

## **Environmental News Seeking and Sharing Behaviors of GenZ**

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## **Abstract**

Social media is important for sharing “sensational, sensitive, political, and causal information” in the digital world (Osatuyi, 2013). Climate change or environmental news seeking and sharing behavior is important to assess in order to promote collective action through individual’s perception of increasing their own social capital and helping communities affected by natural disasters in the real world. Younger people, GenerationZ, are said to be more open to using digital tools to engage in diverse conversations, engage with information and participate in civic and political action (Boulianne & Theocharis, 2020). We hypothesize that the diverse needs of GenZ based on their identity and psychological distance to natural disasters will significantly influence their information seeking and sharing behaviors through the passive and active use of social media and instant messaging applications. Social media and Instant Messaging (1) increase social capital, (2) provide affordance of aggregation, (3) and provide ubiquitous technology for GenZ users. Social Media possesses identity and social affordance critical for GenZ users who strive to increase their social capital. Critical Race theory is important in the emotional and participatory redesign of SM platforms, while featuring ways to connect users to relevant climate change information. Network Society theory is an important framework, across disciplines, that emphasize the significance of our qualitative research regarding the social media behaviors of GenZ.

## Introduction

The “news shapes our sense of the world” (Pariser, 2011). Environmental news, most especially climate change related news greatly differs from other fields as it is a global and long term problem. Climate change is a complex topic that is essentially “changes caused either directly or indirectly by human activities that change the composition of the global atmosphere and the variability of natural climate over comparable periods” (UNFCCC; Luqman, 2020). Many species on Earth, including human beings, face the growing threat of extinction (IPBES, 2019).

Within the U.S an increasing number of adults are using social media to acquire their news (Atske, S. (2022). This case must then be extremely true for adolescents, or Generation Z (GenZ), who are also referred to as “digital natives” (Moreno & D’Angelo, 2019). Generation Z and future generations will have to deal with the major consequences of climate change or global warming and not much research in the field of information technology has explored the mental models and information seeking behavior of young people ((Mead et al, 2012). Because climate change is a global phenomenon, “human-centered” technology must take into account Earth’s diverse population and people of color who are most vulnerable to socio-technical changes that are pushed by the HCI community. The Critical race theory framework must be integrated with HCI in order to ensure that institutional and social injustices are not perpetuated through timeless technology (Ogbonnaya-Ogburu, 2020).

In his recent book called “Climate Change is Racist”, Jeremy Williams links climate change media coverage and attention to the world history of racism. Williams argues that the Global South, specifically countries in the Caribbean, Central America, Africa, South Asia, are also extremely vulnerable to climate change because of their history of colonization by countries in the Global North (Williams, 2021). The Global North still continues to economically benefit, while feeling the natural shocks of climate change the least (Ulgen, 2021). Williams addresses that there is an overall empathy gap and information gap that makes countries in the Global South most vulnerable to climate change, which happen to also not by coincidence possess predominantly non-white populations and are the most economically poor (Williams, 2021; UNFCCC, 2007). He further discusses that People of Color (POC) lives and suffering are seen as worth less than white lives, and considers “Climate change is racial violence” that isn’t seen as such because climate change happens “gradually” and modern forms of racial violence are manifestations of invisible attitudes and perceptions (Williams, 2021).

The term the Global North is used to describe post-industrial/developed countries, while Global South refers to “emerging economies”/developing countries (Ulgen, 2021). Despite the Global North producing higher per capita CO2 emissions and holding responsibility for past and current emissions, the UN - mainly composed of these countries- puts pressure on Global South to take responsibility for reducing future emissions, thereby economically stunting the Global South through restrictive climate mitigation policies (Ulgen, 2021). The Global South not only faces an uphill battle for economic development, but also faces social, financial, and natural disaster challenges.

In this qualitative study, we conducted further research on the information seeking and sharing behaviors of Generation Z on social media regarding climate change activism and engagement (Anderson, 2007). How Generation Z uses social media to learn and share environmental news within their unique online communities has yet to be explored. Past HCI research has almost exclusively focused on social media platforms such as Twitter and Facebook, and past psychology and environmental science research have focuses on how to better communicate the social issue of climate change effectively to the general population (Moser & Dilling, 2007; Parry et al., 2022)

Research questions to be addressed :

- (1) Why are certain social media platforms favored in information seeking and sharing of natural disaster news in and out of the United States?
- (2) What social, psychological, and technological factors play into the behaviors of GenZ online?
- (3) What motivates GenZ to initiate and propagate information sharing online?

This study aims to integrate psychology, sociology, communication, information & (technology), and environmental science, as the field of HCI is influenced by multiple disciplines.

**Keywords:** Affordance, Emotional Design, Environmental News, Instant Messaging (IM), Information seeking behavior (ISB), Information sharing, Misinformation, Network Society Theory (NST), Social Networking Sites (SNS), Social Media (SM), Social Capital (SC), Ubiquity

## Literature Review

Schuldt & Pearson, argue that climate change is a social problem and promote research on assessing the diverse perspectives of racial the diverse perspectives of racial/ethnic minorities (POC). Compared to Millennials, GenZ are more likely to “indicate that they have friends from different backgrounds, races and beliefs” (Pearson, 2018). Thus in order to support climate change communication and information sharing, “individuals’ social group, locality, and lifetime” are important focuses (Spence et al, 2012). In contrast to a few arguments that GenZ are “technology addicts” who cannot communicate in the real world, while Boulianne et al. would argue that this assumption is false and that the nature of SM use only changed (Boulianne et al, 2020). It is crucial to study the behaviors of GenZ, as they present higher emotional gratification when using smartphones compared to older populations (Zhitomirsky-Geffet & Blau, 2017).

The salience of environmental news in social media is greatly dependent on location. The Global South, predominantly Latin America, Africa, South Asia, is greatly impacted by climate change but there is greater media coverage of natural disasters in the Global North (Hase et al., 2021). Media coverage of climate change is divided into 3 dimensions: Societal, Ecological, Scientific; 7 themes: Causes of & Solutions to Climate Change, Climate Politics, Awareness & Education, Impact on Humans, Economic Impacts, Climate Change & Impacts on Ecosystem, Climate Science; topics within themes; prevalent terms associate with each topics. Hase et al. concluded that most news coverage focuses on the societal dimensions of climate change, and most especially countries in the Global South [India, Namibia, South Africa, and Thailand]. Hase et al.’s focus was to operationalize issue attention by looking at the number of climate change related articles published within five countries in either global south or global north, with which they recognized that the themes identified are not entirely distinct from each other which may pose a study limitation (Hase et al., 2021). Despite Hase et al. only utilizing secondary research, their research provides a strong foundation for categorizing climate change information on social media.

## Computer-Mediated Communication

GenZ are natural “shiffters”, shifting between the “digital world” with which they carry on their smartphones and other electronic devices and the “real world” as they communicate and interact with others (Terzimehić et al, 2021). The portability of new devices, which becomes increasingly pervasive, lends itself to the ultimate ubiquity of technology. How GenZ use and what they use, passively and actively, determines how

positively proportional information acquired is to online participation (Arlt et al, 2018). GenZ smartphones (i.e., computers) enable Computer-mediated communication (CMC), such as social media (SM) and instant messaging (IM) applications (Lampe, 2015).

Social media can be formally characterized as a “bundle of applications” that allow for “direct user-to-user interaction”, given its “dependence on user generated content” (Lampe, 2015). This definition goes beyond Boyd and Ellison’s limiting term - Social networking sites (SNS)- which does not take into account non-professional and professional social user-generated content (Anderson, 2017, Boyd and Ellison, 2007). Anderson explains that there are two forms of social media - consumptive and expressive; GenZ can use SM passively as they seek information on climate change news or they can use SM actively as they are actively participating and sharing climate change news (Anderson et al, 2017; Boulianne et al, 2015; Gil de Zúñiga et al, 2012). Pearce et al. suggest that passive and active use of SM can give rise to diverse “platform cultures” that may be used to affirm an individual's identity (Castells, 2012; Pearce et al, 2019). Pearce et al. proposes a new concept called science and technology studies (STS) to understand how SM helps construct and inspire new ideas around climate change news across diverse online and offline communities” (Pearce et al, 2019). Though SM and IM support different types of “relationship maintenance” within the digital world and promotes social capital within the real world, the internet can create a “filter bubble” which Pariser warns information seekers to proceed with caution (Gil de Zúñiga et al, 2012; Pariser, 2011; Resnick, 2001)

In 1977, Gibson establishes the term “affordances” to illustrate the actionable properties that occur in what Koutamanis, 2023 calls the the “in betweenness” between GenZ and the digital/real world at the “precise connections between various part of an environment through protocols and interfaces” (Gibson, 1977; Koutamanis, 2023). While this may be detrimental for traditional news on tv, like CBS, FOX, and NBC, Berlemann & Thomas point out that these news shows are inclined to provide a biased perspective on climate changes impact as the tend to cover more disasters that occur closer to the United States (Berlemann & Thomas, 2019). A glaring limitation of most past research papers is that they tend to focus on traditional media or they tend to focus on one social media platform (Leiserowitz, 2010; Hase, 2021).

### **The Flow of Information**

ISB can be broken down into two categories: social information-seeking behavior and functional/cognitive information-seeking behavior (Zhitomirsky-Geffet & Blau, 2017). Compared to older users who align with more functional/cognitive information-seeking behavior, younger users are more inclined towards social information-seeking behavior (Zhitomirsky-Geffet & Blau, 2017).

Hamid et al. integrates Ellis et al.'s and Kuhlthau's definition to characterize information-seeking behavior (ISB). Information-seeking behavior includes Ellis et al.'s defined eight core sub-processes: starting, chaining, browsing, differentiating, monitoring, extracting, verifying and ending; and Kuhlthau's behavior stages: initiation, selection, exploration, formulation, collection and presentation (Ellis et al, 1993; Hamid et al, 2016; Kuhlthau, 1994). Hendricks et al.'s proposes that ISB is mainly motivated by "information insufficiency and a perceived normative pressure to be informed" (Hamid et al, 2016). Hendricks et al, like Pariser, also recognized the costs of having a plethora of information available to users online; individuals must proceed with caution and be aware of misinformation or what Hendrick et al.'s defines as "disinformation", the intentional spreading of "fake news" online (Hendricks et al, 2020). This requires CMC users to cross-validate information more frequently, using at least more than one source of information provided thru SM or IM (Metzger et al, 2010). Paralleling STS, within the field of psychology, Van der Linden et al. developed research to understand how misinformation is dangerous by distorting messages (Van der Linden et al 2017).

In addition to ISB, GenZ engage in information sharing behavior most frequently through SM and IM. Hendrick's et al, address how SM has become a vital source of information, especially to GenZ, and emphasizes how SM has transformed into a public forum for engaging with [climate change] science (Hendricks et al, 2020, Kim et al, 2014). Information exchange, now aided by algorithms, promotes trust when building and maintaining relationships, while inspiring more civic engagement (collective climate change action; this is also known as "Social Capital", which is more accessible due to ubiquitous technology (Lampe, 2015).

### **Other Relevant Research**

Elias et al. highlights how the pro-environmental orientations of Latino, African American, non-hispanic white, and Asian American consumers attitudes affect their reactions toward green practices such as eco branding, and their own identity, using Social Identity Theory as a framework to understand how these individual's identity

influences their community's identities and collective responses to climate change. Elias confirms that access to various types of "media channels and sources" has a substantial effect on attitudes toward eco branding, unique to each racial/ethnic group (Elias, 2020). They also acknowledge that while individuals may seek out more information about climate change they may have a predisposition to stand by their original opinions. Elias recognizes the limitations of their study, considering that this study was a one time survey with participants recruited online given little incentive to participate and the fact the majority of respondents were female. It is important to note that Elias et al. research analyzed this issue from a communications lens, and suggested future research directions to focus on the specific types of technology and media used to share information to a diverse population.

Another researcher, Benegal, while not specifically investigating the types of media employed, evaluates climate change opinions during Barack Obama's presidency from 2008-2016 (Benegal, 2018). Benegal acknowledges that it was first racial attitudes that started to spillover into public policies, then it was into the economy, and lastly climate change became more racialized during Obama's presidency (Benegal, 2018). Benegal's research focus leans more towards analyzing politics and race to understand attitudes towards climate change information and misinformation within the media, thus supporting the relevance of Castells's Network Society Theory. Research regarding race in relation to climate change lacks depth and needs to be further explored.

We hypothesize that the diverse needs of GenZ based on their identity and psychological distance to natural disasters will significantly influence their information seeking and sharing behaviors in the real world and in the digital world through the passive and active use of social media and instant messaging applications.



## Methodology

### Summary

To further understand the information seeking and sharing behavior of GenZ, we designed an explorative qualitative study. Selected participants were recruited from an online survey [Appendix A], and were invited to participate in a semi-structured, in-person interview [Appendix B]; this included an exercise [Appendix C] to explore emotional reactance from passively consuming climate change natural disaster related news in either the global south or north (US, India or China, Japan, Nigeria), preselected from BBCNew's Instagram feed. Selected Participants were asked to recall past natural disasters that occurred within the United States and internationally. We aim to explore the role of SM in climate change communication.

### Theories at play

There are a few relevant theories that have been established across psychological, sociological and technical fields that will aid in framing this study's research: (1) Construal Level Theory, (2) Appraised Emotion Theory, (3) Social identity theory, (4) Social Cognitive theory, and (5) Network Society Theory.

- (1) Construal level Theory (CLT) suggests that psychological distance may impact how GenZ perceive and interact with environmental news. Bar-Anon et al. identifies four main dimensions of psychological distance that range from a perceiver's actual direct experience, geographic, temporal, societal (Bar-Anon, 2006). Bar-Anon correctly hypothesized that "participants would respond faster with CLT congruent pairing than incongruent pairings", such that low construal levels expressed by perceivers are directly proportional to psychological proximity and high construal levels are associated with psychological distance to an object or event (Bar-Anon et al. 2006). In this case, high levels of construal would mean abstract thinking of climate change and its impacts, while low levels of construal would mean concrete thinking (Jones et al., 2016; Bar-Anon, 2006). Jones et al. applies Bar-Anon et al.'s research to understanding how psychological distance impacts how people view and react to climate change news, while ultimately seeking to improve climate change communication interventions (Jones et al., 2016). Interpolating Chu, younger people tend to be more susceptible to psychological distance impacting their construal of climate change events online, and therefore how, where, and

when climate change is communicated is vital (Chu, 2022). Chu et al. measured gender and age but did not consider race as a social construct that can influence emotions and empathy (Chu, 2022).

- (2) Appraised Emotion Theory (AET) suggests that Gen Z may have a higher emotional reactance to natural disasters occurring in their own proximal country rather than distal-international messages from outside of the U.S., and may lead to increased information seeking behavior online amongst these young individuals. It would be interesting to see whether proximal or distal messages on social media impact empathy of social media users across various racial groups within the United States (Jones, 2016; Bar-Anon, 2006). Chu & Yang recognizes that “emotions arise from people's evaluation and mental construal of their environment”(Chu & Yang, 2019). They take evaluation of emotions a step further and look at the appraisal theory dimensions: multirational relevance, pleasantries, responsibility attribution, coping potential with given events, and future expectancy. They measured (1) innate trait empathy, (2) perceived distance, (3) emotions, (4) concern about climate change, (5) policy support, (6) and pro-environmental intentions. If participants perceived climate change as socially proximal then they felt more negative concrete emotions such as anger, fear, sadness, and guilt. If they perceived climate change as socially distal then they felt more hope, an abstract emotion. In addition, this study found that these emotions: anger, anxiety, sadness, and hope lead to increased policy support and action. Chu & Yang argue emotional appraisal is an important factor to consider in addition to the four dimensions of psychological distance based on CLT (Chu & Yang, 2019).
- (3) Social Identity Theory (SIT) suggests that GenZ's sense of themselves as individuals converts into “communal identities” when they “embrace the interests of social groups they identify with (e.g., racial/ethnic, liberal, environmentalist groups) as their own”, either online and offline (Elias, 2020, Tajfel & Turner, 1986). This theory also provides reason as to why Critical Race Theory is necessary to acknowledge. A 2020 study found that non-Caucasians talked about their race more than Caucasians, when interacting with each other or others on social media ((Brinkman & Jacobi, 2020). If non-Caucasians are highly aware of their race on and offline, what does this imply for their risk perception of climate change representation of -Global South compared to Global North-based natural disasters in the media?
- (4) Social Cognitive Theory (SCT) posits that “individual behavior, personal factors and environmental factors constantly influence and determine each other bidirectionally” (Bandura, 1986). It is important to note that

while Social Cognitive Theory and Social Identity theory both relate to a person's sense of belonging in the digital and real world, SCT emphasizes measuring the cognitive processes in relation to identity and behavior.

- (5) Network Society Theory (NST) essentially combines SIT and SCT, while taking into account economic, political organization status, in addition to cultural, religious, and social status (Castells, 2012). Castell argues that these different statuses inform the “network society” that is based on information and communication networks that are facilitated by technology (Castells, 2012). Therefore it is crucial to understand the “needs, values, and interests of [GenZ ] who use the tech configuration of the relationships between technology, economy, and society”(Castells, 2012) .

[1] Race/ethnicity and [2] age were two important independent variables in this study. [1] Race/ethnicity & U.S. Citizenship: Addressing Ogbonnaya-Ogburu et al.'s call to anti-racism action by keeping Critical Race theory in mind while conducting HCI research, we prioritized collecting responses from a diverse group of individuals (Ogbonnaya-Ogburu et al, 2020) Leiserowitz and Akerlof discovered that POC, fully aware of personal costs, were observed to be the strongest supporters of climate change action (Leiserowitz and Akerlof, 2010). Because Schuldt & Pearson discovered that politics and content framing did not significantly affect POC beliefs regarding climate change, data on politics was not collected nor was there analysis of visual presentation of news on SM (Schuldt & Pearson, 2016). Furthermore, most Americans deem climate change as low priority due to psychological/emotional distance (Feldman & Hart, 2018). Thus we ensured that international students who are currently living in the U.S. have their voices heard as well. [2] Age: Generation Z: Shah et al. confirm that there is a difference in how SM impacts civic participation between young and older adults; further proving a need to distinguish GenZ adults (Shah et al, 2001).

### **Research questions (RQ):**

**(RQ1)** Why are certain social media platforms favored in information seeking and sharing of natural disaster news in and out of the United States?

**(RQ2)** What social, psychological, and technological factors play into the behaviors of GenZ online?

**(RQ3)** What motivates GenZ to initiate and propagate information sharing online?

### Qualitative approach reasoning

Past research regarding climate change news, social media usage, and user sentiment has mainly focused on using quantitative approaches of analysis. Major contributors towards understanding how socio-demographic factors play a role in climate change efficacy, within the fields of psychology, communication, and technology, have been Kahan, Leiserowitz & Akerlof, Tuitjer & Dirksmeier, and Elias et al. who have mainly used online surveys to collect big data. Pearce et al. recognizes the unfortunate limitations of conducting quantitative research. Regarding our topic of research, Pearce et al. argues that “Twitter is over-represented in the literature”, and due to the limitations of API’s only possessing partial access to Twitter’s data, the literature lacks “in-depth qualitative insights from social media” (Pearce et al. 2019). Pearce et al. urges for more research that looks into individual online communities and SM practices (Pearce et al. 2019).

### Sample

A sample of 84 GenZ students were recruited from an opt-in online survey through Qualtrics sent through email listservs within University of Michigan’s School of Information (SI) and School of Environment and Sustainability (SEAS). 15 participants between ages of 18-26 years old were selected; 14 pursuing either a master’s or doctorate and 1 pursuing a bachelor’s degree). We prioritized recruiting a diverse sample, as many POC are not included in environmental conversations; we took into account social backgrounds, citizenship status, and relations in or outside of the United States.

Sample Survey Questions	Responses from Selected Participants
Do you believe climate change is happening? Do you believe that human beings are major contributors to climate change?	Yes, Yes [All Participants]
What social media platforms do you use the most?	Instagram, Facebook, Reddit, Twitter, TikTok, Snapchat, Wechat,
How often do you use social media mobile applications?	ranging from rarely to very often
“I actively check the news” ..	4-6 times per week – daily

“I see myself as someone who cares about the environment” [Pro-environment orientation alignment]	neutral, somewhat agree, or strongly agree
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Participant ID	Program of Study	Citizen Status	Race/Ethnicity
1	SEAS	U.S. citizen	Black/African American
2	SEAS	International Student	Southeast Asian
3	SI	U.S. citizen	Black/African American & European
4	SI	International Student	Southeast Asian
5	SEAS	U.S. citizen	White/Caucasian
6	SEAS	U.S. citizen	White/Caucasian
7	SEAS	International Student	Hispanic/Latinx
8	SEAS	U.S. citizen	East Asian
9	SEAS	U.S. citizen	Hispanic/Latinx
10	SI	U.S. citizen	Hispanic/Latinx & European
11	SI	U.S. citizen	Southeast Asian
12	SI	International Student	East Asian
13	SI	U.S. citizen	Hispanic/Latinx
14	SI	U.S. citizen	White/Caucasian
15	SI	U.S. citizen	Black/African American

## Measures

CMC (SM and IM) usage and preferences, environmental news sentiment and perception, social network ties, emotional reactance to natural disasters, and other alternative sources of information were analyzed. In addition, we measured socio-demographic factors including race/ethnicity, age, location, education (Elias et al, 2019). While the information of participant’s gender was not collected, we collected data from both female and male presenting individuals.

**Psychological factors:** Risk perception, emotions/sentiments, self-efficacy, knowledge (Baron et al, 1994; Chu & Yang, 2019; Elias et al, 2019). These factors are said to be mediated by psychological distance as posited by Construal Level theory and Appraised Emotion theory (Chu & Yang, 2019; Jones et al, 2017).

Specific measures for user sentiment analysis were drawn from Nabi et al.. 25 emotions measured explicitly were four items related to fear: anxious, scared, afraid, worried; four items related to hope: hopeful, inspired, encouraged, optimistic ; four items related to sad: sad, upset, distressed,

disappointed; four items related to anger: angry, annoyed, irritable, frustrated (Nabi et al, 2018) .  
[Visual Exercise in Appendix C]

**Social Influence factors:** Social relationships, subjective norms, race, and age (Elias et al, 2019; Luqman, 2020; Leiserowitz & Akerlof, 2010; Mead et al, 2012).

**Technological factors:** There is little research regarding the technological factors influencing seeking and sharing of environmental news (Zhitomirsky-Geffet & Blau, 2017). Lack of information is our study's motivation.

### **Positionality statement**

The principal investigator (PI) of this study was a black, female. Self-reported responses of the individuals during interviews may have been impacted by social desirability bias. In addition, interpretation of users' sentiments and perceptions may be influenced by PI's socio-demographic background.

## Descriptive Analysis

### [A] Attitudes and behaviors related to information seeking and sharing range across Gen Z participants

GenZ Participants [P1-15] ranged in social media and sentiments when discussing their online interactions through social media and instant messaging applications on their smartphones. Supporting Pearson’s GenZ study, even though participants mainly referred to their smartphones, they did not mind using their laptop to seek information (Pearson, 2018). Participants used SM and IM to “support constant connectivity” with family, friends, and acquaintances who were geographically local or distant (Abowd & Mynatt , 2000). There is overall consensus and appreciation that social media has “made [GenZ] aware of [their] role in contributing to environmental movements or issues” (P11). This increase in climate change knowledge and awareness, is suggested to correlate with increased ISB and increased civic engagement, thus increasing social capital.

<b>GenZ Participant’s Social Media Behaviors &amp; Sentiments</b>			
a.	Strongly align [P13]	<b>Alignment with GenZ on SM (Sense of Belonging)</b>	Somewhat do not align [P14,15]
b.	Not Well Informed [P1,8,10, 13]	<b>Knowledge of Current Natural Disaster related news</b>	Well Informed [P3-7,9,12,14,15]
c.	Passive [P1,8,10, 13]	<b>Presence of SM</b>	Active [P10,11]
d.	Socially [P1-15]	<b>Seeking Information Online</b>	Cognitive/Functional [P9]
e.	Brief / Quick Info [P6,13]	<b>Preferred News viewed on SM</b>	Detailed, updated facts [P4,14]
f.	Open about opinions [P5,6,7,8]	<b>Self-Presentation on SM</b>	Cautious/ Private about opinions [P2,12]
g.	Positive [P7,9]	<b>Opinion of SM</b>	Negative [P2,8,14]
h.	Moderate [P4-7]	<b>Level of SM Interaction (liking, commenting, reposting)</b>	Little to none [P1,11,14,15]
i.	Not Interested or Avoided [P12,14]	<b>Seeking other Users Opinions Online (SM comments)</b>	Interested [P7-10,13]
j.	General followers and friends [P6,7,12]	<b>Comfort with Sharing Natural Disaster related news</b>	Specific friends and family [P9,10,12,14]
k.	Resistant to adopting new technology [P11,14]	<b>New IM or SM technology Adoption</b>	Open to embracing new technology [P8]

**Figure 1: The opposing sides that GenZ participants took when considering:** (a) Sense of Belonging felt by GenZ on social media; (b) Percieved level of climate change knowledge; (c) self-perceived general level of activity or engagement on SM; (d) general social vs cognitive/functional ISB on SM,(e) Information architecture of news viewed on SM (f) Openness/Caution to SM presence, (g) General SM opinions, (h) self-perceived level of SM interactions which are signals of attention like “liking, commenting, or reposting” a picture on SM, interest in knowing the opinions of SM users, (j) comfortability sharing news found

on SM to general followers or to close friends and family, (k) willingness of participants to adopt a new or case specific SM or IM applications.

**[B] Perception and sentiments regarding environmental news on Social Media ranges, depend on users psychological distance.**

Environmental/climate change news is considered low priority because it seems “inevitable”, unless GenZ and their social networks are directly impacted or the magnitude of a natural disaster is great [P15,P14]. Rationality for this phenomenon varied from desensitization to high emotional reactance (ie. surprisement, frustration, distress, disappointment, anger). Because “[climate change] happening all the time and all over” [P9], many participants feel “slightly desensitized” [P9,P11] and would not process climate change news as interesting or requiring action unless it grabbed their attention- either because of disaster severity or more people are posting about the disaster on more than one social media platform [P14]. Some users recalled feeling “angry and disappointed” when looking at “preventable and man made” natural disasters [P1, P15]. There is a great deal of discourse amongst scholars on whether fear is a motivating or dissuading factor in climate change information sharing and action (Nabi et al, 2018). While there is research proving that high levels of fear motivate people to think more critically about climate change and media outlets tend to glumly frame climate change with the intention of inducing fear and anger in their audience, there is also the downside of such emotions inducing feelings of hopelessness and therefore lead to decreased self-efficacy and engagement with climate change issues (Anderson, 2017; Baron et al, 1994; Feldman & Hart, 2018; Maran & Begottil, 2021; Mead et al, 2012; Molder et al, 2022). Leiserowitz & Akerlof also suggest that low engagement and efficacy is due to lack of people in the US feeling personally at risk (Leiserowitz & Akerlof, 2010).

Environmental news is considered controversial, and information sharing is avoided amongst certain individuals. P14 didn’t “agree that [climate change news] doesn’t get enough attention, they suggested that “politics and money” are the reason for “lack of [online and offline collective] action”. P15, on the other hand, recognized that “there are not that many active channels for discussion” or civic engagement; it appears that certain like “Instagram” [P13] are more geared to building connections on other matters besides climate change, “politics” [P13], or “negative” [P2] news.



Whether environmental news is too controversial to discuss in the digital world or the real world, climate change news sharing behavior heavily depends on each GenZ's family dynamics and attitudes (Mead et al, 2012). While P11's family (within the US and outside) was not open to conversations about politics given their "complicated political history, and political divides in family, P10's family "loves to get political" and mentioned that they discuss "political issues, societal issues, and it ranges to environmental news that are currently happening".

Most Participants, with one exception [P14], recognized that the way in which climate change is framed on Social Media is dependent on the geographic location of natural disasters and a few thought that there is a tendency for natural disasters occurring in the Global South to be over-sensationalized or lack depth compared to SM news in the Global North.

P1 noted that it's "tricky when it comes to liking international news, because unfortunately, our US media outlets don't do a good job of carrying it". The difference in sentiments on how SM portrays US and international news, can be explained partially by three out of the four dimensions of psychological distance: geographical distance from natural disaster occurrences, social distance to people affected in other places, and uncertainty regarding climate change as a whole and its specific impacts (Jones et al., 2017).

Participants either feel that they do not encounter enough information on natural disaster news abroad [P1] or they feel as if U.S. news media outlets focus more on climate change affecting other countries than the US [P8]. In this case, climate change awareness can be dependent on the algorithms that aggregate personalized news content on SM and therefore lead to stratification in knowledge and awareness across users within different online communities or with varying SM preferences. In addition to technology inducing bias, Berlemann & Thomas determined that biased media coverage by SM news accounts may be the reason for these GenZ participants' conflicting feelings as to whether natural disasters in different parts of the world are covered in depth online (Berlemann & Thomas, 2019) .

**[C] Particular GenZ participants can be characterized as "Proactive" or "Responsive", which then distinguishes their behaviors and motives regarding information seeking and sharing.**

Out of the 15 participants, many can be characterized as "Proactive" and/or "Responsive" - they increase their social capital by increasing their social interactions online [P1-4,6,7,10-13] (Mead et al, 2012). "Responsive"

information seekers, exhibited high perceptions of risk (“the degree to which they believed climate change posed a risk to human life from”) and also strong efficacy; participating in coalitions [P10], protests, actively blogging about environmental issues to spread awareness [P12], and even translating information from English to Spanish to reach a more diverse audience[P7] (Kahan, 2015; Mead et al, 2012). “Proactive” information seekers exhibited strong efficacy by sharing climate change information on their preferred SM platforms, but did feel moderately low risk in comparison (Mead et al, 2012) [P3,P6]. While P9, P14, P15, expressed high perceptions of risk, they demonstrated weak efficacy and can be characterized as “Avoidant” (Mead et al, 2012).

Many of the proactive/responsive participants (P1-4,7,10-13), also happen to be considered POC, which Elias et al. suggests that their social identity is also a motivator for them to actively engage with climate change news online and exhibit greater “instrumental media use” than “ritualized media use” than their peers (Elias et al, 2020). The latter, social ISB, was considered to be passive use of SM by most participants while cognitive/functional ISB was more associated with active use of SM.

Proactive or Responsive GenZ news seekers tended to seek information from a diverse range of sources and technology and made it their priority to engage in “cognitive/functional” or “active” information-seeking behavior (Zhitomirsky-Geffet & Blau, 2017). Motivations for cognitive/functional information seeking behavior were influenced by a general sense of responsibility, empathy, and past personal experiences.

Cognitive/functional ISB may be increased with social/group motivation and personal interests. Because “advocating for bipoc communities is definitely a priority”, P7 follows “Impact” on instagram because it is helpful for “speaking, or sharing awareness about communities of color and low-income families” [P7]. Some SM users are more intentional than others when it comes to engaging with more diverse news and will selectively curate their SM feeds to align with their personal and community interests. This selectivity may manifest into which news applications, in addition to SM, are adopted. P13 recounts using the New York Time app “at least once a day” to “read the headlines” alongside checking their emails for newsletters that they voluntarily subscribed to. In addition to alternative sources like podcasts [P1] and mobile news applications, “Proactive and Responsive” participants reported that they seek out information through email [P9,P13], youtube [P12], Alexa - virtual assistant technology [P4], and traditional news on tv [P12,14].

Proactive or Responsive participants feel a “responsibility to stay informed” and to share accurate information from “respectable” sources [P15, P7]. P2 aimed “to be as open to information as I can be” and when exposed to new information P7 was inclined to exchange information with others by asking “How can I help? Is there anything that you need or your family needs? Or if there's a outlet that I can like share that with other people like just to confirm that I'm not like given out like also the wrong information”. In general, most participants felt that their social circles in the real world positively influenced them to seek more information. Such circumstantial ISB, included searching for information on mobile devices while in a “conversation with friends” [P6] in order to “look up something while listening to what they’re saying so I can have more information in front of me, and sometimes people have different information”. Manifestations of ISB, particularly cognitive/functional, appear to inform the group while allowing individuals to increase their civic participation.

Reasons as to why proactive and responsive SM users engage in more cognitive/functional ISB may also be related to psychological and emotional ties created to a past disaster event of an affected close member of their community. Participants recognized that they were able to empathize more with people affected by natural disasters and recall more accurately news that they saw on SM, due to their past personal experiences [P3]. This contrasts to some participants who said “didn't know the full facts. I just knew the headline”, but were not personally affected or had any connections to past traumatic natural events [P13]. However, the difference observed in past experience or psychological distance, does not significantly impact the information seeking and sharing behaviors of individuals as long as they maintain the belief that the natural disaster event is a “salient issue” while feeling high levels of “impersonal risk” (Yang & Zhuang, 2020). Hence past hazard experience and psychological proximity to climate change issues is sufficient, but not necessary for active ISB (Yang & Zhuang, 2020). Kim et al. determined that when excluding intrinsic motivators, like past experiences, “expectations of positive social outcomes and sharing enjoyment” were powerful enough to encourage SNS users to share information online when they felt “knowledgeable” (Kim et al, 2015). In addition, during the visual exercise, many of the proactive and responsive GenZ participants, expressed feelings of hope and greater self-efficacy [P1,2,6,7,11-13,15]. Hope, a positive emotion, has been found to be a greater motivator than fear for individuals to actively engage with climate change information and participate online (Arlt et al, 2018; Nabi et al, 2018).

Other motivators, not discussed include: accuracy motivation, defense motivation, and impression motivation (Yang & Zhuang, 2020). While P6 and P11 explicitly recognized their need to be accurate in conversations with friends, they implicitly stated that they were also motivated to “maintain a positive social image” (supported by SCT); defense and impression motivations (Kim et al, 2015; Yang & Zhuang, 2020).

Proactive and responsive participants recognized the prevalence of disinformation online and were willing to cross-validate sources of information when seeking and sharing. Awareness of the importance of credibility included: “wanting to use AP news to get kind of as close to the source as possible” [P3], “checking Flipboard [mobile application] everyday, a news aggregator... put in only your interests, and then it'll aggregate different news from different sites” [P4], or “first going through Twitter and then smaller newspapers linked in posts” [P13].

The ISB of P2 and P3, align with Alfred et al.’s finding that 50% of students value SM content by journalists (Alfred et al, 2012). Alfred et al. also suggests that GenZ Sm users are more inclined to accept climate change news from their social networks, including their preferred journalists and their peers ((Alfred et al, 2012). As for the positive benefits of cross-validating online sources and peers, proactive/responsive study participants are able to then “conserve time and cognitive resources” (Metzger et al, 2010). It is important to note that Mead et al.’s research concluded that as long as individuals maintain “ positive attitudes toward environmental issues, high risk perceptions, and high responsive efficacy” then family influence and social status do not have a significant impact on their high ISB (Mead et al, 2012).

Ultimately, regardless of the type of motivation SM users utilize, combatting “information insufficiency” is their inherent goal (Yang & Zhuang, 2020).

#### **[D] GenZ participant’s active and passive use of SM platforms vary in level of activity and platform preference.**

Participants mainly preferred social media platforms (such as Instagram, Twitter, Tiktok, Snapchat, Reddit, Youtube, and LinkedIn) based on use case and specific platform features. Instagram is a SM platform that is mainly used to connect GenZ with close friends and as entertainment [P12]. Also, Instagram is noted to allow for “greater cross-pollination of content and conversation”, than Twitter because it does not restrict users to hashtags (Pearce et

al, 2019). According to Pew Research, 12% of US adults across generations use Instagram to seek news, and this statistic should be higher for GenZ (Atske, 2022).

Due to the time-sensitive nature of Snapchat, users feel a greater sense of privacy than on most other SM platforms. According to Pew Research, 4% of US adults across generations use Snapchat to seek news, and given Snapchat's target audience this statistic must be higher for GenZ (Atske, 2022). P14 preferred using Snapchat to share sensitive information because of the application's prioritization of discreteness as messages "disappear after 24 hours" [P14].

TikTok is most popular amongst young people (Sehl, 2020; Hautea et al, 2021). According to Pew Research, 3% of US adults across generations use TikTok to seek news, and given TikTok's target audience this statistic must be higher for GenZ (Atske, 2022). P3 feels like "I share funny TikTok more than serious TikToks [video clips], unfortunately, but I think it's because the content just made me feel really sad, and like, especially with like the floods. I get most information from TikTok and share TikTok the most [out of all SM platforms]" [P3].

Twitter, a SM platform overly represented in literature, is mainly used to spread information widely and is characterized as an "event-following" platform (Boulianne et al., 2020, Rogers, 2013). According to Pew Research, 15% of US adults across generations use Twitter to seek news, and given that the majority of study participants use Twitter this statistic must be higher for GenZ (Atske, 2022). P13 felt that Twitter allowed them to be "more vocal because I feel less pressure" to have followers and friends to agree with their options, and so they felt more comfortable "reposting about stories or news" [P13]. Another participant recognized the benefits of Twitter's algorithm which "updated them on event "hour by hour" without taking extra actions [P11].

Reddit is a social media platform that affords users anonymity, while incentivizing online participation with its voting feature. According to Pew Research, 6% of US adults across generations use Reddit to seek news, and this statistic should be higher for GenZ (Atske, 2022). P14 described Reddit as "a collection of reposted articles from like CNN" [P14] and suggested that the prime motivation for Reddit users to engage was to receive "more upvotes" [P14].

Expanding the definition of SM from Boyd & Ellison's definition of SNS, LinkedIn is a useful professional user-generated content platform that allows professionals to share information pertaining to their field of study and therefore perceived as more credible information (Anderson, 2017, Boyd and Ellison, 2007). According to Pew Research, 4% of US adults across generations use LinkedIn to seek news, and this statistic should be higher for older, professional GenZ (Atske, 2022). P2, a proactive SM user mentioned "having a lot of climate scientists on my

linkedin” which allowed them “to hear their perspective, even though I'm not talking to them. But they're posting their own perspective about the whole situation on a like, basically just live as things are happening” [P2].

Youtube is a video based social media platform, mostly used for passively and quickly consuming information. According to Pew Research, 23% of US adults across generations use Youtube to seek news, and this statistic should be higher for younger GenZ (Atske, 2022). P8 mentioned watching the “ NBC Nightly News on Youtube, or like John Oliver - is just hilarious, and I enjoy that it's like a way to get news in a comedic form. Nightly News is nice just because it's really fast” [P8].

When asked to elaborate on the social media platforms they used to acquire information, none of the GenZ participants mentioned using Facebook’s SM application. This is surprising as Pew Research reported that at least 36% of US adults seek news from Facebook (Atske, 2022).

In general, social affordances of SM applications with which participants feel comfortable using range from liking, commenting, posting/reposting, or little to no interaction. Many GenZ may feel inclined to post on SM, as a way to express their unique identity. Some participants intentionally avoid interacting on SM or self-restrict their interactions; P11 is “mostly a consumer, so barely comment on TikTok and personal Twitter”; P2 tried “not to put a lot of personal opinions out there”; while P14 will “never repost on Twitter. I'll like stuff on Twitter”. When it comes to sharing natural disaster news on SM, GenZ may be open but careful about what they post, either keeping in mind the desires of other users [P6] or maintaining a positive, reliable social image [P11]. P6 mentioned preferring to post “things that are very informative. I like good like infographics, if it can look nice, and then spread information without being too cluttered” and is very aware of their SM audience and their presence. While P1 has a more personal approach, I will share or see other close friends “ ‘hey Like, i'm doing okay, like, I have everything that I need’ ”.

The benefits of using SM include maintaining relationships without directly contacting individuals and passively collecting the opinions of others, on a larger scale compared to offline, real world interactions. This may look like “checking stories and posts, but not talking too much” [P11] or “putting out a story communicating with people around me” [P2]. Also as P2 expressed during interviews, comments viewed on SM platforms can influence a user’s perception on a climate change issue and provide “social cues about what content is good/bad, fair/unfair, or accurate/inaccurate”(Houston et al, 2011).

**[E] GenZ participant’s IM application preferences and usage is greatly dependent on U.S. local and international social influence.**

WhatsApp, Facebook Messenger, Viber, imessage, and WeChat are commonly used to communicate and share information with international friends, family, and acquaintances [P1,4,11,12,14]. And even though one participant does not use SM, they still manage to keep in touch with friends and family abroad using IM; demonstrating the international significance and relevance of IM compared to SM [P15]. Other IM applications used for communication include: Signal, Kik, and iMessage.

While Viber has been found to be the most functional IM and possesses the most features (excluding WeChat, which is specific to China), WhatsApp is the most popular IM because of its simple interface (Sutikno et al, 2016). In this case, aesthetic value of the interface outweighs the “functional affordance”, a factor that plays into how “messages are transmitted or saved” ((Moreno & D’Angelo, 2019). iMessage and Facebook Messenger are commonly used to communicate and share information with U.S. based friends, family, and acquaintances [P5, P12]. While in the real world, in person communication is still favored if users are presented the opportunity [P5]. IM is preferred for SM users who prioritize privacy [P14] and are not comfortable publicly expressing climate change news and opinions. P2 “shares [climate change news] with the people who were in the area, or who might be in the area, just to also make sure that they're okay, but also get there on knowledge of what's happening, knowing that they're closer to that place. And then they might have a better sense of what's happening” [P2]

**[F] The affordances of SM and IM applications, which both allow for CMC, tend to overlap and support each other.**

SM platforms like Instagram and Facebook act as both a space for social media and instant messaging [P10,P6]. For international students, P12 appreciates how WeChat has “all the information, all the message from it. So all the way from the text messages that you're talking, and you can do face time. You can post, read other folks -your friends. You can read the news. and “the there is a kind of like the browser extension [in app], so can view twitter or a website within the app & can have as many extensions as desired” [P12].

With the latest instant messaging applications such as Facebook messenger; the identity, social, cognitive, and functional affordances of IM compare to the affordances that SM provides GenZ users and can even enhance the

affordances of SM. This is with the exception that SM provides greater emotional affordance than IM, as “high[er] scalability of messages” enabled by functional affordances of SM can amplify the emotions of individuals and also larger communities (Moreno & D’Angelo, 2019). Almost all SM applications (Instagram, Facebook’s desktop platform, Twitter, TikTok, and Reddit), have built in IM technology (direct messaging) that allows users to engage with more directed and intentional user content. SM applications also allow users to send direct messages outside of its application through other SM or IM applications. Therefore IM is a mode for information transportation with which SM affordances can become more direct and personal.

According to Hautea et al., SM possesses emotional affordance because it “blends the political and personal, thoughts and feelings, into ‘affective statements that mix fact with opinion, and with emotion, in a manner that simulates the way that we politically react’ (Papacharissi, 2015)” (Hautea et al, 2021). IM is not “highly scalable”, because it is a directed form of communication that doesn’t “reach far beyond the initial intended audience” (Moreno & D’Angelo, 2019). So while this is one aspect in which IM lacks a degree of functional affordance, new improvements of IM allow for content to be “searchable” and for messages to hold “permanence” similar to SM (Moreno & D’Angelo, 2019).

As for identity affordance, SM “help with personal identity construction by enabling multiple channels for interpersonal feedback and peer acceptance” (Gil de Zúñiga et al, 2012). Online videos are an example of how SM and IM can afford users identity development (Gil de Zúñiga et al, 2012). Certain SM (TikTok) and IM applications, highly prioritize identity affordance through videos and photos. This is also why some applications (Snapchat) are categorized as both SM and IM, which allows users to “perform and express opinion[s]” (Gil de Zúñiga et al, 2012). Which explains why GenZ participants [P3,8,11,13-15] favor applications like Tiktok. Traditional SM applications are striving to cater to this preference - Instagram created Reels [P8] to compete against TikTok and Snapchat.

Regarding social affordances, design uses “signals” like “tagging, activity streams, user profiles, comments, rating & votes” that enable users to invest in their real world relationships (Donath, 2007; Kavanaugh et al, 2014; Lampe, 2015). The willingness of GenZ to engage with different signals on SM ranges as shown in previous sections **A1** and **D2**. These signals are also available in IM applications, like “mentioning others in group chats” [P14], “reacting to messages (with emojis) on Facebook messenger or iMessage, which you can’t do on Snapchat” [P14], and user profiles on WhatsApp or WeChat [P12].



Lastly, cognitive affordances (“using social media tools to expand one’s learning”) were recognized by all GenZ participants (Moreno & D’Angelo, 2019). IM’s cognitive affordances are direct and narrow avenues for learning. SM’s cognitive affordances provide wider and infinite avenues of learning. For example, TikTok was noted by P3 as being their main information source or aggregator for climate change and other types of news. The way that TikTok’s cognitive affordances are built “prompts users to engage content, not creators or friends” (Zulli & Zulli, 2020). Hautea notes that TikTok creates “publics [that] are inherently affective (Hautea et al, 2021).

With the constant technological fine-tuning of SM’s and IM’s social, emotional, identity, and cognitive affordances, the options for “explicit feedback between users” through signals increases with the innovations of CMC systems (Lampe, 2015). Hence, CMC systems have “led to a variety of avenues for collective action” which is critical for the improvement of climate change communication, ISB, and information sharing amongst GenZ and younger generations to come (Lievrouw, 2012; Hautea et al, 2021).

**[G] In order to seek and share environmental news, GenZ participants must overcome three main obstacles: (1) Technological barriers, (2) Self-presentation, (3) and the costs of assessing information.**

On both SM and IM, “the magnitude of the [climate change] issue is hard to capture in a single story” [P12], which lends to their inherent limitations. Technological barriers can make it even more difficult for users to find and share captured stories online. Internet access is not available to some individuals or communities within the US, which makes SM use difficult for some GenZ users within these affected communities; “sometimes, like my family, we cut our Internet to save expenses” [P7]. The incompatibility of Windows PC and MAC OS can hinder information sharing; “if on Facebook on desktop I will send links to myself thru Messenger to get it on the iPhone, (because I don’t have a MacBook)” [P11]. In P11’s case in order to overcome this barrier they had to use IM to share what they found on SM. Loading Speed of Application is important to GenZ who are used to instant gratification; when “Facebook Messenger is slightly slower to load - can feel it” [P14] so then GenZ user is dissuaded from using the application again because of its functionality.

In addition to lack of internet access, app loading/lagging time, and older generations disapproval or approval of certain SM behaviors, traditional news sought on TV acts as a barrier to specific and relevant information. P4 claims that “On TV, it feels like the news story repeats over and over again. It's kind of for a general audience. Sometimes you don't get the information that you're really seeking out. It's almost not detailed enough, and it's definitely slower

than social media”. While P7 “wish[es] it was kind of more updated quickly. People when they access via TV, then it's like a lot quicker to access than social media. Because maybe some folks don't have access to the Internet or a phone.” Traditional news on TV is considered to be a slower way to get information, despite its capability to reach a massive audience.

Self-presentation is important to GenZ and includes portrayal of authenticity, language proficiency, and privacy. GenZ, like other generations, have a healthy need for self-presentation. P2 described posting on Instagram, “details about my personal life. What's happening? Where am I going? What am I having? Where am I traveling? And that sort of stuff. Just basic updates, but nothing too personal”. While P2 did not explicitly say why they feel the need to share their daily experiences, Syvertsen & Enli would argue that they are struggling with the internal “dilemma of being authentically and genuinely present in real life versus being distracted by online devices” (Syvertsen & Enli, 2020). P2, like many other GenZ, aims to establish real and genuine self-images online as opposed to being “fake, unreal, and untrustworthy” (Syvertsen & Enli, 2020). On the other hand, other GenZ's aim to establish authenticity by being more private in the digital world and more present in the real world [P15]. According to Noelle-Neumann's Spiral of Silence theory, these GenZ “closely monitor their opinions and sentiments expressed within their environment (through social media networks) on their specific topic” which then dictates their level of active SM engagement (Noelle-Neumann, 1974; Tuitjer & Dirksmeier, 2021). Yang & Zhuang also recognize this as “defense and impression motivations” that confirms that these GenZ SM users wish to maintain a “positive social image” and thus aligns with SIT and NST (Yang & Zhuang, 2020). GenZ users then must engage in “audience management” on SM by controlling the amount of information they are willing to share (Moreno & D'Angelo, 2019).

Lastly, language can modulate climate change ISB and information sharing through SM and IM. P7 recounts that with their international family, “there's a language barrier, I'm not well versed in Spanish, so it's kind of hard to have more in-depth conversations with them”. P14 “noticed that some of them know how to write English better than they know how to speak it, writing that information is easier for me than speaking it with them” and so they prefer communication through texting on IM but still find it frustrating to have to rely on google translate to hold in depth conversations. P5, on the other hand, claims that video calling on IM is most useful, “when they have to explain, like a document more, if information is not in Spanish. Researchers, like Hendricks et al, also recognize the significance of language as it may affect the trustworthiness of someone sharing information online (Hendricks et al, 2020).

There are more personal costs of assessing information that GenZ SM information seekers and sharers must determine are worth their effort: credibility of information, psychological distance to information, and political sensitivity to information. This may present itself as frustration with disruptive, sponsored advertisements, to ill informed “friends that couldn’t even tell me what climate change is” [P9], to negative effects on mental health [P6, P7,P11,P14], to too controversial or sensitive topics preventing conversation and information on climate issues to freely flow.

Another factor that plays into GenZ user’s adoption of SM and IM applications is the social influence of their generation and of older generations. There is a generational divide over what SM and IM platforms are relevant for everyday, digital world interaction; “Facebook just doesn't have that much for me. It's a lot I don't know. I feel like more of my Parents' generation is really on it. So when I am communicating with my dad's family, and on my mom's side, we also have some family like in Germany and in Norway that occasionally - that's my primary means of communicating with them” [P6]. P6, like many other GenZ participants, does not like using Facebook or Facebook messenger and grudgingly uses it to keep up with older generations. Glass & Li discovered that “social influence is more important than perceptions of usefulness and ease of use in distinguishing between the non-adopters and adopters of IM”; so while some GenZ may argue that Facebook is slower and harder to use, the influence of their parents and other older family members can over power their attitudes toward certain applications (Glass & Li, 2010). This also aligns with the fact that their “perceptions of risk and efficacy closely married those are their parents”, and lends to the issue of whether GenZ are willing to engage in climate change related ISB and sharing online (Mead et al, 2012). There is also a generational divide regarding the high-emotional sentiments shared online. P14 claims that “social media has made the differences between GenZ (said to be too sensitive,emotional) and older generations [more apparent]; I think it's always been the same where the younger gen is viewed as "emotional". Social media just gave them [younger generations] more of a voice and because there are more younger people on Twitter vs Facebook”. There is constant discourse amongst older generations on whether the behaviors of GenZ online are appropriate or inappropriate. Older generations may disapprove of GenZ’s civic and political participation online and could try to dissuade them from using SM frequently.

Some solutions to mediating the negative effects of SM include SM app supplementation (“deleted TikTok, supplemented TikTok time with IG, just get the same content just months later” [P8]), taking breaks (“going through phases of

looking at news" [P8]), and using new Artificial Intelligence technology ("I'll probably be using things like Chat Gpt more often to now to get information" [P14]). These are all ways to protect users from cognitive overload and depression; Syvertsen & Enli characterize this short or long term behavior as "digital detoxing" (Syvertsen & Enli, 2020). GenZ SM users have different incentives that motivate them to overlook the costs of searching for credible and through abundant information and enable them to increase their social capital.

## Discussion

Social media and Instant Messaging (1) increase social capital, (2) provide affordance of aggregation, (3) and provide ubiquitous technology for GenZ users.

**[1] Social Capital:** Social Capital entails the (1c) trust that is built as people form (1a) relationships, and the prosocial behavior of (1b) civic participation within the real and digital world (Gil de Zúñiga. et al, 2012; Lampe, 2015)

(1a) Social Media's Identity and social affordances affords GenZ users a sense of belonging and a way for them to develop their identity in society (Moreno & D'Angelo, 2019). Social Media creates a community through its features that allow users to share their opinions in comment sections, post with hashtags that are common to particular social networks, like posts to show their support; the " system makes visible to the network that a relationship investment has taken place" (Donath, 2007). More importantly social media allows communities to share climate change information efficiently and help develop cross-communication between individuals and institutions (Kavanaugh et al, 2014). While Social media allows GenZ users to collect information to gain stronger, efficacious opinions in public affairs, the accumulation of social capital may not be equally available to non-Caucasian individuals and communities (Brinkman & Jacobi, 2020; Pearce et al, 2019). Brinkman & Jacobi suggest that "subsequent experiences of marginalized [POC] individuals are not valued in part because they contradict norms set by a Caucasian dominated culture", which implies that the concept of increasing social capital may be biased towards Caucasian SM users (Brinkman & Jacobi, 2020).

(1b) The sharing of information through social media allows users to form deeper connections with others and increases their shared knowledge (Gil de Zúñiga. et al, 2012). Social media also provides individuals the opportunity to access information outside of their real world social networks that is diverse and "non-redundant" (Ellisson et al, 2007; Granovetter, 1973). The effects of social media are similar to a positive feedback loop, in

which seeking climate change information leads to sharing information which contributes to greater information exchanges between SM users (Gil de Zúñiga. et al, 2012). SM posts going “viral” escalates this feedback loop and allows for individuals to quickly understand what kinds of information are most relevant at a certain time and can help motivate SM users to engage in active ISB and participate in civic action in a timely manner (Gil de Zúñiga. et al, 2012; Karine & Hemsley, 2014; Yang & Zhuang, 2020). In addition, from a psychological lens, “high-arousal emotionality is “key driver of viral social media posts” and of cognitive/functional ISB (Berger & Milkman, 2013; Hautea et al, 2021)

(1c) At the foundation of SM users creating social ties and engaging in civic participation lies “reciprocity and trust” (Gil de Zúñiga. et al, 2012). With Network Society Theory and the Social Identity Theory framing, individuals feeling a sense of belonging or community through SM enables them to merge their individual identity with communal identities (Elias et al, 2019; Gil de Zúñiga. et al, 2012). “Signals” in SM user interfaces, like commenting or liking a post, create trust and build relationships (Donath, 2007). Thus, SM signals are the physical manifestations of trust in the digital world which reflects trust in the real world; and ultimately increases SM users social capital when they seek and share salient climate change information, and increase their own knowledge and the knowledge of others. Yang & Zhuang’s study affirms that “sense of community and relevant hazard experience” with trust in social media bolsters this information exchange and increases social capital amongst individuals with share personal experiences (Yang & Zhuang, 2020).

“Time and space” are no longer important limitations to GenZ who aim to social capital built through SM and IM technology (Terzimehić et al, 2021). The effectiveness of SM to establish social capital depends on how GenZ utilize social media: consumptive or expressively (Anderson, 2017), instrumental vs ritualized use (Elias et al, 2020), and with either “epistemic motivation [or] social motivation” (Yang & Zhuang, 2020).

**[2] Affordance of aggregation:** From a more technical standpoint, the affordance of aggregation enables SM users to increase their social capital. Individuals can use social media to create communities or “virtual spaces” for information interaction in the digital world, or seek and share information that has been aggregated by other SM users (2a) or SM algorithms (2b) (Kavanaugh et al, 2014). More digital spaces to talk about and share information

regarding climate change news are needed and can be enhanced with AI algorithms. In the real world, schools can act as physical aggregators by “helping students find organizations as well as provide space to debate, organize, and express their political views” (Alfred et al, 2012; Maher & Earl, 2017). Since the early 2000s, we have grown to rely more on “human and software curators to determine what news we should consume” and is relevant to us (Pariser, 2011).

(2a) Information aggregated by humans is based on the “recommendations of people they trust” and the assumptions “that they intimately know the interests and needs of the people with whom they have strong ties” made by other SM users. (Alfred et al, 2012; Kim et al, 2015). One downside of this, is the possibility of “homophily” in which users are inclined to “validate their core beliefs” with the information they gather (McPherson et al., 2001).

(2b) Information aggregated by algorithms is based on “Real Simple Syndication (RSS) feeds from diverse internet sources” and allows for SM aggregators to be “continuously updated content on an automatic basis” while using user-generated information (Kavanaugh et al, 2014). Thus the concept of personalization of news feeds based on indicated user interests is ever growing. Two downsides of algorithms, highlighted by Pariser, are that SM users may get inundated with too much compiled information and suffer an “attention crash” or “filtered environments” (digital world) will decrease SM user’s curiosity and active ISB because they may no longer feel a sense of information insufficiency (Pariser, 2011). Another issue, within the frame of Critical Race Theory, is that algorithmic biases may reflect real world biases and therefore negatively impact racial minorities in online environments (Ogbonnaya-Ogburu et al., 2020).

**[3] Ubiquitous technology:** The interactions and relationships maintained in the real world are facilitated by the digital world, but are not totally dependent on online interactions (Ellisson et al, 2007). Now with presence of smartphones, wearable ICTs, virtual assistant technology, and “commonly used devices such as hand-held personal digital assistants (PDAs), digital tablets, laptops, and wall-sized electronic whiteboards” the pervasiveness of tech increased significantly since the early 2000s (Abowd & Mynatt, 2000). While GenZ are very aware of the negative impacts of SM, such as information overload and mental ailments (depression, fear, anxiety, stress and loneliness), GenZ SM users demonstrate capabilities of “self-regulation” (Syvertsen & Enli, 2020).

As for design and research implications, the functional and social affordances of location sensing technology and social network analysis should be explored to enhance social media applications, like Instagram. Instagram stories is a popular technology amongst GenZ, within the application, that could be used to push relevant

environmental news affecting users and/or their friends and family in a given location. With this automated function, GenZ will be able to better empathize with others affected by natural disasters in different parts of the world by decreasing psychological distance. Gustafson et al. affirm the idea of personal storytelling as an effective way to minimize psychological distance and to communicate climate change online (Gustafson et al, 2020). While this may increase negative emotions online or what Maran & Begottil call “climate anxiety”, this automation of information sharing may help disrupt filter bubbles that Pariser warns of (Maran & Begottil, 2021; Pariser, 2011).

## **Conclusion**

Social media is important for sharing “sensational, sensitive, political, and causal information” in the digital world (Osatuyi, 2013). Climate change or environmental news seeking and sharing behavior is important to assess in order to promote collective action through individual’s perception of increasing their own social capital and helping communities affected by natural disasters in the real world. We suggest that the identity, cognitive, and social affordances of popular SM applications like Instagram, TikTok, Twitter & Reddit amongst GenZ are reasons why certain social media platforms are favored in information seeking and sharing of natural disaster news in and out of the United States (RQ1). Psychological distance to climate change news, associated risk perceptions, mental health, misinformation, politics, and race are key factors that directly modulate the behaviors of GenZ online (RQ2). Self-presentation, social influences, and appraisal of emotions are key motivations for GenZ to initiate and propagate information sharing online (RQ3).

Social media and Instant Messaging increase social capital, provide affordance of aggregation, and provide ubiquitous technology for GenZ users. Social Media possesses identity and social affordance critical for GenZ users who strive to increase their social capital. Critical Race theory is important in the emotional and participatory redesign of SM platforms, while featuring ways to connect users to relevant climate change information. We hypothesized that the diverse needs of GenZ based on their identity and psychological distance to natural disasters will significantly influence their information seeking and sharing behaviors within their social networks through the passive and active use of social media and instant messaging applications.

## **Limitations**

This study was limited to a small student population within a highly educated community, and did not take into account diverse economic backgrounds. Future research should include non-student samples from more than one region of the U.S. (Kim et al, 2015). Education may play a significant role in SM use and social capital (Boulianne & Theocharis, 2020). This also lends to the limitation arising from exclusively studying a GenZ sub-population, who are “likely more open than the general population to our study’s sustainability advocacy messages” and are not skeptical of climate change’s existence (Ma et al, 2019; Nabi et al, 2018). In addition, there was insufficient data collected to make a strong connection between “empathy, perceived distance, and emotions” from this technologically focused qualitative study (Chu & Yang, 2019). Limitations of collecting self-reported information from participants contributed to this issue.



## Appendix

### Appendix A: Screener Survey

#### Seeking Environmentally Conscious Students

**Do you care about the current state of our environment and how climate change is addressed on social media?**

It is important for us to understand a broad range of experiences. Help us understand your background...

1. Are you at least 18 years old AND currently physically located outside the EU?
  - a. Yes
  - b. No
2. "I consider myself a pro-environmentalist [someone who takes proactive measure to protect the environment]"
  - a. Strongly agree
  - b. Agree
  - c. Somewhat agree
  - d. Neutral
  - e. Somewhat disagree
  - f. Disagree
  - g. Strongly disagree
3. "I actively check the news" ..
  - a. Daily
  - b. Weekly
  - c. Randomly or Infrequently
  - d. Only when my friends or family bring an issue to my attention
  - e. Not at all

[If screener criteria is met]

#### Questionnaire:

1. How old are you?
2. "I see myself as someone who cares about the environment"
  - a. Strongly agree
  - b. Agree
  - c. Somewhat agree
  - d. Neutral
  - e. Somewhat disagree
  - f. Disagree
  - g. Strongly disagree
3. Which race/ethnicity do you typically identify with?
  - a. [Short answer]
4. Which nationality do you most closely identify with?
  - a. [Short answer]
5. Which of the following best describes your relation to the US.
  - a. My parents as well as I are U.S. citizens.
  - b. I am a U.S. citizen, but one or more of my parents is not.
  - c. I am not a U.S. citizen.
  - d. I prefer not to say.
  - e. Other \_\_\_\_
6. Do you have any family or close friends who currently live outside the United States?
  - a. Yes
  - b. No
7. Do you have 3 or more close family or friends who live in another country?
  - a. Yes
  - b. No

8. Which country? (If more than one, please indicate the country in which you have the most connections.)
  - a. [Short answer]
9. Do you believe climate change is happening?
  - a. Yes
  - b. No
  - c. I am not sure
10. [If yes, 9] Do you believe that human beings are major contributors to climate change?
  - a. Yes
  - b. No
11. Personally, do you think that you are well informed or not about...
  - a. The different causes of climate change
    - i. Very well informed
    - ii. Fairly Well informed
    - iii. Not very well informed
    - iv. Not at all informed
  - b. The different consequences of climate change
    - i. Very well informed
    - ii. Fairly Well informed
    - iii. Not very well informed
    - iv. Not at all informed
  - c. Ways in which we can reduce climate change
    - i. Very well informed
    - ii. Fairly Well informed
    - iii. Not very well informed
    - iv. Not at all informed
12. Have you ever taken these steps or plan to take steps to address climate change or help the environment?  
[Check all that apply]
  - a. Turn off the lights when not in use
  - b. Turn down the heat
  - c. Try to save water
  - d. Walk or cycle short distances instead of going by car
  - e. Buy things that are likely to involve less energy or resource use
  - f. Pay a bit more for environmentally friendly products
  - g. Avoid charging mobile phones overnight
  - h. Turn off the stand-by button of the TV set or switch appliances off at the plug
  - i. Use the manual opening doors instead of pressing the button for automatic opening
  - j. Use rechargeable batteries
13. How much do you think global warming will harm:

[Matrix]	Not at all	Only a little	A moderate amount	A great deal
You personally				
Your family				
Your Community				
People in the US				
People in other modern industrialized countries				
People in developing				

countries				
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14. How often do you use social media mobile applications?
  - a. Never
  - b. Rarely
  - c. Sometimes
  - d. Fairly often
  - e. Very often
15. [if yes, 14] What social media platforms do you use the most?
  - a. Instagram
  - b. Facebook
  - c. Twitter
  - d. TikTok
  - e. Snapchat
  - f. Other\_\_\_\_
16. What email address would you like to be contacted by for a possible interview?

## **Appendix B: Interview Protocol**

Hello, my name is Fisola and I am a graduate student at UMichigan's School of Information. I am currently conducting research on the information seeking behavior of GenZs in regards to environmental issues and climate change. I wanted to meet with you to learn about how you view yourself in relation to environmental issues, how you search for information, and how you see yourself amongst your peers.

Before we start, it is important for you to be aware that your responses will be kept confidential and anonymous.

Lastly, this interview is completely voluntary. If you feel uncomfortable continuing, we can either skip a certain question or end the interview at any moment; there will be no repercussions. If later on you would like to exclude something you said, we will erase it from our records.

This interview will be split into two parts: a traditional interview and a figma board instagram exercise.

Do you have any questions for me before we continue?

And may I record this interview session?

Okay thanks! I would like to thank you again for taking your valuable time to meet with me.

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### **Part I - Personal Connections**

To start off with, I am interested in how people communicate with their families and friends abroad. In your screener you indicated that you had family/friends abroad.

1. How often do you keep in touch with your family or friends living abroad?
2. Are there any times, which you talk about politics or natural disasters that are occurring?
3. How do you usually communicate with them?
  - a. Why do you use that form of communication (app)?

- b. Are there any other ways in which you would prefer to keep in touch?
  - c. Thinking about your communication, what are some of the barriers?
4. What do you think works well?
5. What do you think doesn't work well?

## **Part II - Individual Recall**

Next, I would like to learn more about your past experiences with climate change related news. I would also like to further explain what is considered a natural disaster. Examples of natural disasters include earthquakes, landslides, volcanic eruptions, floods, hurricanes, tornadoes, blizzards, tsunamis, cyclones, and wildfires.

(1) When was the last time you read, viewed, or sought, in some depth, news about a natural disaster in the United States?

(2) When was the last time you read, viewed, or sought, in some depth, news about a natural disaster in [the country you named in Q8 of the Questionnaire]? (Or, if they didn't name any country, then any non-U.S. country.)

1. What was the natural disaster?
  - a. Where/when did it take place?
2. Did you actively seek out information about this event or did the information come to you passively through conversation with others or a notification?
  - a. [If actively searched] Why did you want to learn about the natural disaster?
3. What was your gut reaction or initial feeling when you learned about this natural disaster?
4. Did you have some personal connection to the natural disaster, friends or family ?
5. What do you think were the contributing causes of the natural disaster?
  - a. To what extent, do you believe climate change played any role in causing the disaster or its results?
6. Did any of the above affect how you think about climate change and its eventual impacts?
7. How do you decided what type of information you share and when?
  - a. How much information do you share usually?
  - b. Are you more open to discussion on environment online in digital world or real world?
8. When do you usually check your phone for news in a given day?
9. What was your initial reaction or feeling when you heard about the news
10. If any, who did you share what you learned with others?
  - a. Who?
  - b. How did you share this knowledge with others?
  - c. If you don't usually share facts with others, what do you think about sharing what you learned?
  - d. What social media platform would you feel most comfortable sharing on and why?
  - e. What issues would you share with close friends on social media ?
  - f. What types of issues or news would you feel comfortable sharing with your general followers on social media?
    - i. What issues would you feel uncomfortable sharing with your followers on social media
11. Are there any country specific websites that you use to search?
  - a. If so, are they reliable enough for you to share with your friends or family?
  - b. Do you cross-check these websites or articles that you find?
12. How have you considered acting on the knowledge you gained?

## **Part III - Examples on Instagram**

Now I will present 4 past BBC news posts on Instagram describing different natural disaster events across the world that occurred in 2022.

**1. Imagine you are talking to your family members or friends based in Japan, and they share news that someone they know was affected in some way by major flooding.**

**2. Imagine you are talking to your family members or friends based in Nigeria, and they share news that someone they know was affected in some way by major flooding. You then happen to see this post [printed image] come across your instagram feed.**

**3. Imagine you are talking to your family members or friends based in China or India, and they share news that someone they know was affected in some way by major flooding. You then happen to see this post [printed image] come across your instagram feed.**

**4. Imagine you are talking to your family members or friends based in Florida, and they share news that someone they know was affected in some way by major flooding. You then happen to see this post [printed image] come across your instagram feed.**

**[Card Exercise: Imagination]** Would you mind looking over these cards here and placing colored stickers on the feelings that most align with how you feel about climate change, given the context of this natural disaster?

- a. Four columns of choices:
  - i. four item related fear: anxious, scared, afraid, worried
  - ii. four items related to hope: hopeful, inspired, encouraged, optimistic
  - iii. four items related to sadness: sad, upset, distressed, disappointed
  - iv. four items related to anger: angry, annoyed, irritable, frustrated
- b. Could you further elaborate on these feelings and why you believe you feel them?

You then happen to see this BBCNews post [printed image] come across your instagram feed.

1. Link: <https://www.instagram.com/p/B3mRK9pH6mO/?igshid=YmMyMTA2M2Y%3D>

2. Link: <https://www.instagram.com/p/CjuoYebNc9l/?hl=en>

3. Link: India: <https://www.instagram.com/p/Cd5SprjlkfW/> or China: <https://www.instagram.com/p/CfO7AWUDnqw/>  
[half of participants viewed India post]

4. Link: <https://www.instagram.com/reel/CjH8Q3BDEii/?igshid=YmMyMTA2M2Y=>

**[Card Exercise: After viewing IG post]** Would you mind looking over these cards here and placing colored stickers on the feelings that most align with how you feel about climate change, given the context of this natural disaster?

1. What immediately came to mind when you saw this [image of post]?
2. How familiar is this disaster to you?
3. Could you describe who you would imagine to be most affected by this disaster?
4. What website or application would you cross-check this information with?
5. How would you share this post?

Which post was: \_\_ and why?

1. Most familiar
2. Least familiar
3. Most Intense
4. Least Intense

**Part IV - Reflection**

1. How do you think your background impacts your thinking?
2. How do you think environmental news is different from other topics of news?
  - a. What topics do you currently prioritize?
  - b. Why do you think that climate change news is slow to implement actual change?
3. Do you feel like you belong to GenZ cohort?
  - a. Online vs in person

I will stop the audio recording now.

Thank you for taking the time to answer research questions. You will be compensated \$35 for your participation. You should receive it within the following week.

Do you have any questions for me?

**Appendix C: Instagram Exercise**

1. Per Participant

1.

1.

2.

2.

3.

3.

4.

4.

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