" methods.

Selection of People as an Information Source

Researchers in the field of information science and organizational science have investigated how individuals select specific people to serve as a source of information. Most of these papers have considered organizational contexts, examining information-seeking practices of knowledge workers from either the "expert-finding" or "knowledge-sharing" perspective. This line of research has consistently shown that two main characteristics of sources – accessibility and quality – affect people's decision about source selection [25, 47].

Accessibility refers to the cost in terms of time and effort associated with gaining access to the physical carrier of information and the information in it [35], while *quality* is commonly described as the value or benefits of the information in a particular source [19]. With regard to the relative importance between accessibility and quality, historically researchers have found either accessibility or quality is dominant, depending on contextual factors such as information need and task importance [2, 33].

Although most work on source selection has been done in organizational settings, given that adolescents tend to prefer other *people* as their information source over other sources like media [30, 31, 36], researchers have examined the factors that influence teens' decisions regarding who they turn to for information. Findings from these studies on youths' human source selection processes are in line with findings from work done in organizational settings, in that adolescents also consider accessibility and quality as important when selecting human information sources. For example, Shenton and Dixon [43] found that youngsters consulted people who are readily accessible, who share similar needs, and who possess knowledge in relation to the subject of the need. Similarly, Julien [27] found that when adolescents look for information to make career decisions, they rely heavily on the people whom they trust to advise and inform their decisions, including their families, guidance counselors, and people perceived to have pertinent personal experience and expertise.

College Information Seeking by Young People

College access is an important public concern today because it has significant ramifications for the economic and general well-being of thousands of young people.

According to the U.S. Department of Education [45], the more educated you are, the less likely it is that you are unemployed and the higher your weekly salary is likely to be. People who have a post-secondary education also are more civically engaged and have better health than those who do not. Similarly, a recent Pew Research Center report on higher education [44] has shown that Millennials ages 25 to 32 without a college degree are more likely to earn less, to be in poverty, and to be unemployed than their college-educated peers.

Much of the work on college-focused information seeking has been conducted in the field of education where this issue has been explored through the lens of college access issues. Research has found that students tend to use families and school counselors as the main sources of college information during the process of college information search [8, 34]. In addition to human information sources, according to the National Research Center for College and University Admissions, 82% of students obtained information about college from institutional websites [41].

Gathering college information in the process of college-going is a particularly challenging information task because students need to consider a wide range of factors including the major of study, courses, career opportunities, financial aid, location, and safety [26]. In particular, many researchers have found that first-generation students tend to be at a disadvantage in the process of college information seeking because their parents are unlikely to provide them with relevant information [e.g., 17] and schools they are attending often lack quality counseling programs [e.g., 9]. This lack of access to resources ultimately results in lower rates of getting accepted to college and low college enrollment among first-generation students compared to those who are not first-generation students, exacerbating the college access gap.

With regard to young people's information seeking, many researchers have also investigated how adolescents select information sources to satisfy their information needs. Common themes found across these studies were that adolescents tend to use multiple sources to find information they need and often show a preference for turning to other people, including peers, teachers, and parents to seek information [30, 36]. When selecting sources relevant to their information needs, adolescents appear to have preference towards strong ties such as friends and family.

With regard to the relationship between information quality and tie strength, the literature suggests that weak ties tend to be better sources of novel information [e.g., 22, 23]. This is due to multiple reasons, including the fact that individuals typically have more weak than strong ties (even if most time is spent with strong ties), tendencies towards homophily, and fewer shared experiences and social ties.

A few studies have looked at how youth use social media platforms to seek information in general [20] and to seek health-related information in particular [6]. However, as far as we know, no studies specifically examine the role of social media in relation to college information seeking among adolescents, despite this population's active usage of social media [32].

This work extends prior work on question asking in social media by exploring how social media influence adolescents' information practices with respect to selection of people as an information source. Specifically, we seek to understand how additional (primarily visual) affordances, offered by a Facebook app, influence adolescents' selection of their Facebook Friends as a source of information about college. In doing so, we specifically focus on the context of college information seeking where people such as families and school counselors have been found to serve as main sources of information.

The research questions addressed by this study are:

RQ1: How do adolescents use social media to seek information about college?

RQ2: How do adolescents decide whom to approach for college information among their Facebook Friends?

RQ3: How does seeing network members as a network influence adolescents' selection of college information sources among their Facebook Friends?

METHODS

Description of College Connect
College Connect is a web-based Facebook application designed to help students identify useful resources in their Facebook network and ask them questions about college. The app visualizes a user's Facebook personal network, meaning the set of a user's Friends as well as the friendships between these Friends (See Figure 1). We draw upon conventions in social network analysis to represent this network. A user is a 'node' represented by a circle. A Friend is an 'edge' represented as a line between two nodes. The placement of the nodes is automatically determined by a network layout algorithm [21]. The coloring of the nodes
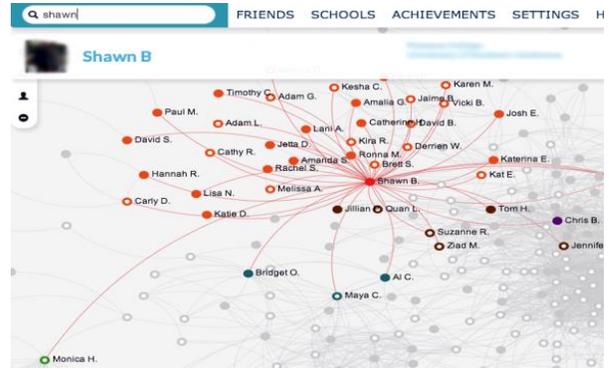
**Figure 2. Example of a highlighted friendship network.**

is automatically determined by a community detection algorithm, such that likely members of a particular cluster have the same-colored nodes [5].

The friendships between network members are highlighted or greyed out when the user is interacting with the network by hovering a mouse or clicking on a node (See Figure 2). If the Friend has a college or university listed in his or her profile, the dot is solid-colored; Friends who don't have a college or university listed in their profiles are represented as an empty dot. Users can interact with their network visualization (e.g., by zooming in or clicking on specific nodes to see Friends in common) and search for specific Friends or colleges/universities. Moreover, the app includes a list of suggested questions (See Figure 3) and enables users to send questions to people in their network via Facebook private messaging (See Figure 4). The suggested questions address common college-related information needs.

The app connects to the Facebook Graph API (version 1.0) in order to access a list of a user's Friends and the connections between these Friends. In order to use the API, the application must be granted explicit permission by the user to view Friends and Friend data. The ability for third parties to access this data is no longer available as of Graph 2.0. Nevertheless, this work demonstrates what can be done with social network data, not exclusively with Facebook data in their current state.
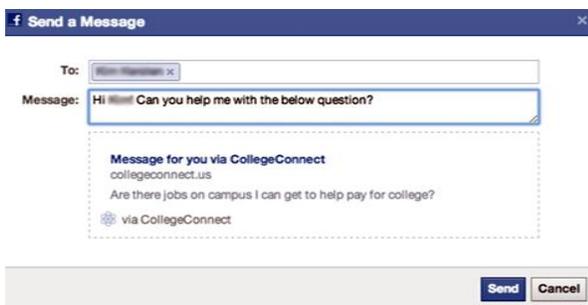
Participants
We recruited 12th grade students from two high schools, one in Minnesota and one in Michigan. We chose these two
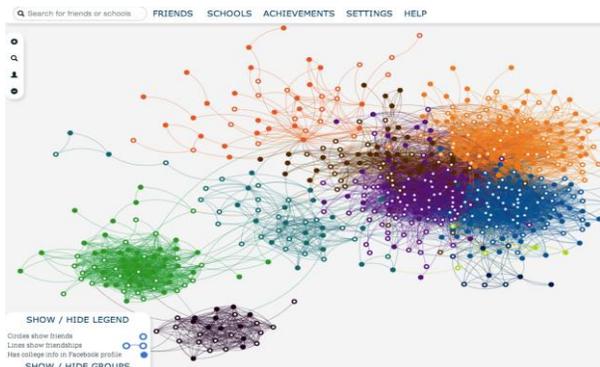
Figure 1. Example of the College Connect network visualization.
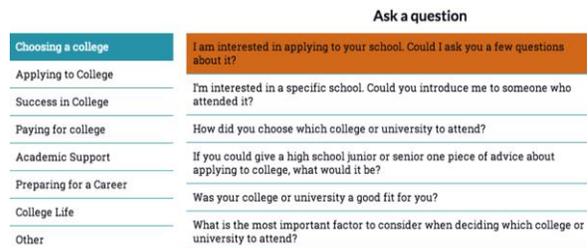
Figure 3. Example of a list of suggested questions.

Figure 4. Example of sending a question.

schools because they both showed high interest in college access issues and indicated their support for our data collection effort, while differing on important student population characteristics (namely, ethnic diversity and proportion of first-generation students). Students in the Minnesota high school were participating in the College Possible program, an afterschool program designed to help promising low-income students become college graduates. Students in Michigan were from a public magnet school which prides itself on its academic college preparation. To participate, students needed to meet three criteria: (1) be a high school senior, (2) have had a Facebook account for at least one year, and (3) log into Facebook at least twice a week. Information forms were distributed to parents of potential participants by a contact person at each school. Only students who had their parents' consent were allowed to participate.

Participants were given a link to an online survey, to be completed before their interview, by their contact at the school and were contacted by a researcher to schedule an interview. After completing the survey, they were directed to the College Connect app, which downloaded data about their Facebook Friends network. After they completed the online survey and network download, a face-to-face interview took place during school hours on the school campus. All interviews took place within seven days of the network download, but were typically conducted the next day. All participants received a $30 Amazon.com gift card for their participation.

Procedure
The online survey asked participants to nominate up to six people they would turn to for college information ("Imagine you have a question about what colleges to apply to. Of your Facebook Friends, who would you ask this question?"). For each person they nominated, participants were asked to report how many years they knew the person and to rate the person on six dimensions: availability, comfort, closeness, understandability, expertise, and reliability on a scale of 1-5 (1 = strongly disagree, 5 = strongly agree). The online survey also included items about participants' demographic information such as gender, race, parents' education level, and their plans after high school. Finally, the instrument included questions

about participants' Facebook use and their assessment of Facebook as an information source.

During the face-to-face interview, participants were first asked questions about college information seeking in general and question asking within the Facebook setting. After the brief walk-through of the College Connect application, participants were given time to engage with the app, exploring the visualization of their Facebook network on their own. They were asked to narrate their thoughts aloud as they did so. After spending some time with the app, we asked them again to nominate up to six Facebook Friends they would approach with questions about college. Ratings on the six dimensions were collected for any newly-named Friends not rated on the initial online survey. Finally, participants were asked about their perceptions of their Facebook Friends as a source of college information. The interview concluded with questions about participants' reactions to College Connect's features and functionality. Participants' on-screen activities during the interview session were recorded using a screen capture software and interviews were recorded, transcribed, and imported into NVivo for analysis. Two interviews were not recorded due to technical problems; our qualitative analysis is based on the responses of 22 participants. Interviews lasted between 44 and 74 minutes, averaging 57 minutes.

Sample Demographics
Twenty-four 12th grade students, 12 from a high school in Minnesota and 12 from a high school in Michigan, participated. Out of 24 study participants, 14 (58%) were males and 10 (42%) were females. Participants from Minnesota and Michigan differed slightly: the majority of the sample from Minnesota was Asian (83%), while Whites accounted for 58% of the sample from Michigan. 83% of the sample from Minnesota identified themselves as first-generation, while 25% of the sample from Michigan self-reported as first-generation (defined as neither parent graduated from college). In addition, all participants from the school in Minnesota qualified for free or reduced lunch at school, whereas 17% of the sample from Michigan did. All participants from both research sites reported that they planned to attend college after high school. However, there were differences in terms of type of school they planned to attend. The majority of participants from Minnesota (83%) reported that they planned to attend four-year college or university full time, while 58% of participants from Michigan reported that they planned to do so; 34% reported they planned to attend a two-year community college.

In terms of frequency of Facebook use, 33% of all participants reported that they visited the site once or twice a day, 25% of participants reported that they visited the site 1-6 times a week, and 38% of participants reported that they visit the site 1-3 times a month. One participant reported visiting the site less than once a month; this participant's data were not included in our quantitative analyses. On average, participants reported 473 Facebook

Friends with a median of 454, while data we obtained from their network download showed participants had an average of 597 Friends with a median of 456. When asked how often they asked a question using status updates on Facebook, 61% of participants reported that they never used status updates to ask a question on Facebook, although 52% of participants reported that they asked questions using private messages 1-2 times a week.

Measures
The online survey included the following measures:

Facebook as an information source
Social Media Information Mobilization (α = 0.78, *M* = 3.36, *SD* = 0.78), a 3-item scale introduced in Wohn et al. [46], captures the perceptions of participants regarding the usefulness of social media in getting college information. Sample items include: "I learn about college from my friends on Facebook and/or other social media sites" and "I get information about college on Facebook and/or other social media sites."

Facebook Friend College Resource (α = 0.82, *M* = 4.17, *SD* = 0.78), a 4-item scale used in Wohn et al. [46], gauges participants' beliefs about whether they could obtain information or advice about college from their Facebook Friends, specifically Friends who have attended or are attending college. Sample items include: "I am "Friends" with someone on Facebook who graduated college and faced the same kind of challenges I face" and "I am "Friends" with someone on Facebook that could answer questions about college."

See Table 1 for summary statistics for the scales.

Characteristics of human information sources
Six dimensions of source characteristics of each Friend nominated by a participant were measured using one Likert-scale item for each dimension, rated on a scale of 1-5 (1 = strongly disagree, 5 = strongly agree). These dimensions, derived from previous literature, include aspects related to source accessibility (availability, comfort, and closeness) and source quality (understandability, expertise, and reliability). The items were worded as follows: "This person is always available to me" (availability), "I feel comfortable asking this person a question" (comfort), "I think this person and I are close" (closeness), "I think this person will provide an answer that is easy to understand" (understandability), "I think this person knows a lot about college" (expertise), and "I think I will be able to get a reliable answer from this person" (reliability).

The ratings data collected in the interview were entered into an Excel spreadsheet, merged with the downloaded survey data, and then imported into Stata for quantitative analysis.

FINDINGS

Looking for College Information Using Social Media
Our first research question asked about students' college information seeking practices using social media. In the survey, two measures (i.e., Social Media Information Mobilization and Facebook Friend College Resource) captured participants' perceptions of Facebook as an information source. In general, participants moderately agreed that social media were useful in getting college information (*M*=3.36, *SD*=0.78) and reported greater perceived utility of Facebook Friends as resources for information or advice about college (*M*=4.17, *SD*=0.78).

While most participants responded that they obtained college information through word of mouth when asked where they obtained information about college, most had never used Facebook as a means to reach out to other people to seek information about college. When asked if they had ever asked a question about college using either the status update feature or private message feature on Facebook, most participants said they had never done so. When asked why, some participants voiced concerns about visibility, saying that college-related questions were too "personal" to post on Facebook. For instance, S19 said:

> I guess [college-related questions are] more personal than just writing it [on Facebook] for everybody to see. I mean, not all these kids … that I say are my friends on Facebook are really my friends, like really close to me. I guess I don't really like to express those types of things online [Male, Non First Gen].

Some participants responded that they would ask questions about college directly to a few people using private

Measures	Mean	SD
Social Media Information Mobilization (Cronbach's α = .78)	**3.36**	**0.78**
I learn about college from my friends online.	3.35	1.03
I learn about college from my friends on Facebook and/or other social media sites.	3.43	0.84
I get information about college on Facebook and/or other social media sites.	3.30	0.93
Facebook Friend College Resource (Cronbach's α = .82)	**4.17**	**0.78**
I am "Friends" with someone on Facebook who graduated college and faced the same kind of challenges I face.	4.48	0.95
I am "Friends" with someone on Facebook that could answer questions about college.		
I am "Friends" on Facebook with an older relative who graduated college.	4.35	0.57
I am "Friends" with someone who is currently in college on Facebook.	3.74	1.18
	4.13	1.06

Note: Scale ranges from 1 = strongly disagree to 5 = strongly agree.

Table 1. Summary statistics for scales in the online survey

	Before	After	p-value (adjusted p-value)
Availability	3.97 (0.98)	3.87 (0.89)	0.358 (1.000)
Comfort	4.34 (0.66)	4.43 (0.67)	0.223 (1.000)
Closeness	4.15 (0.83)	3.90 (0.95)	0.025 (0.150)
Understandability	4.22 (0.71)	4.45 (0.64)	0.001 (0.006)**
Expertise	3.97 (0.90)	4.26 (0.77)	0.001 (0.006)**
Reliability	4.24 (0.67)	4.40 (0.58)	0.005 (0.030)**

Note: Significance reported based on the adjusted p-value after correction for multiple comparisons.

Table 2. Ratings between pre- and post-visualization

messages instead of broadcasting their questions because they believed that they were more likely to get relevant answers to their questions when using private messages. S16 stated:

> I feel like it [my question] doesn't apply to everybody. Whatever I'm trying to post, I don't need to show to everybody, so I basically will message one, two, maybe three different people, max, about whatever I need [Male, First Gen].

A small number of participants expressed doubt about the usefulness of Facebook as an information source, stating that Facebook was mainly a place for connecting and keeping in touch with their friends rather than for getting information. A few pointed to the composition of their Facebook Friends, who were not serious about college or were still in high school, as a reason why Facebook was not a place for getting information about college.

Selection of Facebook Friends for College Information

Our second research question asked how students decide whom to approach for college information among their Facebook Friends. When comparing participants' survey responses (from before they interacted with the app) and their responses after seeing the visualization, we found participants named more people on average after seeing their Facebook network visualization (pre-visualization: 5.04 and post-visualization: 5.70). The difference was not significant although the p-value approached significance (p-value=0.057). In addition, on average, 4.22 new people were named after participants saw their Facebook network visualization, replacing other people nominated in the initial round.

With regard to ratings of the nominated informants, linear mixed models (LMMs) were utilized with participant as a random effect and time (i.e., before/after exposure) and first-generation status (i.e., whether a participant is first-generation or not) as fixed effects to compare ratings of friends nominated before seeing the network visualization and those nominated after. We chose to use LMMs because they account for the correlation between individual participant ratings before and after exposure to the app. In addition, a Bonferroni correction was used to account for multiple comparisons.

The data showed that there were statistically significant differences after the Bonferroni correction between pre- and post-visualization in terms of understandability, expertise, and reliability. Specifically, students' average ratings of the understandability, expertise, and reliability of people they nominated increased from 4.22 to 4.45 (understandability), 3.97 to 4.26 (expertise), and 4.24 to 4.40 (reliability) (adjusted p-value=0.006, 0.006, and 0.030, respectively). Evidently, after engaging with the app, participants chose Friends who they rated as more likely to provide an "easy to understand" answer, more knowledgeable about college, and more likely to give a reliable answer. See Table 2 for details.

To test whether students who were likely to have fewer resources in their network (namely, first generation students and those reporting lower perceived value of Facebook Friends as sources of college information) would benefit more from the visualization affordances, we compared pre- and post-visualization ratings between resourced and less resourced groups on these two dimensions.

First, when comparing these ratings before and after exposure to the visualization by first-generation status, there were statistically significant differences between pre- and post-visualization ratings in terms of reliability for first-generation students only. The data showed that after seeing their Facebook network visualization, first-generation students selected Friends who they rated as significantly more likely to give a reliable answer. Specifically, first-generation students' ratings for reliability increased from 4.06 to 4.41 (adjusted p-value=0.000). With regard to understandability and expertise, after seeing the visualization, first-generation students' ratings of people they nominated increased from 4.08 to 4.43 (understandability) and 3.88 to 4.35 (expertise). However, these differences lost their statistical significance after the Bonferroni correction. For non first-generation students, there was no statistically significant difference identified between pre- and post-visualization. See Table 3 for details.

Second, we divided participants into two groups according to whether they perceived their Facebook Friends to be valuable resources about college: those who were above the median (4.25) and those below. Viewing the social network visualization had an impact only for those who reported lower scores on the "Facebook Friend College Resource" measure. Students with lower scores were significantly more likely to nominate Friends with greater expertise and reliability after viewing their social network as an

	Non first-generation (n=10)		First-generation (n=13)		p-value
	Before	After	Before	After	(adjusted p-value)
Availability	4.14 (0.93)	3.85 (0.99)	3.85 (1.01)	3.88 (0.82)	0.135 (0.810)
Comfort	4.50 (0.58)	4.55 (0.63)	4.21 (0.69)	4.35 (0.69)	0.302 (1.000)
Closeness	4.24 (0.94)	3.98 (0.87)	4.08 (0.73)	3.84 (1.00)	0.770 (1.000)
Understandability	4.41 (0.61)	4.47 (0.63)	4.08 (0.75)	4.43 (0.64)	0.043 (0.258)
Expertise	4.08 (0.85)	4.15 (0.78)	3.88 (0.94)	4.35 (0.76)	0.045 (0.270)
Reliability	4.47 (0.54)	4.37 (0.56)	4.06 (0.70)	4.41 (0.59)	0.000 (0.000)**

Note: Significance reported based on the adjusted p-value after correction for multiple comparisons.

Table 3. First-generation vs. Non first-generation

interactive graphic. These students named Friends believed to be more likely to provide an "easy to understand" answer after exposure to the app, although the difference was not statistically significance after the correction for multiple tests. For those who scored in the higher half on this measure, there was no statistically significant difference in ratings between pre- and post-visualization scores. See Table 4 for details.

Fisher's test was used to test for a relationship between first-generation status and the level of Facebook Friend College Resource given our small sample size. The results indicated a statistically significant relationship between first-generation status and the level of Facebook Friend College Resource (p-value=0.005). First-generation participants were more likely to report lower perceptions of Facebook Friends as a source of college information, indicating a perceived lack of resources in their immediate Facebook Friends network. (Participants completed this measure before viewing the application and we did not assess this during the interview.)

Effect of Visualization Affordances on Selection of Facebook Friends for College Information
Our last research question asked about how the ability to see the network visualization in College Connect influenced students' decisions regarding their selection of good sources of college information among their Facebook Friends. During the interview, participants were asked what new information, if any, they obtained from the network visualization that might have affected which Facebook Friends they nominated as good sources of college information. In response, some participants mentioned the fact that the app surfaced information about whether a specific person had listed a college or university in their profile. Most participants assumed that the content entered

in this field was an indication of what schools their Friends went to or were attending, although they acknowledged that in some cases these fields might represent aspirations or serve as signals of interest, as opposed to colleges they were actually attending at that moment.

When asked about new information they obtained from the visualization, S06, for example, said "'oh, I didn't know you went to college,' or 'I didn't know you had some college information.'" This is consistent with participants' responses when asked why they picked certain people among their Facebook Friends after viewing the visualization: they picked individuals who were currently attending college and thus had relevant experience. While some participants specified that the Friend was attending the specific college that he or she was interested in, most simply mentioned the fact that the Friend was in college as the reason for choosing that person. In a similar vein, when asked about helpful features of the app, participants reported on one affordance in particular: people that had college information were solid dots, whereas those who had no information were empty dots. As S13 explained, "You can have a very specified [*sic*] way of seeing who goes to what college." Similarly, S19 stated that solid dots served as confirmation of his knowledge about specific schools his Friends went to.

One participant (S16) stated that seeing many solid dots in his network was "a little push" for him, explaining, "There's a lot more people in my friend group on Facebook that are associated with different colleges than I had anticipated." He further stated:

> I was definitely not debating whether I was going or not. That's definitely a future plan in motion. It was interesting to see that there are so many people that I

	High level of FB Friend college resource (n=13)		Low level of FB Friend college resource (n=10)		p-value
	Before	After	Before	After	(adjusted p-value)
Availability	4.19 (0.84)	3.96 (0.92)	3.65 (1.10)	3.75 (0.84)	0.113 (0.678)
Comfort	4.41 (0.63)	4.55 (0.64)	4.22 (0.70)	4.27 (0.68)	0.833 (1.000)
Closeness	4.24 (0.86)	4.13 (0.88)	4.00 (0.76)	3.58 (0.96)	0.181 (1.000)
Understandability	4.39 (0.62)	4.49 (0.67)	3.96 (0.76)	4.38 (0.59)	0.016 (0.096)
Expertise	4.17 (0.82)	4.21 (0.84)	3.65 (0.95)	4.33 (0.67)	0.001 (0.006)**
Reliability	4.46 (0.58)	4.45 (0.62)	3.89 (0.65)	4.33 (0.51)	0.000 (0.000)**

Note: Significance reported based on the adjusted p-value after correction for multiple comparisons.

Table 4. Low Facebook Friend College Resource vs. High Facebook Friend College Resource

know of that are in college, going to college [Male, First Gen].

In relation to this, S10 found it surprising to see Friends who she did not know had an interest in college include college information on their Facebook profile. Participants viewed having information in this field as a sign of these Friends' level of seriousness about college and often chose these "solid dot" Friends as someone they would turn to for college information. She expressed surprise, saying "Some people that do have colored-in dots, I'm just like, "Oh, so you were serious about college?" 'Cause some of them, I didn't expect them to be."

On average, 42 percent (*SD*=0.05) of nodes in the Facebook networks had some college information. The percent ranged from a minimum of 30 percent to a maximum of 52 percent with college information. This suggests that highlighting these people could show substantially more possible information sources than the respondent expected.

Similarly, when asked why they found the app helpful for obtaining college information, participants reported that it helped them locate people who could answer their questions about college. For instance, S17 stated:

> I believe it could help me find who to ask to make it easier so you wouldn't have to either embarrass others on them not knowing, or make yourself feel awkward in the situation of going out asking all these different people and everything [Male, First Gen].

S10 stated that "since I know people that actually will be interested in there [the college I am interested in], I can ask them for questions like that, other than asking someone that doesn't really know, or just heard about it [the college I am interested in]."

In some cases, the network visualization, which allowed participants to see the entire web of their Facebook connections, appeared to remind participants of close friends whom they were not cognizant of or had forgotten about. When asked why they selected different people after seeing the visualization compared to the names they listed in the survey, many participants stated that College Connect acted as a reminder. For instance, S11 indicated that he named one of his closest friends as one of his new people post-visualization because "we haven't seen each other for like five months, I think, so I kind of forgot about her a little bit."

Participants reported that the visualization also reminded them of their weak ties, allowing them to recognize people they did not know well or they did not realize were in their Facebook network, perhaps because these weak ties were hidden by the News Feed algorithm. (Recall that participants' average ratings for closeness decreased from 4.15 to 3.90 when comparing pre- and post-visualization in Table 2.) When asked why he selected new people for the question about college after seeing the network visualization, S24 explained:

> I did [nominated] these two because I just know them very well. Those are the people that just, off the top of my head, I could just immediately count on. I added the other four because this gave me a really good visual aspect of … It really, I guess, opened up the options that were available that previously I didn't know about [Male, Non First Gen].

Similarly, S20 said that "I think, without a visual, I was just referring to people in my mind that I know pretty well."

Although our interview questions were designed to capture how the visualization affected participants' choices, if at all, participants' responses to a question about the helpfulness of College Connect compared to Facebook more generally revealed the additional potential of the application for increasing the utility of Facebook. When asked how helpful they found College Connect compared to Facebook, some participants mentioned the fact that the application provided focused and specific information to users. For instance, S05 found College Connect more helpful than Facebook because "when you're on Facebook … you don't think about college. This is a certain app for college and it's connected to your Facebook friends." S18 also indicated that "Facebook is really broad. This kind of like makes it more specific and just gives you a lot more information than just going on the Facebook bar and looking up a certain thing." Similarly, S24 described that "it's sort of display information [*sic*] that I really care about, whereas normally, for the most part, Facebook has stuff where it's more just like everyday bantering."

One participant (S19) suggested College Connect might help people get more value from Facebook. He felt a shift in norms around appropriate activities on the site could add value by increasing Facebook's utility for information seeking. He told us:

> I see some kids here that have silly things. Like … on my Facebook wall, [I put] I'm the manager at Stride gum, which makes absolutely no sense. I feel like I would want to be able to explain myself a little better and put real schools and things. Because the kids I'm friends with, we kind of see Facebook as this time-consuming area on the web that really, it's kind of a silly type of thing. This [College Connect] makes it really useful. I feel like if people actually took it this seriously, then it would actually be a really great source of information and just of anything. Which would be really cool and really good [Male, Non First Gen].

DISCUSSION

Our findings show that the visualization affordances offered by College Connect have the potential to support information seeking around college questions, especially for those participants with fewer likely resources among

their Friends on Facebook. Students selected Friends who were more likely to provide easy-to-understand answers, more knowledgeable, and more likely to give reliable answers after viewing the network visualization. Importantly, this difference was significant only for those who lacked access to college information resources (i.e., first-generation students and those who reported they were less able to obtain college information from their Facebook Friends). Indeed, the visualization helped participants list Friends who were more appropriate for answering college-related questions.

Surfacing Important Information

One of the important affordances offered by College Connect was to highlight the visibility of relevant information by displaying Friends who listed a college or university in their profiles as a solid dot. By surfacing this information and presenting it in aggregate, the app seemed to help participants scan and direct attention to information in the network that was relevant to their needs. After seeing the network visualization, participants picked Friends they rated higher in terms of understandability and reliability. Of course, the app only presented information that was already available through the general Facebook platform, although it would require clicking on individual profiles to view college information and examining lists of mutual Friends to determine clusters. In short, without the app, we believe relevant information is likely to be buried in the network and not recognized by participants, given the typically large number of Facebook Friends people have on average. According to a Pew Research report, the median number of Facebook Friends among its users was 150 [11]. In this study, the median number of Facebook Friends reported by participants was 454, and the median number of Facebook Friends obtained from their downloaded network data was 456. Future research could consider other ways in which salient information contained within Facebook might be surfaced for individuals facing important information challenges.

Serving as a Reminder

The network visualization also appears to play a reminder role by aggregating all of our participants' Facebook Friends in a playful and engaging visual format, thus surfacing information sources that they otherwise might have overlooked. Our finding that the visualization reminded participants of their weak ties suggests that making weak ties more accessible could be one way to help people take better advantage of the weak ties in their network. Participants reported that the visualization helped them recognize people they did not know well or had forgotten about. As one participant (S20) explained, "I think, without a visual, I was just referring to people in my mind that I know pretty well," attesting to this surfacing dynamic.

The visualization reminded participants of not only weak ties but also strong ties they forgot. Accordingly, we found that participants nominated a greater number of people in the post condition compared to before they saw the visualization, suggesting that the app surfaced the existence of some Friends who might otherwise be "out of sight, out of mind." The difference in the number of nominated Friends was not significant at the .05 level (p-value=0.057), but given our small sample size (23 participants in the quantitative analysis), we expect this difference would be significant with a larger sample.

Potential of Social Media Interventions

Perhaps our most promising finding involves those who are more likely to lack college knowledge resources in their immediate networks and the fact that these individuals were more likely to benefit from use of the app. We found that only first-generation students were influenced by the visualization when selecting people to turn to for college information, while non first-generation students were not. First-generation students tend to be at a disadvantage when it comes to college information seeking because they are less likely to get information about college from parents, who, for non first-generation students, may be one of the main sources of college information [17]. Similarly, looking at pre- and post-visualization scores, only participants who reported lower perceptions of having Facebook Friends as a source of college information demonstrated significant differences in ratings of expertise and reliability.

Researchers have found that whether people use social media to seek information or not is influenced by individual characteristics [e.g., 29]. For instance, those who perceive that it is appropriate to ask questions on Facebook are more likely to seek information using Facebook [29]. Three participants indicated that seeing college information in their Friends' profiles may have changed their perception that Facebook is a frivolous place where people put "silly things." While seeing college information on their Friends' profiles came as a surprise to them, in particular, the change in perception appeared to be more likely to happen because participants recognized peers' interests or aspirations they had not been aware of. Our findings suggest that designers may try emphasizing certain profile fields in order to shift norms around information seeking on the site. For example, seeing Friends' college profile data might serve to signal that these Friends are serious about their educational pursuits, thus encouraging them to take advantage of social media as one means to access human information sources in their network when seeking information they need. Job-seeking is another example of a complex information task that requires a lot of resources and support. For instance, highlighting previous work experience among adults might help the unemployed feel more comfortable reaching out for networking or with job-related questions.

Our findings are positive regarding the potential of social media interventions for remediating unequal access to post-secondary education. Social media apps that can provide

similar affordances may serve as a useful tool for less resourced individuals such as first-generation students by allowing them to access resources hidden in their network. In addition, these interventions may also shift norms – in this case around perceptions of social media as inappropriate for getting information – thus, promoting the use of social media for college information seeking. This ultimately may lead to more access to resources embedded in people's network, but otherwise not visible.

College Connect has been discontinued due to new changes in the Facebook platform. As of April 30, 2015, Facebook has restricted access to one's Friend list with the introduction of Graph 2.0, which means the app can no longer access the Friend data needed to create network visualizations. Designers will have to be creative in finding other ways to uncover and highlight weak ties. We believe that more work is needed to further explore the role of social media in helping people access hidden resources in their network in the process of seeking help and information.

Limitations

Our sample was small – only 24 participants. Given that some p-values approached significance (e.g., difference in the number of people nominated between pre- and post-visualization), these differences may have reached significance with a larger sample size. When collecting data, artificiality was introduced by having participants use the app during a face-to-face interview. As participants were given a limited amount of time and had to use a laptop instead of a larger monitor, their experience with the app could have been affected by these constraints. The timing of data collection also could have influenced responses we obtained. Both the survey and interview were conducted during the period in which students were sending out their applications (i.e., November and December, 2014). Considering the college application timeline, this means that most participants had already made decisions about where to apply and were mostly likely interested in information about a specific college rather than conducing broader searches. If data collection took place earlier in the process, the college information seeking practices reported by our participants might have been different. Finally, due to time constraints, we used one-item measures to assess the characteristics of human information sources; future work should use multi-item scales.

CONCLUSION

The search and broadcasting affordances offered by SNSs mean that these platforms may serve as useful venues for information seeking. One of the benefits of using SNSs for information seeking is that weak ties that would otherwise have degraded may be more accessible. Although research on youth's social media use has been increasing, still little is known about the role of social media in adolescents' information seeking practices.

This study examined how social media influence adolescents' information practices with respect to the selection of human information sources in the context of college information seeking. This form of information seeking is a complex task, requiring help from families, peers, and institutional resources. Considering that first-generation students tend to lack informational resources in their family, they may most benefit from social media when looking for college information. Our findings show that first-generation students indeed were more likely to benefit from social media compared to non first-generation students in that after seeing the visualization, first-generation students selected Friends who were more appropriate for providing information about college.

This work contributes to our knowledge about the role of social media in the process of information seeking, and provides some insights into the relationship between affordances of social media and people's information practices in relation to topic-specific informational tasks.

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