Supporting Youth Activists' Strategic Use of Social Media: A Qualitative Investigation of Design Opportunities

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Social Networking Sites (SNS) provide a platform for engaging youth in activism (e.g., by helping mobilize civic action). While youth typically employ casual approaches to online activism (i.e., quick actions, such as broadcast posts to advertise social justice events), more strategic practices (i.e., those that are more creative and informed) can increase the likelihood of successful online campaigns. However, little work has examined how youth activists can be supported to use SNS more strategically. To address this research gap, we conducted interviews with youth activists, exploring how youth made sense of social network visualizations and their perspectives on how such tools could support their activism efforts. Our findings characterize how participants made inferences about followers' identities based on their hashtag use, and how they used those inferences in outreach decisions. We conclude with design implications for future research in this area.

CCS Concepts: • **Human-centered computing → Visualization application domains**; Social networking sites.

Additional Key Words and Phrases: Youth activism, social media, social computing tool

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1 INTRODUCTION

Activism is described as actions and efforts aimed at creating more inclusivity and equality for underrepresented groups through social change [16]. Youth activism, in particular, not only helps create social change among marginalized groups, it can also have a positive developmental impact on young people [56, 74, 85]. In this regard, Social Networking Sites (SNS) have played a significant role in recent social movements and youth engagement in politics. [3, 47, 59, 76].

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Prior work has examined the practices that youth engage in online, including investigation, production, circulation, dialogue and feedback, and mobilization [65]. Furthermore, the approaches that youth take to carry out these practices can range from casual to purposeful. It is much more common for youth to use SNS *casually* (e.g., liking and sharing a post), that is, through actions that involve less time and consideration and that aim to reach broad, less explicit goals. While such casual approaches can be valuable (e.g., by raising awareness about issues), their impact can be limited [65, 69]. As compared with casual use, the *strategic* practice of using SNS for advocacy involves using SNS in informed ways [65]. For instance, a strategic approach might involve identifying influential people that can connect youth to a broader network, thus increasing opportunities for mobilizing action [65].

Therefore, while both casual and strategic actions are important components of youth activism, prior work has found that youth engage in strategic action much less frequently. One report found that among youth activists, 49% did not use any strategic practices in their online efforts [65].Of those that did utilize strategic approaches, these practices were used infrequently. This is in contrast with casual practices, which were used by 99% of youth studied. Furthermore, an important issue raised by this prior work was that the casual actions taken by youth online were often out of sync with the more ambitious societal change goals they sought. These findings emphasize the need for research investigating how technology can better enable strategic civic action on social media amongst youth, to help compliment the more widespread use of casual civic practices [65].

One important approach to helping youth engage in online civic action more effectively and thoughtfully is to equip them with knowledge about the social capital available to them within their networks (i.e., the resources afforded to people through their social connections), as well as skills and strategies to achieve their goals [29]. In fact, research shows that people have difficulty accurately remembering and accessing the social capital available in their social networks [8]. Network visualizations offer one opportunity for helping youth make sense of such social capital. Although there is no one best way to represent networks to aid decision making [78], network visualizations can help people (including youth) navigate their networks and use them strategically. Despite the potential that such visualizations offer, there remains a paucity of knowledge regarding how such visualizations should be designed to support youth. As such, we investigated the potential of social network visualization tools to help youth activists better understand the social capital within their network, and as a result, engage in strategic decision-making in their online activism.

Our work is focused on activism within youth empowerment programs. Within such initiatives, adults work alongside youth, providing encouragement and support to help youth identify, and take action to address, social and community-based issues [10, 26, 38, 52, 58, 64]. In the organization we partnered with, youth were employed for the period of a year, during which they identified community issues that they shared a common interest in tackling. These issues included mental health, community violence, and police-youth relationships. The youth then designed, planned, and created initiatives (e.g., in the form of community events) to alleviate issues they focused on. These programs, which are gaining in prevalence throughout the world, are thus important contexts for nurturing young people's engagement with issues of societal concern [48]. Within empowerment organizations, youth use SNS to involve their peers in civic action [7, 73]. Given prior work documenting the importance of helping youth develop strategic approaches to online activism [65], we sought to specifically examine how social network visualization tools might help them develop the skills and resources needed to use SNS in more mindful and informed ways.

To this end, we conducted semi-structured interviews with 13 youth within a youth empowerment organization, to investigate how social network visualization tools can support strategic social action. Our participants were members of racial/ethnic minority groups and low-SES neighborhoods, populations that have traditionally been excluded from sources of power and influence in society.

Given that prior research has shown how essential social capital is for promoting wellbeing and opportunities for upward mobility [23, 41, 42], it is critical to equip low-SES groups with tools to better access and enhance their social capital.

During our interviews, we showed participants two interactive, low-fidelity prototypes that visualized participants' hypothetical social network of followers. These visualizations depicted information such as their followers' number of followers, level of activity on SNS, and most commonly used hashtags. We then used the interviews to explore youth's perceptions of the visualizations, including to what extent the designs could support their activism work. The following research question guided our interviews: *What are youth perspectives on how social network visualizations can support online activism?* By answering this research question we sought to understand 1) youth activists' perspectives on the value that social network visualization tools could provide, 2) potential limitations of such tools, and 3) the ways in which information provided by these tools might help to inform youth activists' decision-making as they seek to mobilize and engage their online networks.

We found that visualizations of information about followers' hashtag usage was particularly valued by our participants. Our findings characterize how youth saw hashtags as playing a central role in helping them understand their social media followers, and how to approach them. Our study illustrates how participants saw learning about a follower's commonly used hashtags as offering important insights into that person's identity (i.e., their interests and priorities). We discuss how participants felt such hashtag information could help guide their decisions about who to reach out to in their network. Finally, we discuss how participants sought to employ hashtags to directly and indirectly approach their target audiences.

The results from our qualitative study provide initial evidence for how social network visualizations can support youth activism. We use our findings to discuss directions for future work, including how metadata from SNS (such as the hashtags that people use) can help youth activists learn about others' interests and, as a result, produce greater collaboration online. We conclude by elaborating on issues that arose as a result of the ways youth interpreted the visualizations and discuss ethical challenges (e.g., the danger of non-participants being included in social media analysis research) that this line of research may present in the future.

2 RELATED WORK

2.1 Youth Activism on SNS

Previous research has shown that youth participation in civic matters possesses several benefits for both the community and youth themselves [1, 56, 85]. Youth civic engagement not only affects social change in the present, it can also predict youth's political participation later in their lives [56, 85]. Additionally, research has shown that youth civic engagement positively affects the engaged youth's well-being [1]. As such, it is important to increase and encourage youth civic engagement.

Given this work, researchers have investigated the potential for, and benefits of, using SNS as platforms for youth activism [33, 34, 65]. Research has shown how SNS can provide youth with a way to express their opinions amongst a wider audience and facilitate collective action [77]. Furthermore, compared to more traditional forms of political participation (i.e., voting), youth often prefer to use SNS platforms for civic engagement [76].

One of the benefits of SNS is its propensity for helping youth engage with their social networks [24, 40]. SNS help youth access and improve their social capital, which is defined as resources, social support and trust embedded in a person's network. Research has shown that using SNS helps individuals connect with others in their networks and enhance social trust, civic engagement, and political participation [24, 39, 40].

However, individuals' success in accessing the aforementioned resources depends on several factors, among which are individuals' ability to perceive and interpret their interconnected relationships, and their capacity to successfully extract and utilize their resources. However, research has shown that accurately recalling and navigating one's network is not a simple task [8]. People have a tendency to forget others in their networks, and this tendency may be higher for certain types of relationships [8]. In other words, people have a greater chance to forget those they interact with infrequently as opposed to those they interact with more often. Therefore, we argue that novel social computing tools, through making the features of one's network more visible, present key opportunities for helping individuals to recall, understand, and utilize the social capital within their networks.

In summary, while previous research has shown the potential of online interactions on SNS (e.g., Facebook and Twitter) for building and maintaining social capital [24, 40], there is a dearth of research regarding how technology can help youth activists become more aware of their social capital and how youth can leverage their online networks for civic action. To address this gap in research, we investigated the potential of using network visualizations for helping youth activists better understand the resources available to them.

2.2 Hashtag Activism

Research on *hashtag activism* provides further motivation for the work reported on in this paper. Hashtag activism is defined as the emergence of a large number of social media posts – with the pursuit of a particular political or social issue – under a common hashtag or phrase [82]. Hashtag activism has been effective in creating solidarity amongst underrepresented groups (groups that are mostly neglected by mainstream media and governments) [22, 62].

Using hashtags, everyday people, activists, and celebrities can bring attention to issues concerning underrepresented groups. For instance, the hashtags #Ferguson, #BlackLivesMatter and #SayHerName have been used to create discourse around police brutality, mobilize offline protests, and refocus the attention of mainstream media [9, 37, 62, 80]. Similarly, #MeToo has been used to create a narrative around violence against women [35, 49].

Moreover, platforms such as Twitter provide a channel for *counterpublics* to become more visible [36, 37, 47]. Counterpublics refers to marginalized groups that produce counter narratives related to their identities, interests, and needs for social change [36, 37]. Such counter narratives are in opposition to dominant perceptions of these marginalized groups perpetuated throughout public spheres. "Black Twitter" is an example of a counterpublic in which primarily African-American Twitter users have created an alternative narrative and public performance of black identity in order to catalyze socio-political change [32, 67]. In this way, hashtag activism aids in the formation of collective identities [4, 28, 43]. For instance, those who follow feminist hashtags (e.g., #YesAllWomen, #BringBackOurGirls) may experience a sense of connection to the way such hashtags and tweets are phrased and identify with them. As a result, communities develop around feminist identities [22].

Hashtag activism researchers have largely focused on the process and context of hashtag emergence within prominent social movements [37, 79]. For instance, researchers have investigated the important actors, such as initiators and influencers, within the #Ferguson movement [37]. Researchers have also explored various narrative and discursive aspects of prominent hashtags, such as #BlackLivesMatter, and the identities created around them [82].

Our work builds upon this ongoing hashtag emergence research. As hashtags become powerful tools for social change, our findings characterize how interpretations of hashtag usage within one's network may drive the work of youth activists online.

2.3 Visualizing SNS data

Our research is further motivated by prior work on visualizing SNS data, including how the users of SNS participate on these platforms [18, 60, 81]. For instance, in the field of data journalism, Santos et al. [66] investigated how temporal visualizations of Twitter hashtags used before and during a soccer game might help journalists identify topical discourse trends, that could inspire news article pitches. Additionally, prior studies have investigated how social media data visualizations can improve transparency and communication among political institutions and voters [60]. For instance, Stieglitz and Dang Xuan [71] have proposed a framework for social media data analysis, and have investigated how visualizations (e.g., retweet networks and word clouds) can help political institutions to learn about the trends and the social landscape on social media.

However, while SNS visualizations have been previously studied in various domains, to our knowledge, there are no studies investigating the design of SNS visualizations for youth activists. In this paper, we focus on how youth activists could potentially tap into their social capital online by acquiring useful knowledge about existing patterns within their audience visualizations.

Moreover, prior work has mostly focused on providing visualizations of hashtags regarding trends among a large group of users [66]. In this work, we wanted to understand how showing node-level information, as opposed to aggregated information, can help users infer knowledge about their audience as individuals. As a result of using such visualizations, we hope that youth can identify potential influential connections in their networks.

3 METHOD

We conducted a study to examine how visualizations of one's network connections can help youth make more effective decisions in their work as youth community organizers (youth organizers for short). Youth organizers are individuals who work to engage their peers and local residents in addressing problems within their communities [20].

To carry out this work, we partnered with a youth empowerment organization located in a metropolitan city in the northeastern United States. Like empowerment initiatives throughout the world [38, 52, 58, 64], the focus of our partner organization is equipping youth with the skills and resources needed to identify and address community issues (e.g., gang violence and mental health). Youth are employed by the organization and trained to engage in social action. Adult staff help youth to understand and choose social issues to focus on, and to plan and organize community events that address these issues. Outreach (promoting events in the community) is a central component of the youth's work, SNS being a primary means of this outreach. Therefore, youth must be armed with the necessary technical and interpersonal skills to effectively use SNS for outreach. The organization we studied has four physical sites located in different neighborhoods. We recruited 13 youth (5 girls and 8 boys, between the ages of 13-21 years old) from two sites within the organization. The lead researcher conducted a semi-structured, one-on-one interview with each participant. Interviews took place at the organization's sites and lasted 30-50 minutes each.

During each interview, participants were asked to examine two low-fidelity prototypes that visualized their hypothetical Twitter followers. We focused on Twitter because it is used by many different communities (e.g., politicians, media, regular citizens, activists and celebrities) and has the potential for helping people reach out to a broader audience and influence people in power [44]. Additionally, Twitter, which has been used for over 13 years, is where early usage and popularization of the hashtag concept originated, and has been the focus of a significant number of research studies in online activism [9, 37, 62, 80]. Each prototype was implemented using the Invision app [25] and was shown to youth on a mobile phone. We chose to focus on mobile phone visualizations because

of the prevalence of mobile phones amongst low-SES populations [84] –the demographic focus of our work. Furthermore, smartphones enable easier access to visualization tools within and outside of youth empowerment organizations.

We created two visualizations to prompt discussion around network characteristics that could potentially help youth make more effective decisions in their outreach work. These prototypes explored two network types (i.e., an individual youth's network alone versus the individual youth's network plus that of the organization), and two visualization approaches (list and graphic visualizations). Our selection of these prototype variants was informed by: 1) our previous pilot studies that we conducted with the staff and youth, in which they expressed their desire for a tool that supported individual and group outreach; hence the individual and organization level visualizations, 2) our desire to create visualization variations that could help us explore various characteristics that youth in our prior studies had voiced as important factors to consider when doing outreach, and 3) previous research that explored similar categories of network visualizations to support decision making [78].

It is important to note that the prototypes were created as part of a qualitative, exploratory examination of youth's preference for such tools, rather than an experimental comparative evaluation of each design approach. Therefore, each visualization does not represent a unique permutation of the design dimensions we sought to explore. Instead, given the limited research examining how network visualizations can support youth activism, we used our prototypes to spur conversations with youth that would help surface important areas for future inquiry and design. Similar research methods (e.g., the use of probes) have been used by HCI researchers for data collection; either to learn about users' behavior with technologies that already exist or their potential use of new technologies [6]. In this case, our work was driven by a desire to investigate how technology might go beyond the features within currently available SNS, to support youth in more strategically engaging their online audiences. In addition, given how nascent this research area is and the need for formative work that helps drive the design of network visualization tools for youth activists, our goal at this stage was not to conduct a naturalistic evaluation of a system or experimental study evaluating design alternatives. Instead, our goals in this formative research were to 1) investigate youth perspectives on how network visualizations can support online activism in ways that are not already possible using only current SNS, 2) characterize the kinds of data and insights that youth activists desire from such tools, and to 3) establish research questions that future work should further explore about youth activists' interactions with network visualization tools.

Admittedly, using youth's real SNS data would have provided further insights into the kinds of scenarios in which youth could have used the information gained from the network visualization prototypes. However, our findings reveal that our low-fidelity prototypes were effective in spurring rich conversations that deepened our understanding of how youth felt network visualizations could support their work. Moreover, while the data about their networks was hypothetical in the prototypes, we situated participants' explorations of the visualizations within the context of their work at the organization as follows. Before asking youth to engage with the visualizations, youth discussed an upcoming event they were planning as part of their work in the empowerment organization. They then discussed how they would use the visualizations to reach out to their audiences for their event of interest. This approach helped youth to think concretely about how network visualizations such as those in our prototypes might aid their work as well as potential shortcomings, and what they would like to see in future iterations.

The first prototype is a list visualization (Fig. 1) and shows a participant's list of hypothetical Twitter followers. Each row corresponds to data related to one of the followers (in this case, Sam, Angela, Steve, and Mariam). In each row, the network characteristics of each follower are visualized using bar charts (i.e., age, activity, interactivity, novel connectors, and followers). Additionally, a

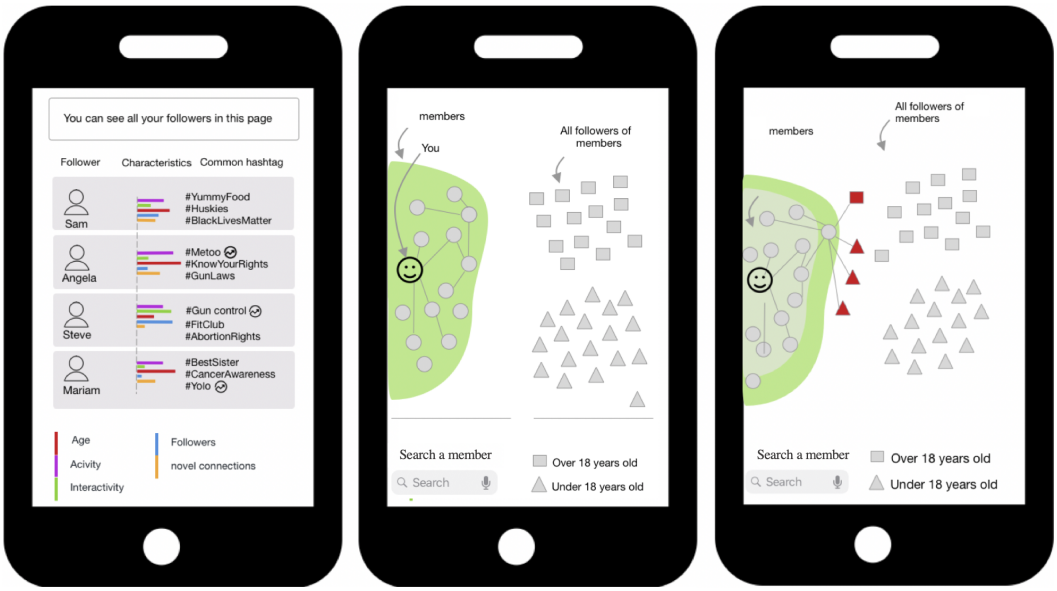

Fig. 1. From left to right: a) The list network visualization displays youth's hypothetical list of followers, along with various characteristics: age, level of activity on social media, level of interactivity with the participant, number of followers, and number of non-mutual connections with youth ("novel connection") b) The graphic network visualization displays two sets of nodes for a Twitter user. Nodes on the left side represent people within the empowerment organization that the user is a part of. Nodes outside of the green area represent all the followers connected to people within the organization. Followers are categorized by their age (over 18 vs. under 18). c) This graphic visualization displays a member of the organization and their connected followers. Red shapes represent followers connected to one of the members of the organization, which was searched using the search tool.

follower's most commonly used hashtags are also displayed [2, 12]. Our goal was to understand how this data might help youth strategically focus their outreach online. For example, knowing who the novel connectors are in their network (i.e., people with numerous connections outside of one's immediate network connections) might lead youth to reach out to those individuals in hopes that these people will share the youth's posts with a wider audience than the youth can directly access on their own.

The second visualization, is a graphic representation that aims to help users understand which organizational members they are connected to and the people who follow members of the organization. We hoped that by seeing the network of other youth activists working at the organization, as well as those individuals' followers, youth would be helped to envision collaborative outreach opportunities with their peers. For instance, by identifying people within the organization with the highest number of followers under 18 years old, youth might decide which member of the organization should take a more active role int accessing their network for that event. The nodes inside the green background area correspond to the members of the organization. The nodes outside of the green area correspond to all the followers of the organization's members. By searching for a member of the organization (using the search bar), participants can view that member's connections. We intentionally avoided illustrating all the connections at once, because we did not want to overwhelm the small screen size of the visualization. Hence, we chose a detail-on-demand approach to visualizing the connections [72]. Participants can identify the age of their followers based on the shape [54] of the nodes. Followers under the age of 18 are displayed as triangles,

List Visualization	Graphic Visualization
1) Explain what you see in this visualization 2) Who is the youngest among the people displayed in this visualization? 3) Name the person with the highest number of followers? 4) If you were to approach someone from this list for your next upcoming event, who would that be? Why?	1) Explain what you see in this visualization. 2) Show who are under 18 years old 3) Point out people inside of the organization 4) How would you use the information acquired from this visualization for your work as youth organizers? 5) Imagine that Eve is the name of a youth working at the organization with you. Search for Eve to find out more information about her connections.

Fig. 2. Tasks youth completed for each visualization

and followers over the age of 18 are displayed as squares. Additionally, participants can search for a member of the organization through the search bar and see which of their own followers are connected to that organization member.

3.1 Procedure and Data Collection

We used semi-structured interviews to explore youth's perspectives on the visualization variants described above. The first part of the interview consisted of questions regarding youth's use of SNS, including to what extent they use these platforms in their work as a youth organizer. This baseline information was collected to understand the challenges and opportunities youth face for using SNS for activism, and to determine the degree to which introducing our intervention could help them overcome those challenges. The researcher then introduced the visualizations and some of the terms used in them (e.g., followers, novel connectors, etc.). Youth were provided with a sheet explaining those terms and were instructed to use the sheet as a reference as needed during the activities.

Youth were then asked questions to assess the visualizations' usability and to what extent they found the information provided by the visualizations useful for their work. Fig. 2 summarizes the tasks we asked youth to complete for each visualization.

Next, we asked participants to compare the two visualizations based on usability for their work. We also asked youth to discuss ways to improve each visualization. Youth were also asked to rate each visualization based on enjoyment and learnability (10-point Likert scale questions). It is important to note that, following an iterative qualitative methodological approach [19] we added these two questions midway through our data collection, to help us further explore emergent themes. Therefore, we were only able to gather this information for six participants.

We then asked participants to rate followers' characteristics (introduced in the list visualization) based on the significance of this information for their activism. These characteristics included the followers' number of followers, novel connector status (number of connections that the follower has outside of the participant's immediate network), commonly-used hashtags, level of activity (how active they are on Twitter), and level of interactivity (how frequently a follower engages with the participant on Twitter, by liking or commenting on their posts, sharing their posts, and messaging the participant).

All interview sessions were audio-recorded and transcribed verbatim. We used open coding from grounded theory [19] to inductively characterize concepts in the qualitative data. We then iteratively clustered the resulting codes into higher-level themes. The lead researcher open-coded the transcripts, and iteratively refined the main themes through regular sessions with the research team. Throughout the data collection and analysis, we used memos to record our reflections on the data. We constantly compared concepts identified earlier in our analysis with new concepts

that arose throughout the data collection and analysis. This process helped us refine and add more questions to the interview guide as the data collection was taking place. Prior to starting data collection, we received approval for this work from our University's Institutional Review Board. We used consent forms for youth 18 and older. Because our study was designed as part of the organization's activities for which youth were employed to do, for minors the IRB approved our use of assent forms along with the organization's letter of support to conduct the study with youth.

We emphasize that our goal in this qualitative study was to achieve naturalistic generalizability (i.e., providing a thick description of findings and the study's context to help readers determine if they resonate with their own or vicarious experiences, and if they can be applied in the contexts they wish to study) [70].

4 FINDINGS

Our findings provide initial insight into participants' perspectives on how social network visualizations can support their outreach work online. Through our inductive analysis, we identified rich and multifaceted themes around the value of hashtags. In fact, of all the visualization features in the prototype, participants most frequently said that the most useful feature was the list of followers' most commonly-used hashtags.

As such, in this paper we focus on ways that youth interpret hashtag information about their followers, and how their perspectives on such information can impact their outreach. We begin this section by unpacking how participants felt that learning about their followers' hashtag usage could help them better understand their followers, and how to approach these individuals. We discuss the role that hashtags played as a tool: to infer the identity of participants' followers, to choose who to target, and to solicit help from their audience. We then provide an overview of participants' overall attitudes toward the list and graphic network visualizations.

4.1 Hashtags

There were several ways in which participants felt that more insight into their followers' hashtag usage would be useful, namely, that it would help them better understand who their followers are and how to engage with them.

4.1.1 #Decoding Followers' Identity. One of the most prominent themes of our study was youth's discussions of using hashtags to make inferences about various aspects of their followers' identities. Here, identity refers to both a static and socially constructed sense of self [5, 27, 45, 57]. For instance, one's age is a static construct, whereas one's character (individual behaviors and beliefs) can be socially constructed. Prior work has extensively studied the use of hashtags as a form of online identity presentation and construction, from the perspective of people who tweet hashtags to participate in online discourse [43, 56]. In this section, we extend previous work by examining another side of the hashtag activism phenomenon: how youth activists make sense of the hashtags used by their followers, as a means of learning about their followers' identities.

Using Hashtags to Infer Demographics: Demographics was one dimension of follower's identity that participants tried to decode while using the prototypes. In fact, when using the visualization interface, youth often made inferences about their followers' age and race. For instance, when looking at hashtags, P6 tried to guess the age of her followers:

> [...] the hashtags that [the follower] uses, he's pretty young, so probably like a teenager, a little bit older, in his twenties

Similarly, when asked to identify the youngest person in the visualization, P13 looked at the hashtags used by the followers and made this conjecture:

> I'm guessing. Based on [the hashtags] they're talking about, I would kind of assume that Sam is the youngest one, but it says based on the bar, it says that Steve is the youngest one

What makes P13's case interesting is that despite the fact that she could have compared the age bars (in the list visualization), she opted for comparing her followers' hashtags instead. In another case, P1 guesses Sam's race based on the type of hashtag that Sam is using:

> He is a young person and a person of color because he put #BlackLivesMatter and assume he is a person of color.

We argue that this is a somewhat bold assertion because #BlackLivesMatter could be used by allies of the movement, who are not necessarily people of color. Additionally, it is important to note that in this study, youth were given a hypothetical list of followers (Mariam, Steve, Angela, and Sam). As a result, our findings might not fully translate if participants were shown the list of their actual followers. However, our findings suggest that using hashtags as contextual clues may be helpful, particularly as young people expand their efforts beyond their immediate social circles (which activists must do to have a broad impact). Furthermore, we do not argue that youth will necessarily derive the correct information from visualizations of hashtag usage. Rather, we identify what led our participants to extrapolate such conclusions from the prototypes in our study. In the Discussion section, we will expand on the pitfalls of using visualization systems for decision making through the lens of bounded rationality [68].

Hashtags reveal personal facets of one's life: When looking at their followers' commonly used hashtags (both popular hashtags and less known hashtags), some participants discussed how hashtags could speak to aspects of their followers' personal lives. For instance, when seeing Mariam's hashtags (#CancerAwareness and #BestSister), as well as Angela's hashtag (#MeToo), P13 concludes that:

> You can see that Mariam is going through something right now with, maybe her sister has cancer or something? [...] Angela, she's using the hashtag #MeToo, so maybe she knows someone who's been assaulted or sexually assaulted, or maybe it's her too.

In this case, P13 also speculates that Angela might have been dealing with sexual violence on a personal level (or through someone they knew), based on Angela's commonly used hashtag #MeToo. We argue that in this case, P13's assumption might be close to reality, since the main purpose of #MeToo is for women to share their experiences of sexual harassment and has served as a way to show solidarity with victims. However, P13 also concludes that since Mariam has mostly used the two hashtags #BestSister and #CancerAwareness, Mariam's sister might be dealing with cancer. P13 not only makes inferences based on individual hashtags, but she also derives a conclusion about her follower's identity (how her sister's cancer affected her) by combining various hashtags. In the following quote, P3 also makes a similar assumption that Mariam's family might be affected by cancer:

> Best sister hashtag, so I'm assuming family is very important to her, or at least to herself because it's not best family or best anything, just best sister, which I'm assuming is her. And hashtag cancer awareness, which is very great. Illnesses are very important. Very interesting. People talk about cancer all the time, so I'm surprised. That must have affected her in her family for her to be so motivated to post that.

While most participants contemplated the meaning of each hashtag individually, the above quotes show that participants also interpreted hashtags in combination. As a result, hashtags can adopt slightly different meanings based on how they are displayed and how participants interpret

that display. In the Discussion section, we will expand on the role of visualizations in creating such assumptions.

Hashtags Represent Awareness: Lastly, followers' level of awareness about societal issues was another dimension of identity that youth inferred from their followers' commonly used hashtags. It is worth noting that during the interviews, youth were only asked to look at the visualization, discuss what they see, and choose people they find important for their work of outreach. Therefore, youth naturally made such inferences, without any further detailed prompting. For instance, while looking at his followers' most common hashtags, P4 says:

> [Steve's] hashtags clearly indicate to me that he's someone who is aware and someone that wants to see change in his community. Just based on, again, the hashtags. [...] Just based on his hashtags, they're very telling of the kind of person he is. I think I would definitely make it a point in terms of reaching out to Steve and demonstrating these issues we're addressing very much so in these and our production and just reaching out to him.

In this case, Steve's level of awareness about societal issues is an important factor that influences P4's decision to reach out to him. We argue that such an inference can be considered to be quite bold given that using a hashtag does not necessarily mean that one is aware of social issues and wants to see change in their community. P1 also compares followers' level of awareness, by comparing their hashtags:

> I don't really like the term YOLOs. But she does have the MeToo movement going on, so she might be a little woke as well. I feel like every one of these are woke, with the exception of Sam. Sam's just talking about yummy food. But everyone else is just kinda like out here like cancer awareness is really important, a lot of people suffer from cancer.

As illustrated in the quote above, participants saw hashtags as not only representing awareness about societal issues, but also a lack of awareness about such issues. For instance, P7 mentioned:

> The hashtags are important; I mean it tells what kind of person they are. If they're some person saying #yummyfood huskies, they're not really interacting with the community as much. This one right here has #guncontrol and #BlackLivesMatter

Of course, not tweeting about certain issues is not a definitive indicator of one's activist identity. However, we argue that such an interpretation of one's identity speaks to potential perceptions amongst participants about what constitutes alignment with an issue (i.e., using the relevant hashtag on SNS). In the Discussion section, we will further expand on the challenges of reaching such conclusions from visualizations.

When discussing hashtags, two participants made distinctions between the types of social issues in which their audience expresses interest. For instance, P8 discusses how topics such as cancer awareness might be an important cause, but he creates a distinction between topics that he thinks reveal people's opinions and those that do not, i.e. causes that people take different sides on (i.e gun control) versus those that everyone already supports (i.e. cancer awareness):

> I feel like the thing that stands out the most is really interesting that three out of the four have one of their most used hashtags is a social cause that they are very invested in. Angela and Steve specifically very political causes 'cause really nobody is pro-cancer but Steve and Angela are very opinionated [about] political causes which I think is really interesting. I feel like something you see a lot on social media, and especially amongst young people in the newer generation, that is something that you see a lot. Definitely.

P3 also distinguishes between hashtags about cancer awareness; which he believes people do not have the power to change. This is in contrast to social issues, on which he believes people can instigate change.

> They're posting about [...] cancer when social injustice ... Cancer you cannot really change that. You could by getting treatment, but social injustices, you could change that. You can make a difference.

The quotes above further highlight the process through which P3 evaluates activist identity. In this case, P3 argues that posting about cancer awareness, although important, is not necessarily as strong an indicator of one's activist identity as posting about what he perceives to be social injustices. Additionally, it seems that P3 is implicitly prioritizing social injustice above cancer awareness (i.e. social injustice is worth tweeting about, but cancer is not), because he believes tweeting about social injustices can make a difference.

4.1.2 #Screening Device. In the previous section, we discussed how youth interpreted their followers' commonly used hashtags, as a way to learn about their identities. In this section, we discuss how youth used the information they acquired about their followers' identities to choose who to target for their outreach work. For instance, in the following quote, P6 discusses how hashtags help her understand her followers' interests, and, as a result, evaluate whether or not her followers may be interested in an event held by the organization:

> What is helpful though was the hashtag signs, because although not all the time, based off of what a person's hashtags means, that's what their demeanor connects to and that's what they're actually about. But I feel like it would help more to see, oh, this person is interested in this, so I should outreach to them. Another thing that I would think about is interest to the event. So, I feel like that was really helpful when outreaching, because if I know that someone is in the women's club and they went to the women's march and they do all these things for women, I'm probably going to go to them first when I'm outreaching for a women's event or something like that. It doesn't mean that I won't outreach to other people, but she's someone that I'd go to first. Yeah, I feel like those are the first things I see or think about when I need to outreach to someone.

In this case, P6 says that knowing who is interested in an event can help her figure out who to prioritize for the event. P6's quote speaks to the strategic use of the prototype we introduced and emphasizes how hashtags served the youths' strategic goals. Similarly, P13 refers to hashtags as a mechanism to identify and filter supportive audiences:

> I like the idea of the [list visualization]. It's just showing the hashtags, because it gives me an idea of who's interested in what, and whose time would really be worth my while. You know, people who just do it for fun, or to support artists or to support speakers, public speakers, it would all depend on that.

Like P13, P8 stressed the importance of hashtags as important contextual data that needs to be shown in combination with numerical data (i.e., follower counts or novel connectors). As shown in the quote below, P8 described how seeing hashtags in combination with follower count can help determine whether someone with a high number of followers is worth targeting:

> Their hashtags [...] shows you what they are doing because I feel like just having numbers is obviously effective but also having data on what those numbers are contributing to is also important with the hashtags [...] What they contribute to because it's like if you said someone has a million followers. That could be so many different people. That could be a rapper who doesn't care about anything, doesn't support any causes

> or that could be a politician that is very opinionated and has a clear agenda. It's like are those million people just being given something of no value or even a negative value or are they being given something that is, I don't know if it's positive or negative or are they being given an opinion almost to a way. It's just like how they are being swayed because I feel like you can do a lot of good or a lot of bad with however much you have on social media. I feel like just the numbers isn't, doesn't tell the whole story.

P8 shows less interest in whether the follower in question a lot of connections and opportunities has to reach out to a broad audience and is more interested in how his follower may usefully help disseminate a message. Also, P8 later discussed the type of contextual data he wants to see visualized that could help his activism:

> I feel like that contextualized data would help because then it tells me the type of audience [my follower] is speaking to. Because someone speaking on issues, I can speak from experience, living in [my neighborhood], it's a very progressive city and that seems to be the way that a lot of people's opinions go. They are very, for example, in saying, low hanging fruit [...] That opinion isn't revolutionary [in my neighborhood]. But if this is in say, if we are using the same example. Like a county in West Virginia where [a conservative politician] won 80% of the vote. If he's a BlackLivesMatter supporter and he wants gun control that's a rarity in that area. That's a lot more impact because when I scroll through my timeline, I see 20 people who think they are the second coming of Martin Luther King Jr or Malcolm X, you know what I mean, everyone thinks that they are. [...] I feel like everybody wants to make change, which is a beautiful thing, but I feel like a lot of times we overestimate how much impact we are making when everyone around us is saying the same thing.

The quote above shows how P8 perceives influence online as the potential to influence an audience with different opinions than one's own. P8 elaborates that, oftentimes, people have a large network which is composed of like-minded people. Spreading a message among people who already think similarly may not be as powerful as spreading a message among people who have different points of views. Consequently, a powerful approach to outreach could be to identify critical people with the potential to act as connectors to individuals with different ideas. P8 later used an example to explain how to identify such critical people:

> On a lot of college campuses for example. That's traditionally a lot of progressive minded people. If I'm taking a progressive stance I'm not necessarily making as big of an impact as a conservative one. [...] Again like if Sam [from the list visualization] was shown from [name of a state] which is very red, you know what I'm saying [...] but where his views are different, that's a very impactful social media user.

P8's quotes illustrate the tension between the kinds of people he aims to target. On the one hand, he explains the importance of reaching out to people who align with his views. However, later he discusses the value of reaching out to a more heterogeneous network (*"Like a county in West Virginia where [a conservative politician] won 80% of the vote. If he's a BlackLivesMatter supporter and he wants gun control that's a rarity in that area"*). This tension may be because he distinguishes between the people he would like to reach out to as the target audience (people he believes need to be from a more diverse audience) versus the people he chooses as advocates for his causes (people he believes should align with his activist values).

While most participants mentioned they would reach out to connections with similar interests as those espoused by their empowerment organization, P3 discussed how he would instead use that information to reach out to those who appear less engaged in similar issues.

> I would approach Angela and Steven [...] Because they're already aware of those issues and things like that. ... But maybe I shouldn't since they already know about those issues. I would probably want to go reach out to Sam and Mariam more-so because they're posting about food and cancer.

P3 was the only participant who explicitly evidenced this desire for reaching out to followers who might not be posting about social issues. In this way, P3's outreach goals stood out from those of all other participants, who focused primarily on reaching out to followers already interested in a given issue. Distinguishing these sorts of differences in activists' goals can change how we design visualization tools. If the goal of an activist is to find already engaged individuals, the main functionality of the tool might constitute suggesting and connecting people with similar activism goals. However, if the goal of an activist is to target less engaged individuals, the tool might also suggest how to approach individuals (e.g., identifying advocates or mutual connections with more influence among their audience of interest).

Finally, in addition to the information that was already available in the visualizations, two of the youth discussed their desire to view the location of their audiences. P6 and P7 explained how knowing about the location of their audiences could help focus their outreach to specific neighborhoods of their interests. For instance, P6 mentions that:

> Usually I just think about accessibility, so what location do they live in? Do they live close to the event so that I can actually outreach to them?

Similarly, when asked about suggestions to improve the visualizations, P7 explained that:

> I would add what percent, like, of where [my audiences] are from, because some people have followers that are not even from here, and don't know anything about [neighborhood].

P6 and P7's desire to limit their audiences to a specific location stems from the fact that many of the organization's offline events are focused on issues relevant to their local communities. Therefore, by learning about the location of their audiences, they could filter their audience of interest based on the locality of an event.

4.1.3 # Tool for Soliciting Help. In the previous sections, we discussed hashtags as markers to identify followers' identities and their significance as potential targets for youth's work. In this section, we describe ways in which participants wanted to potentially utilize the information acquired about their followers' identities to solicit help from them.

Hashtags as Initiator of Conversation: When asked how they would approach followers that they identified as important for their work (i.e., because they were seen as their target audience, or influencers who could help reach that target audience), more than half of the youth (P1, P12, P6, P1, P2, P7 and P3) discussed how they would directly contact their targeted audience. P1 describes how he would directly message their targeted audience, and include followers' common hashtags as a way to initiate dialogue on issues of interest:

> Probably just DM them like a normal "Hey what's going on? I see that you're interested in gun control. What are your thoughts about gun control?

Similarly, P8 mentions that:

> Steve seems like he's really someone who would be down for this so I really just be like, hey I see that you're active on issues revolving around the black community, about to celebrate some black history you should come through.

In this case, P8 discusses how useful it would be to use the information acquired from Steve's common hashtags to point to the commonalities between Steve's interest and the organization's activism. Similarly, P2 highlights her common interest with a potential target:

> For like the [name of an event the organization holds], I'd be like, Hi, I see that you're really interested in this, and etc. and I work for an organization, [name of the organization] who also stands up for the same things. And we're gonna have an event, you know, this day, and I would be really interested if you could come.

In this case, P2 uses her follower's interest as a way to initiate conversations about the organization's events. In contrast, previous research has uncovered challenges that limit youth's ability to solicit help through direct means of communication online. For instance, Irannejad Bisafar and colleagues discuss the fact that youth do not find direct messaging to be a socially appropriate way to engage in activism [33]. Our study highlights the knowledge of followers' hashtags as a tool youth activists might use in order to facilitate such interactions, and as a result, overcome this challenge of establishing connections with others on SNS.

Using Hashtags to Indirectly Get target's attention: In the previous section, we discussed more direct ways that youth wanted to use hashtags to solicit help from their audience. Our findings also point to youth's desire to use hashtags to facilitate more indirect forms of interactions with their target audience. For example, P1 describes that one way to get his audience interested in the organization would be to tweet content that includes the same hashtags that his followers are using:

> [...] if I wanted to invite them to a [organization] event, I'll probably use the same hashtag they are using, like if we are talking about gun control, I'd hashtag gun control. And they might hashtag gun control too and they will see it and say oh teen empowerment around me and I follow this person, I may want to go to that event.

Similarly, when asked how he would approach his target audience, P4 mentioned that:

> [Angela's] commonly used hashtags being #MeToo and #YOLO. I would start to include [#MeToo and #YOLO] in maybe the content that I create. As a creator that's probably how I would approach that. Of course, add those hashtags.

P4 later added that by including common hashtags, one can also increase their own personal network on social media. Therefore, having information about followers' most common hashtags would be useful.

> #YOLO, #MeToo, commonly used hashtags. That's actually very helpful how I would use that 'cause I'm always trying to figure out how to increase my own network on social media. A lot of weight is how I would do that. I would look for commonly used hashtags so having that would be very, very helpful. Especially those that have the most novel connections and using [the same hashtags] to get to those other people.

Here, P4 triangulates network-level information (i.e., amount of novel connections) with the information about his followers' hashtag in order to identify critical people to reach out to in their network.

Similarly, P3 discusses how hashtags can help messages to reach beyond his followers and at the same time it's a more "chill" and efficient way to approach his followers.

> Using hashtags are more efficient [than tagging every person you want to notice your post] because sending a jerk message ... My phone is sitting next to me, "Oh, my god, I got a message," or whatever. But also, being chill about it and creating a hashtag, and people that aren't in my followers can see it.

P3's comment speaks to findings from prior research that we discussed in the previous section, regarding the challenges of direct communication for activism online [33]. We argue that using "chill" ways of approaching their audience (i.e., indirectly approaching the audience by creating posts with hashtags and hoping that others will notice the post) is a way for youth to use SNS for activism, given the existing social norms among their peers about ways to approach people on SNS. These findings highlight another approach that participants see as helping them overcome the cultural and social aspects of online interactions that might limit the use of SNS affordances for activism.

Overall, our findings illustrate the value of and limitations around visualizing hashtag usage data to support more strategic youth activism. Our participants envisioned ways of using knowledge they gained from the visualizations to make more informed decisions of how to approach followers. In the next section, we present a summary of the participants' perspectives regarding the two visualizations that we investigated in this study.

4.2 List vs. Graphic Network Visualization

Overall, youth preferred the list visualization over the network visualization. Our findings show that eight out of thirteen youth found the list visualization more useful. Three participants found the network visualization more useful, while two participants were undecided and discussed what they found useful in each visualization.

Most participants preferred the list visualization because it provided more information than the graphic network visualization about their followers. For instance, the information from the list visualization allowed participants to infer the identity of their followers and use this information to guide their outreach process. Moreover, they valued the hashtag usage information in the list visualization because it provided insight into their followers' interests and mindsets, beyond just numerical data (e.g., number of followers). Furthermore, participants who preferred the list visualization found it clearer, and more efficient to see all the information at once without the need to interact with it. On the other hand, the graphic network visualization required more steps to extract the information (e.g., participants needed to search for a specific follower's name in the search to see more information about that follower). While the information that was provided by the two prototypes differed, participants were able to see the information in the list visualization at a glance (i.e., without interacting with it), therefore they found it easier to use.

Among participants who answered the questions regarding the enjoyment and learnability of the visualizations, the easier they found the visualization to learn, the more enjoyment they found in using it. Five out of six participants found the list visualization more enjoyable to use. However, among participants who enjoyed the list visualizations, two remained undecided about which visualization they would choose for their activism work. This suggests enjoyment of a visualization does not necessarily equal its perceived utility for one's work. The one participant who preferred to use the graphic visualization for their work also found it more enjoyable and easier to learn.

These findings, together with the previously-described findings around hashtags, provide initial insight into our participants' perspectives on network visualizations. As mentioned previously, the feature visualizing followers' most commonly-used hashtags was the most valued feature across our participants. Even participants who preferred the graphic visualization, where hashtag information was not shown, discussed how they would want to see follower hashtag usage integrated with it. This finding underscores a central and key insight from our analysis—the importance of hashtag usage information for helping youth activists to make sense of their networks and more strategically engage with them.

5 DISCUSSION

Youth are a key part of the growing hashtag activism movements, in which using social media is being used to address issues of social justice [50]. Despite their participation in this form of civic engagement, little research has examined how novel tools might help to better scaffold and amplify the impact of their online activism efforts. Indeed, given that youth are much less likely to employ strategic practices in online civic action (as opposed to casual approaches) [65], there is a need for research that examines how such strategic action can be better supported. This work is especially needed in the context of marginalized youth populations such as low-SES and racial and ethnic minority groups. These populations, who are typically excluded from sources of power and decision-making, have utilized online platforms to engage in vitally-needed civic action, by advocating for change such as increased educational resources and by creating counternarratives to negative stereotypes perpetuated about them [13, 17, 50] Our work contributes to research in CSCW and related disciplines on the use of technology to address issues of social justice. To our knowledge, our work is some of the first research to investigate how social network visualizations might better support youth in understanding the features of their networks and how to better leverage their networks for social action. Given that youth differ from older populations in the frequency and nature of their social media use and in how they choose to engage in civic action [11, 63, 86] it is critical that research specifically investigate how technology might most effectively support online civic action amongst youth. In this paper, we have characterized our participants' perspectives in this regard. We use the remainder of this section to provide recommendations for future work examining how novel network visualization systems can better support youth civic action.

5.1 Visualization Misanalysis

Our findings show how youth used hashtags as a way to interpret their followers' identities. We also discussed how these interpretations are subjective. In this section, we categorize some of these findings and use bounded rationality [68] to explain aspects of the visualization that appeared to lead youth to derive conclusions that might not have been correct. While our interview questions were not designed to investigate bounded rationality, through our inductive analysis we found that our themes resonated with the concept of bounded rationality. That is, as is common with qualitative research [61], we utilized a theoretical construct (bounded rationality) to interpret our findings and their implications. Bounded rationality was chosen specifically because it provides a conceptual framework for more deeply analyzing the ways in which our participants were interpreting and making decisions based on the visualization information we presented them, and the limitations therein.

Bounded rationality refers to the limitations that individuals face in making rational decisions in uncertain situations [68]. Bounded rationality posits that such limitations in decision making are due to three main factors: human cognitive limitations, imperfection of information presented to the individual, and time constraints on finding rational solutions. In this study, we showed youth two visualizations and asked how they would use the information shown to them to make decisions for outreach. We encountered two cases in which the visualization's imperfections led to misleading interpretation of the data: interpreting the lack of data and interpreting data in combination. Admittedly, in our study, part of the limitations and uncertainty in the interpretation of the data visualizations may have been related to the fact that we used hypothetical data in the creation of the visualizations. However, we argue that while users might have made more rational decisions if they were given data about their own connections, our results are still valuable for cases in which users do not know their connections (e.g., when people follow strangers, weak ties,

or people that they could solicit help from, who they may not know well or at all–which may be common amongst activists who are seeking to engage a wide audience).

When looking at their followers' most common hashtags, some youth not only interpreted the hashtags they saw in the visualization, they also analyzed the lack of other hashtags. For instance, when a follower did not have hashtags about societal issues among their top common hashtags, participants assumed the follower was unaware of societal issues. However, this assumption ignores that a follower with no activism hashtags at the top of their list might still use such hashtags, but also use many more hashtags that are about other issues. In this case, the imperfection in the visualization shown to the participants, which only showed the followers' top hashtags as opposed to a ratio and distribution of the followers' total hashtags, might have limited participants' rational decision making.

A similar example of participants' erroneous interpretation of data visualizations can be found in literature on visualizing uncertainty [31]. Hullman et. al. discuss the uncertainty that arises when visualizations are created based on data that is not representative of the total population (e.g., when unemployment rates are visualized based on sample data rather than the whole population) [31]. The authors describe how people can interpret such visualizations incorrectly because they do not know the value of the unsampled data. In the case of the unemployment example, Hullman et. al. suggest visualizing uncertainty of unemployment as a probability distribution [31].

In this paper, we discussed a similar type of uncertainty in data interpretation caused by the visualization's selection of data for presentation. We showed how non-visualized data introduces opportunities for the misinterpretation of visualized data. One simple way to overcome this challenge is to explore alternative ways of defining and visualizing top common hashtags. For instance, top hashtags may be visualized based on specific keywords that youth activists use to search relevant issues of interests (e.g., searching for gun violence-related hashtags).

Another case in which participants erroneously interpreted the visualization was when participants created a narrative about the follower based on two of their top hashtags. Upon viewing Miriam's tweets containing #CancerAwareness and #BestSister, two participants concluded that one of Miriam's family members likely suffered from cancer. In this case, not knowing the context in which Miriam used the hashtags (e.g., if the hashtags appear in the same tweet or separately), resulted in potentially erroneous conclusions. Participants drawing such conclusions may have done so because the hashtags were displayed next to each other with no context about each hashtag (e.g., whether the hashtags appeared in the same tweet or not), leaving participants to assume the hashtags appeared in the same tweet. A starting point for overcoming this issue is examining alternative ways of visualizing multiple hashtags. For instance, rather than simply showing various hashtags next to each other, a solution could be to add contextual information (for instance, time, tweet in which the hashtag was used, and frequency of which hashtags appeared together or in separate tweets).

Additionally, we argue that, while visualizations can be beneficial for learning about audiences' interests, youth might only focus on reaching out to people who are interested in voicing their opinions online. We argue that these visualizations are most beneficial for learning about those who are already most vocal about similar issues or interests; however, this visualization has the potential to ignore audiences who do not similarly use online platforms to advocate for these issues. Therefore, future work could explore the design of such tools to identify inactive supporters as well.

5.2 Beyond Discourse: Connections

Within the space of hashtag activism, hashtags have been extensively studied as tools to create discourse among people interested in a specific social movement [14]. As a result, hashtags engender

online and offline collective action. We have described how our participants also saw visualizing information about hashtag usage as a way for activists to select their targeted audience, create connections among online entities directly or indirectly, and finally solicit help from their network. Our findings illustrate how hashtags (and learning about followers' interests and level of awareness concerning social issues) can help youth activists initiate personal interactions and conversations in order to solicit help.

Soliciting help from connections has been previously studied in different domains. For instance, Nichols and Kang [55] have investigated the potential of Twitter as a platform for asking questions to targeted strangers. In their research, targeted strangers were identified based on the content of their public posts. In order to increase the likelihood of strangers replying to their questions, the authors used questions they believed to be less personal, solicited from accounts with corporate-looking names. In our research, we are focusing on soliciting help for activism that goes beyond answering simple questions (e.g., asking people to retweet) and on topics that might be more controversial (e.g., societal issues).

We suggest that future work explores how learning about others' interests could help activists initiate interactions online. A simple design intervention might suggest people to connect with based on location, activist history, and interests. The mining of interests of social media users has been largely studied in the context of helping corporations target users indirectly (through social media ads) [83]. However, our work suggests a different direction—helping activists to connect with others using their personal social media accounts, by creating more personal rapport with those who seek to engage. The goal of such an approach would be to help activists make use of their existing connections on SNSs (i.e., visualizing characteristics of a user's followers). Taking this approach changes the dynamic of interactions as compared with the more corporate focus of prior work [83]. First, it changes the ways in which messages need to be crafted (e.g., the tone of the message). Second, it might impact the way people respond to a message that asks for help. Research is needed to examine how such tools should be designed and how they might be used in practice, including the ways in which they are received by activists and the individuals they reach out to.

Additionally, future work can examine how the use of supporting tools for online activism can impact how youth activists utilize the various types of social capital available to them. For instance, through our previous observations with youth, we found that they mostly reached out to people they already know and have close relationships with, known as *bonding capital*. However, this could result in overlooking the value of what is called *bridging capital* in their networks. Bridging capital can help people connect to larger and more heterogeneous networks, and expand youth's reach to a broader and diverse audience [75]. Therefore, tools that can expose youth activists to various types of capital within their networks and encourage them to reach out to individuals who can serve as bridges to more diverse audiences can benefit youth activists' work. Future research should investigate the types of information that could help youth to shift their focus to accessing their bridging capital. Such research should further study strategies that youth use when reaching out to various types of connections. For instance, one potential hypothesis would be that learning how to start conversations and creating connections (using hashtags) can be beneficial when youth want to reach out to people they do not often interact with – people that could help them connect to broader and more heterogeneous networks.

5.3 Ethical Implications

While using information about one's network might augment the experience of youth activists (by helping them to connect to each other), it is also important to consider the ethical implications of using network visualization analysis tools for activism.

One issue that needs to be considered is the danger of non-participants being included in future studies using actual user data from Twitter networks without non-participants' consent. Our own formative study was aimed at investigating the potential of a future tool to analyze publicly available data and data that can be accessed through the API about youth's network. We showed hypothetical data about a user's network to explore how such data might help youth activists make better decisions in their outreach work. In practice, using publicly available data should avoid the ethical issues about user privacy [46, 51]. However, as privacy concerns about the use of data by third parties are changing, so are the ethical implications of research. For instance, one question is from whom should researchers obtain consent when conducting studies? Should consent be obtained from the main users of the application or from their followers as well?

In this regard, Twitter has added a setting for its users to opt out of third parties being able to use their data for personalization. Such changes can positively give social media users the option to have more control over their own data. However, a general and broad setting, like restricting or allowing third parties to use data, may also be limiting to research. Instead, an alternative way of giving social media users more control could be to let them choose which entities they would like to trust to access their data. Social media users could also be notified when their data is being used by third parties (e.g., if a third party creates a pull request about a social media user, the user would be notified). Of course, such fine-grained transparency might also be burdensome for social media users to actively select with whom they share their data.

A second ethical concern is the extent to which SNS in general, and third parties specifically, can and should interfere in people's decision-making and behavior change. In our study, we partnered with a youth empowerment organization focused on social justice and as such the scope of this work has been local in nature. But, what are the implications of creating network visualization tools that are used at a larger scale? Would the use of such tools be ethical in the context of political campaigns seeking to more widely spread messaging? How would organizations aiming to spread propaganda and misinformation be prevented from using such tools? Again, one solution is to provide more transparency to social media users regarding how such SNS and third parties impact their behavior and their decision making. For instance, Twitter could provide its users with reports of the ways in which seeing certain posts might have affected their own behavior. Alternatively, we recommend that, instead of having a global setting for opting in/out of third-party app access to a user's social media data, companies could enable users to monitor the types of organizations that access their data as a way of facilitating transparency. Some implementation challenges include the hurdles involved in engaging users in finer-grained data privacy management.

Because these important ethical questions are complex, they require further dialogue and careful consideration. Indeed, any attempt at providing more ethical use of users' social media data should be a concerted and ongoing effort between designers of the platforms, research institutions, lawmakers, and of course the users themselves. Such collaborations require transparent communication of values, opportunities and challenges that each party faces. Of course, encouraging activism comes with potential risks (e.g., if it leads to protests, and violence against protestors) [15, 21, 30]. However in our study, we worked with an empowerment organization where youth are provided social and institutional support by the adult staff in the organization. Such organizations may have resources for safeguarding youth that could be used in conjunction with tools designed to support online activism. If such tools are created in the context of empowerment organizations, adults can help monitor and educate youth about how to safely use SNS for activism, and help connect youth to available resources in case of risks. For example, if youth are subject to bullying, staff could better help youth navigate the issue. Therefore we argue that developing tools that could be used within empowerment organizations, and used in collaboration with adults, could help mitigate some of the risks introduced by engaging in activism.

6 STUDY LIMITATIONS AND FUTURE WORK

In this study, we were motivated by the well-established advantages of using low-fidelity prototypes to gather insights early in the design process [53], and we used these prototypes to investigate youth's perspectives. In future work, evaluations of high-fidelity prototypes are needed to investigate the use of network visualization tools in naturalistic settings. As a first step in this design space, our analysis yielded valuable, previously unavailable findings that can help guide the design of functional prototypes.

Furthermore, it is important to note that in our study, we used hypothetical user data in the prototypes, not data about the users' real Twitter network. This approach enabled us to leverage the benefits of a low-fidelity prototype (e.g., in helping focus participants' attention on high-level design features versus low-level user interface design elements, and enabling discussions that surfaced valued and potentially problematic aspects of the design approaches early in the design process). In our interviews, participants did reflect on how they would use these tools with their own networks. They reflected on their own experiences using social media to ground their assessments of the prototypes and the content therein, and how they might employ such systems in their future work as activists. As such, participants did not simply guess how they would use this tool, youth shared nuanced and thoughtful perspectives that were grounded in personal reflections on their networks and past experiences. We encourage future research that leverages our findings to create network visualization of their own data. Our study represents an important first step towards creating such visualization systems, by highlighting important issues for future work to consider in the design of network visualizations for youth activists.

Lastly, we acknowledge that the specific design options we presented may have impacted our findings. That is, if we had chosen to present different design choices, different conversations may have emerged in our interviews. However, our findings are still valuable in that they provide insight into how our participants interpreted their followers' hashtag usage, and such findings will help ground future design efforts.

7 CONCLUSION

Youth activism online presents opportunities for youth development and for the voice of youth to be heard. However, to have impactful participation online, it is important to provide youth with tools to use SNS in strategic ways. Our study is a stepping stone for work that aims to create tools that help youth strategically navigate the social capital available in their network. Our findings revealed the importance of visualizing hashtag usage, as a means of supporting youth activists' decision-making. Future research should explore other aspects of one's network that might impact such decision making. One area in need of further research is the study of opportunities and challenges that the deployment of such tools over a prolonged period may present. Such work is necessary for a better understanding of how to augment youth' experience using SNS for activism.

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REFERENCES

[1] Cinzia Albanesi, Elvira Cicognani, and Bruna Zani. 2007. Sense of community, civic engagement and social well-being in Italian adolescents. *Journal of Community & Applied Social Psychology* 17, 5 (2007), 387–406.

[2] Eytan Bakshy, Jake M Hofman, Winter A Mason, and Duncan J Watts. 2011. Everyone's an influencer: quantifying influence on twitter. In *Proceedings of the fourth ACM international conference on Web search and data mining*. ACM,

65–74.
[3] Albert Bandura and Lynne Cherry. 2019. Enlisting the power of youth for climate change. *American Psychologist* (2019).
[4] Bernadette Barker-Plummer and David Barker-Plummer. 2017. Twitter as a feminist resource:# YESALLWOMEN, digital platforms, and discursive social change. In *Social movements and media*. Emerald Publishing Limited, 91–118.
[5] Jeremy Birnholtz, Nicholas Aaron Ross Merola, and Arindam Paul. 2015. Is it weird to still be a virgin: Anonymous, locally targeted questions on facebook confession boards. In *Proceedings of the 33rd annual ACM conference on human factors in computing systems*. ACM, 2613–2622.
[6] Kirsten Boehner, Janet Vertesi, Phoebe Sengers, and Paul Dourish. 2007. How HCI interprets the probes. In *Proceedings of the SIGCHI conference on Human factors in computing systems*. 1077–1086.
[7] Petter Bae Brandtzaeg, Ida Maria Haugstveit, Marika Lüders, and Asbjørn Følstad. 2016. How should organizations adapt to youth civic engagement in social media? A lead user approach. *Interacting with Computers* 28, 5 (2016), 664–679.
[8] Devon D Brewer. 2000. Forgetting in the recall-based elicitation of personal and social networks. *Social networks* 22, 1 (2000), 29–43.
[9] Melissa Brown, Rashawn Ray, Ed Summers, and Neil Fraistat. 2017. # SayHerName: a case study of intersectional social media activism. *Ethnic and Racial Studies* 40, 11 (2017), 1831–1846.
[10] Julio Cammarota and Michelle Fine. 2010. Youth participatory action research: A pedagogy for transformational resistance. In *Revolutionizing education*. Routledge, 9–20.
[11] Pew Reseach Center. 2018. Internet/broadband fact sheet. *Internet, Science & Tech* (2018).
[12] Meeyoung Cha, Hamed Haddadi, Fabricio Benevenuto, and Krishna P Gummadi. 2010. Measuring user influence in twitter: The million follower fallacy. In *fourth international AAAI conference on weblogs and social media*.
[13] Lynn Schofield Clark and Regina Marchi. 2017. *Young people and the future of news: Social media and the rise of connective journalism*. Cambridge University Press.
[14] Rosemary Clark. 2016. "Hope in a hashtag": the discursive activism of# WhyIStayed. *Feminist Media Studies* 16, 5 (2016), 788–804.
[15] Jennifer E Cobbina, Soma Chaudhuri, Victor M Rios, and Michael Conteh. 2019. "I Will Be Out There Every Day Strong!" Protest Policing and Future Activism Among Ferguson and Baltimore Protesters. In *Sociological forum*, Vol. 34. Wiley Online Library, 409–433.
[16] Jerusha Conner and Sonia M Rosen. 2016. *Contemporary Youth Activism: Advancing Social Justice in the United States: Advancing Social Justice in the United States*. ABC-CLIO.
[17] Jerusha Conner and Amanda Slattery. 2014. New media and the power of youth organizing: Minding the gaps. *Equity & Excellence in Education* 47, 1 (2014), 14–30.
[18] Michael D Conover, Bruno Gonçalves, Jacob Ratkiewicz, Alessandro Flammini, and Filippo Menczer. 2011. Predicting the political alignment of twitter users. In *2011 IEEE third international conference on privacy, security, risk and trust and 2011 IEEE third international conference on social computing*. IEEE, 192–199.
[19] Juliet M. Corbin and Anselm L. Strauss. 2015. *Basics of qualitative research: techniques and procedures for developing grounded theory* (fourth edition ed.). SAGE, Los Angeles.
[20] Melvin Delgado and Lee Staples. 2007. *Youth-led community organizing: Theory and action*. Oxford University Press.
[21] Joseph DiGrazia. 2014. Individual protest participation in the United States: Conventional and unconventional activism. *Social Science Quarterly* 95, 1 (2014), 111–131.
[22] Kitsy Dixon. 2014. Feminist online identity: Analyzing the presence of hashtag feminism. *Journal of Arts and Humanities* 3, 7 (2014), 34–40.
[23] Silvia Dominguez and Celeste Watkins. 2003. Creating networks for survival and mobility: Social capital among African-American and Latin-American low-income mothers. *Social problems* 50, 1 (2003), 111–135.
[24] Nicole B Ellison, Charles Steinfield, and Cliff Lampe. 2007. The benefits of Facebook "friends:" Social capital and college students' use of online social network sites. *Journal of computer-mediated communication* 12, 4 (2007), 1143–1168.
[25] Invision Enterprise. 2011. *The digital product design platform*. https://www.invisionapp.com
[26] Pennie G Foster-Fishman, Kristen M Law, Lauren F Lichty, and Christina Aoun. 2010. Youth ReACT for social change: A method for youth participatory action research. *American journal of community psychology* 46, 1-2 (2010), 67–83.
[27] James L Furrow, Pamela Ebstyne King, and Krystal White. 2004. Religion and positive youth development: Identity, meaning, and prosocial concerns. *Applied Developmental Science* 8, 1 (2004), 17–26.
[28] Paolo Gerbaudo and Emiliano Treré. 2015. In search of the 'we'of social media activism: introduction to the special issue on social media and protest identities.
[29] Homero Gil de Zúñiga, Nakwon Jung, and Sebastián Valenzuela. 2012. Social media use for news and individuals' social capital, civic engagement and political participation. *Journal of computer-mediated communication* 17, 3 (2012), 319–336.

[30] Peter Gundelach and Jonas Toubøl. 2019. High-and Low-Risk Activism: Differential Participation in a Refugee Solidarity Movement. *Mobilization: An International Quarterly* 24, 2 (2019), 199–220.
[31] Jessica Hullman, Matthew Kay, Yea-Seul Kim, and Samana Shrestha. 2017. Imagining replications: Graphical prediction & discrete visualizations improve recall & estimation of effect uncertainty. *IEEE transactions on visualization and computer graphics* 24, 1 (2017), 446–456.
[32] Jelani Ince, Fabio Rojas, and Clayton A Davis. 2017. The social media response to Black Lives Matter: how Twitter users interact with Black Lives Matter through hashtag use. *Ethnic and racial studies* 40, 11 (2017), 1814–1830.
[33] Farnaz Irannejad Bisafar, Lina Itzel Martinez, and Andrea G Parker. 2018. Social Computing-Driven Activism in Youth Empowerment Organizations: Challenges and Opportunities. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, 183.
[34] Farnaz Irannejad Bisafar, Herman Saksono, Priscilla Baquerizo, Dana Moore, and Andrea G Parker. 2016. Youth Advocacy in SNAs: Challenges for Addressing Health Disparities. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. ACM, 3620–3624.
[35] Sarah J Jackson, Moya Bailey, and Brooke Foucault Welles. 2019. Women Tweet on Violence: From# YesAllWomen to# MeToo. *Ada: A Journal of Gender, New Media, and Technology* 15 (2019).
[36] Sarah J Jackson and Brooke Foucault Welles. 2015. Hijacking# myNYPD: Social media dissent and networked counterpublics. *Journal of Communication* 65, 6 (2015), 932–952.
[37] Sarah J Jackson and Brooke Foucault Welles. 2016. # Ferguson is everywhere: Initiators in emerging counterpublic networks. *Information, Communication & Society* 19, 3 (2016), 397–418.
[38] Louise B Jennings, Deborah M Parra-Medina, Deanne K Hilfinger-Messias, and Kerry McLoughlin. 2006. Toward a critical social theory of youth empowerment. *Journal of Community Practice* 14, 1-2 (2006), 31–55.
[39] Hao Jiang and John M Carroll. 2009. Social capital, social network and identity bonds: a reconceptualization. In *Proceedings of the fourth international conference on Communities and technologies*. ACM, 51–60.
[40] Kevin Johnston, Maureen Tanner, Nishant Lalla, and Dori Kawalski. 2013. Social capital: the benefit of Facebook 'friends'. *Behaviour & Information Technology* 32, 1 (2013), 24–36.
[41] Ichiro Kawachi, Lisa Berkman, et al. 2000. Social cohesion, social capital, and health. *Social epidemiology* 174, 7 (2000).
[42] Ichiro Kawachi, Bruce P Kennedy, and Roberta Glass. 1999. Social capital and self-rated health: a contextual analysis. *American journal of public health* 89, 8 (1999), 1187–1193.
[43] Alexah Konnelly. 2015. # Activism: Identity, Affiliation, and Political Discourse-Making on Twitter. *The Arbutus Review* 6, 1 (2015), 1–16.
[44] Julie Letierce, Alexandre Passant, John Breslin, and Stefan Decker. 2010. Understanding how Twitter is used to spread scientific messages. (2010).
[45] Hanlin Li, Disha Bora, Sagar Salvi, and Erin Brady. 2018. Slacktivists or activists?: Identity work in the virtual disability march. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, 225.
[46] Ben Light and Kathy McGrath. 2010. Ethics and social networking sites: a disclosive analysis of Facebook. *Information Technology & People* 23, 4 (2010), 290–311.
[47] Regina Marchi and Lynn Schofield Clark. 2018. Social media and connective journalism: The formation of counterpublics and youth civic participation. *Journalism* (2018), 1464884918807811.
[48] Douglas S McCall and Mary M Shannon. 1999. Youth led health promotion, youth engagement and youth participation: a research review. *Tobacco Control Unit, Health Canada. https://www. yumpu. com/en/document/view/25946368/youth-led-healthpromotion-youth-engagement-and-youth* (1999).
[49] Kaitlynn Mendes, Jessica Ringrose, and Jessalynn Keller. 2018. # MeToo and the promise and pitfalls of challenging rape culture through digital feminist activism. *European Journal of Women's Studies* 25, 2 (2018), 236–246.
[50] Ellen Middaugh, Lynn Schofield Clark, and Parissa J Ballard. 2017. Digital media, participatory politics, and positive youth development. *Pediatrics* 140, Supplement 2 (2017), S127–S131.
[51] Megan A Moreno, Natalie Goniu, Peter S Moreno, and Douglas Diekema. 2013. Ethics of social media research: common concerns and practical considerations. *Cyberpsychology, behavior, and social networking* 16, 9 (2013), 708–713.
[52] Matthew H Morton and Paul Montgomery. 2013. Youth empowerment programs for improving adolescents' self-efficacy and self-esteem: A systematic review. *Research on social work practice* 23, 1 (2013), 22–33.
[53] Stefanie Mueller, Dustin Beyer, Tobias Mohr, Serafima Gurevich, Alexander Teibrich, Lisa Pfistere, Kerstin Guenther, Johannes Frohnhofen, Hsiang-Ting Chen, Patrick Baudisch, et al. 2015. Low-fidelity fabrication: Speeding up design iteration of 3D objects. In *Proceedings of the 33rd Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems*. ACM, 327–330.
[54] Keith V Nesbitt and Carsten Friedrich. 2002. Applying gestalt principles to animated visualizations of network data. In *Proceedings Sixth International Conference on Information Visualisation*. IEEE, 737–743.
[55] Jeffrey Nichols and Jeon-Hyung Kang. 2012. Asking questions of targeted strangers on social networks. In *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work*. ACM, 999–1002.

[56] Jelena Obradović and Ann S Masten. 2007. Developmental antecedents of young adult civic engagement. *Applied developmental science* 11, 1 (2007), 2–19.

[57] Daphna Oyserman, Kristen Elmore, and George Smith. 2012. Self, self-concept, and identity. (2012).

[58] Melissa M Pearrow. 2008. A critical examination of an urban-based youth empowerment strategy: The teen empowerment program. *Journal of Community Practice* 16, 4 (2008), 509–525.

[59] Thomas Poell and José van Dijck. 2018. Social Media and New Protest Movements. In *The SAGE Handbook of Social Media*. SAGE Publications Ltd, 1 Oliver's Yard, 55 City Road London EC1Y 1SP, 546–561. https://doi.org/10.4135/9781473984066.n31

[60] Caroline Queiroz Santos, Holisson Cunha, Carlos Teixeira, Daniele Ramos de Souza, Roberto Tietzmann, Isabel Manssour, Milene Selbach Silveira, Marcelo Träsel, Duncan Dubugras Alcoba Ruiz, and Rodrigo Barros. 2017. Media professionals' opinions about interactive visualizations of political polarization during Brazilian presidential campaigns on Twitter. (2017).

[61] Scott Reeves, Mathieu Albert, Ayelet Kuper, and Brian David Hodges. 2008. Why use theories in qualitative research? *Bmj* 337 (2008).

[62] Carrie A Rentschler. 2017. Bystander intervention, feminist hashtag activism, and the anti-carceral politics of care. *Feminist media studies* 17, 4 (2017), 565–584.

[63] V Rideout and M Robb. 2018. Social media, social life: Teens reveal their experiences. *San Francisco, CA: Common Sense Media* (2018).

[64] Sherer W Royce, Deborah Parra-Medina, and DeAnne H Messias. 2006. Using Photovoice to Examine and Initiate Youth Empowerment in Community-Based Programs. *Californian Journal of Health Promotion* 4, 3 (2006), 80–91.

[65] Margaret Rundle, Emily Weinstein, C James, and H Gardner. 2015. Doing civics in the digital age: Casual, purposeful, and strategic approaches to participatory politics. *Youth and Participatory Politics Research Network* (2015).

[66] Caroline Q Santos, Roberto Tietzmann, Marcelo Trasel, Silvia Moraes, Isabel H Manssour, and Milene S Silveira. 2016. Can Visualization Techniques Help Journalists to Deepen Analysis of Twitter Data? Exploring the" Germany 7 x 1 Brazil" Case. In *2016 49th Hawaii International Conference on System Sciences (HICSS)*. IEEE, 1939–1948.

[67] Sanjay Sharma. 2013. Black Twitter? Racial hashtags, networks and contagion. *New Formations* 78, 78 (2013), 46–64.

[68] Herbert A Simon. 1955. A behavioral model of rational choice. *The quarterly journal of economics* 69, 1 (1955), 99–118.

[69] Marko M Skoric. 2012. What is slack about slacktivism. *Methodological and conceptual issues in cyber activism research* 77 (2012), 77–92.

[70] Brett Smith. 2018. Generalizability in qualitative research: Misunderstandings, opportunities and recommendations for the sport and exercise sciences. *Qualitative Research in Sport, Exercise and Health* 10, 1 (2018), 137–149.

[71] Stefan Stieglitz and Linh Dang-Xuan. 2013. Social media and political communication: a social media analytics framework. *Social network analysis and mining* 3, 4 (2013), 1277–1291.

[72] Egemen Tanin, Richard Beigel, and Ben Shneiderman. 1997. Design and evaluation of incremental data structures and algorithms for dynamic query interfaces. In *Proceedings of VIZ'97: Visualization Conference, Information Visualization Symposium and Parallel Rendering Symposium*. IEEE, 81–86.

[73] Rosemary Thackeray and MaryAnne Hunter. 2010. Empowering youth: Use of technology in advocacy to affect social change. *Journal of Computer-Mediated Communication* 15, 4 (2010), 575–591.

[74] Jennifer Tilton. 2010. *Dangerous or endangered?: Race and the politics of youth in urban America*. NYU Press.

[75] Panayiota Tsatsou and Yupei Zhao. 2016. A "two-level social capital analysis" of the role of online communication in civic activism: Lessons from the role of Facebook in the sunflower movement. *Social Media+ Society* 2, 4 (2016), 2056305116671967.

[76] Sebastián Valenzuela. 2013. Unpacking the use of social media for protest behavior: The roles of information, opinion expression, and activism. *American Behavioral Scientist* 57, 7 (2013), 920–942.

[77] Alcides Velasquez and Robert LaRose. 2015. Youth collective activism through social media: The role of collective efficacy. *New Media & Society* 17, 6 (2015), 899–918.

[78] Brooke Foucault Welles and Weiai Xu. 2018. Network visualization and problem-solving support: A cognitive fit study. *Social Networks* 54 (2018), 162–167.

[79] Sherri Williams. 2015. Digital defense: Black feminists resist violence with hashtag activism. *Feminist Media Studies* 15, 2 (2015), 341–344.

[80] Sherri Williams. 2016. # SayHerName: using digital activism to document violence against black women. *Feminist media studies* 16, 5 (2016), 922–925.

[81] Chaolun Xia, Raz Schwartz, Ke Xie, Adam Krebs, Andrew Langdon, Jeremy Ting, and Mor Naaman. 2014. CityBeat: real-time social media visualization of hyper-local city data. In *Proceedings of the 23rd International Conference on World Wide Web*. ACM, 167–170.

[82] Guobin Yang. 2016. Narrative agency in hashtag activism: The case of# BlackLivesMatter. *Media and Communication* 4, 4 (2016), 13.

[83] Wan-Shiou Yang, Jia-Ben Dia, Hung-Chi Cheng, and Hsing-Tzu Lin. 2006. Mining social networks for targeted advertising. In *Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS'06)*, Vol. 6. IEEE, 137a–137a.
[84] Sarita Yardi and Amy Bruckman. 2012. Income, race, and class: exploring socioeconomic differences in family technology use. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 3041–3050.
[85] Jonathan F Zaff, Oksana Malanchuk, and Jacquelynne S Eccles. 2008. Predicting positive citizenship from adolescence to young adulthood: The effects of a civic context. *Applied Development Science* 12, 1 (2008), 38–53.
[86] Ethan Zuckerman. 2014. New media, new civics? *Policy & Internet* 6, 2 (2014), 151–168.

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