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Role of Social Media in Coping with COVID-19 Stress: Searching for Intergenerational Perspectives

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Abstract. The COVID-19 pandemic has accelerated demand for screen-mediated social connections. The drivers of digitization of socialization are often young and social-media savvy individuals who wish to alleviate the stress of social isolation for seniors. To design successful programs, it is important to first consider intergenerational differences in both the experience of COVID-19 stress, and the affordances of technology. In this mixed-methods study, we aimed to investigate perceptual differences in how social media can assist older adults (65+) cope with the COVID-19 stress. Data was obtained from two sources: A snow-ball survey (conducted between April - Sept 2020, n=595); and scraping the public comments on mainstream media's articles focusing on senior's coping with the COVID-19 (7 sources, and 3390 valid comments). Quantitative analysis of age-related differences in attitudes towards social media, and changes in media usage after pandemic (in <25, 25-34, 35-54, 55-65, 65+ groups) indicate significant differences in what, why and how different age groups use the social media. Qualitative analyses of the comments indicate intergenerational misunderstandings about one another's coping needs. In general, older adults indicate to be less vulnerable to COVID-19 stress than the younger generation and technology is not their main resource for coping with the social isolation. Nevertheless, communication technologies such as Zoom emerged as important for younger generations connecting to their parents and grandparents. While technology plays an important role in keeping older adults connected, it does not address the stress of losing time to be together in reality. These findings suggest that with the exception of Zoom, the affordances of other social media for older adults have not changed from before the pandemic.

Keywords: COVID-19, Older Adults, Stress, Social Media, Zoom, Intergenerational, Appraisal.

1 Introduction

1.1 Background

The COVID-19 pandemic has created an abrupt and forceful thrust of several generations into a common stressor: an age-discriminating infectious disease, with age-dependent socioeconomic consequences of mandatory "social distancing". Among the many, social isolation, especially of older adults (defined as those aged 65+) has become a major concern. Indeed, emerging data suggest that social isolation is a remarkable additional health risk [1-6].

In 2020, information and communication technologies (ICTs) accelerated their penetration in the daily lives of many, especially older adults, for whom these technologies have become a necessity for connecting to services and maintaining safe social relations.

We experienced the stress of disconnection firsthand, as the mandatory lockdowns forced us to halt all our participatory-research activities, which specifically aimed to address the question of creating intergenerational communities through various modes of self-expression and communication. In 2019, we set up the 'engAGE Living Lab Créatif' (ELL) in a shopping mall in the Cote Saint-Luc District of Montreal with high percentage of seniors. The aim of ELL was to serve as a hub to connect university researchers who study different aspects of aging (urban planning, engineering, cognition, healthcare, leisure, public practice arts therapies, etc.) with the stakeholders (seniors and their caregivers).

A cost-free, open-door, inclusive and creative cultural milieu, ELL was set up as an Art Hive, a multimedia space equipped with materials for making art (textile, painting, photography, photoshop), and a Media Spa for experiencing art (films, games, VR systems). The pandemic forced us to move all our interactive space to Zoom, and social media. In this context, we sought to investigate the potentials and barriers of communication in the digital era, primarily, focusing on intergenerational understandings of the affordances of social media for seniors in the context of coping with COVID-19 stress and isolation.

1.2 Previous Related Work

The affordances of social media for older adults have been studied extensively. In a mini-review in 2013, Leist showed that at the time, there was resistance among older adults to adopt social media for several reasons ranging from discontent about the (lack of) social norms to concerns about privacy, or personal relevance and control [7]. However, in a 2014 study by Dumbrell and Steel, they showed that six months after training older adults to use Skype, Twitter and Facebook, more than 77% of the 110 participants found them beneficial for finding information, 65% found them important for sharing information, and more than 64% found them safe to use (with respect to their privacy concerns) [8].

Connecting with the younger generations is also an important motivation for older adults to use social media. In a qualitative study of Technologies in Later Life (TILL) in 37 rural older adults in 2020, Freeman *et al.* showed that to remain connected to

younger members of their family (be it to share experiences with grandchildren, appease them, or just to stay in touch for practical reasons) is a key motivation for using social media [9].

Nevertheless, the TILL study also revealed important impediments in adoption of communication technologies, stemming from inadequacy of interfaces and instructions, as well as from misunderstanding of the actual needs of seniors for such technologies, often introduced to the lives of older adults by their children [9].

In fact, the penetration of social media in older adult population remains low. As the Pew Research Centre's survey [10] illustrates, despite the steady growth of social media use among those 65+, a significant intergenerational gap remains, in the percentage of population that use them (**Fig. 1**). This raises an important challenge for those who, like us, need to create social media spaces for intergenerational communication.

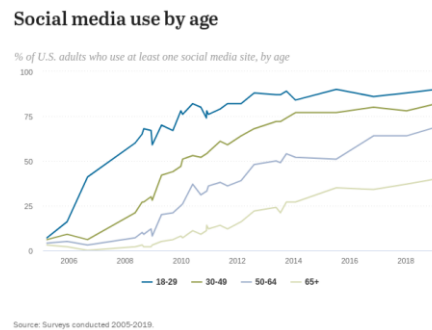


Fig. 1. Age-related differences in social media use. Source: Pew Research Centre. Retrieved Feb 2021. <https://www.pewresearch.org/internet/fact-sheet/social-media/>

While the question of acceptability of social media is frequently asked, less is done to design modes of interaction that foster comfortable and mutually satisfying intergenerational experiences. Most design studies focus on creating accessible and attractive user experiences in relation to presumed cognitive and physical abilities of older adults [11], or try to maximize their use and gratification--reiterating general assumptions about their cognitive and perceptual limitations [12]. In other words, the question of age is often addressed in either a biological and functional context, or in relation to psychosocial harms or benefits, without attention to the circumstances in which certain technologies become meaningful [13].

1.3 Importance of 'Generationing' in the Context of COVID-19 Stress

Social media is a place where the co-presence of different generations occurs naturally, but this means that this space must respond to needs arising from different life cycles (e.g. school, work, or retirement), accounting for differences in culture (arising from historical memories experienced across generations) [14]. Nicoletta Vittadini emphasized the importance of considering the concept of generation in media studies, as tied to their shared histories, media landscapes and social participation in dramatic life events (e.g. WWII, the fall of Berlin Wall or the 911 attacks).

In the context of this global and unprecedented life event involving an infectious disease, the generational divide is both related to the life cycle and to culture. In terms of life cycle, older adults are more vulnerable to contracting COVID-19, the schools are interrupted for the young, and the work-life balance has shifted for the majority of adults who need to care both for the elders and for the young. In terms of culture, older generations have richer historical memories, different communication tools, and different media-grammar styles. Therefore, because the nature of stress experienced by different generations is different, the ways in which they adopt media to cope with those stressors are likely to be different as well.

1.4 Generational Differences in COVID-related Social Media Use

Social media both exacerbates and reduces the burden of COVID-19 [15-20].

In a cross-sectional telephone survey in Hong Kong (May-August 2020), Wong *et al.* (2021) examined the associations between social media use and anxiety symptoms in 3421 adults aged 60 years and older. They found that the use of social media for COVID-19-related information was associated with more anxiety symptoms that predicted lower social trust in information and higher COVID-safe behaviours [21].

Boursier *et al.* (2021) surveyed a sample of 715 adults (18-72 years) to examine the relation between loneliness, anxiety, and excessive social media use. They found that perceived feelings of loneliness predicted both excessive social media use and anxiety. In their study, excessive social media exacerbated anxiety levels, especially in younger adults [17].

Similarly, Zhong *et al.* (2020) surveyed 2185 participants from 30 provinces across China, who were the first to experience the COVID-19 outbreak in the world, showed that although using social media did not cause mental health issues, it mediated elevation of stress, anxiety, depression, and traumatic experiences, especially in those living in big cities compared to those living in rural areas [18]. An interesting finding of this study was that socioeconomic and demographic factors determined what kinds of support the users sought from WeChat: Younger high-income high-education female participants sought information, but older high-income high-education participants sought more emotional support.

In a survey study in 650 adults conducted prior to COVID-19, Khalili-Mahani *et al.* (2019) found a positive correlation between emotional and perceptual stress and increased dependency on screen-mediated activities, especially social media for younger adults [22]. A follow-up survey in the aftermath of the COVID-19 North-American shut-downs in March 2020, showed that there was a causal relationship between COVID-19 stress and increased usage of certain media technologies, with significant demographic and intergenerational differences in which types of media were preferred for coping. One interesting observation in that study was that while age-related differences in social media dependence were not significant, the differences in appraisal of their usefulness or stressfulness across different age groups were significant [23].

1.5 Research Objective and Rationale

In studying the relation between media use and stress, it is essential to account for interindividual differences in perception of, and coping with any given stressor.

Specifically, in designing media-based interventions to relieve the burden of physical or mental stress, we advocate for a process that starts from data-driven approach to identify the patterns that emerge from voluntary interactions of different people with different modalities that fit their needs or interests [24].

Survey studies are the first informative step as they reveal the commonalities in patterns of specific behaviors or sentiments related to the motivations or outcomes of coping via media. However, survey studies cannot account for specific contexts or perspectives experiences by their participants. Such knowledge is usually obtained from qualitative research studies, that explore patterns of salient behaviors or beliefs emerging from extensive conversations with a small study sample (e.g. [9]) or from small conversations with a larger group of participants in specific programs (e.g. [25]).

In both cases (survey or narrative studies), what participants share is structured and guided by specific research questions and governed by the ethical constraints that frame the implicit or explicit relationships between the researcher and the participant. As such, both participants and researchers are self-prohibiting in what they express. In studying psychosocially contentious issues such as intergenerational relations in the midst of a global pandemic (that threatens different age groups differently), the patterns of 'noise' that emerge in public discussions on an issue constitute important data. To this end, social media provides an important site for research.

Hence, in order to gain a timely perspective on the issue of using screen-based intergenerational community-building, and communication, we tapped into the mainstream media's response to the question of senior's coping with COVID-19 stress.

Specifically, we sought to investigate the patterns of intergenerational exchanges that emerged around the topic of stress, coping and communication technologies in order to identify the benefits, barriers, and opportunities. To address these questions, we re-analyzed our previous survey [26] with specific attention to age-related differences in avoiding or approaching the social media in relation to COVID19 stress. We also examined public comments on social media posts addressing the question of senior's coping with COVID-19 stress.

2 Materials and Methods

2.1 Cross-Sectional Snowball Survey Study

Data Collection.

Data presented in this report provide a new perspective of the survey study that we published earlier [23]. The minimum sample size (384) was calculated based on a 5% margin of error and a confidence level of 95%. We obtained 595 complete answers. The survey was distributed via email lists and social media.

Social Media Use and COVID-19 Stress.

Because it was important to deploy the survey in the early phase of the pandemic, we created a brief survey that took less than 5 minutes and avoided administering extensive psychometric scales for stress measurement. Instead, we simply asked to rate the level of stress experiences as a result of COVID-19. In addition, we asked participants to rate whether they were worried about physical or mental health of increased screen-usage as a result of the pandemic ('Yes I am worried', 'I am a little worried', 'No, I am not worried', 'I don't know').

To assess attitudes toward social media in the context of COVID-19 stress we asked participants to state their opinions ("Definitely true," "Somewhat true," "Not really true," "Definitely false," or "I don't know") about the following statements: (1) *I use social media to be connected while social distancing*, (2) *social media connects me to what is happening in the world*, (3) *COVID-19 news and social media posts overwhelm me*, (4) *social media spreads false information about COVID-19*, (5) *Following COVID-19 news gives me a sense of knowledge and control*, (6) *I try to avoid the COVID-19 news as much as I can*.

In addition, we asked respondents to indicate whether their usage of media (Facebook, Instagram, Twitter, Print Media, Telephone and Video conferencing had changed after the COVID-19 lockdowns ('increased', 'decreased', 'stayed the same', 'rarely use it.')

Age information was collected as a categorical variable: <25 (n=75, 79% female), 25-34 (n=131, 75% female), 35-54 (n=166, 77% female), 55-64 (n=99, 78% female) and >65 (n=124, 70% female).

Statistical Analyses.

Survey statistics are presented in terms of within-group percentage of response frequencies to each question and results are plotted using Likert charts. One-way Kruskal-Wallis analysis of variance is used to investigate the statistical significance of age-related differences on dependent variables (COVID-related changes in changes in pattern of usage; and COVID-related attitude towards social media.)

2.2 Surveying Social Media Comments

In order to obtain more organic data about the opinions of different users of social media on the topic of helping seniors cope with stress through technology, we canvassed the internet for any articles with topics related to older adults coping with COVID-19 stress.

Fig 2. depicts a summary of the social media data mining procedures which involved targeted investigation of general public's interactions with mainstream media content accessible to our local community (Montréal residents). Details are presented below.

Targeted Mainstream Media Search.

We searched major media outlets with global readership (such as The Guardian, The Wall Street Journal, New York Times, The Washington Post, CNN, and Fox News), as

well as Canadian (The Star and CBC), and Montreal newspapers (Le Devoir, Le Soleil, and The Montreal Gazette).

We searched any articles published between March 2020 and September 2020 (corresponding to the dates of our survey study) with the terms "Senior" OR "Older Adults" OR "Elderly" AND "technology" AND "coping" AND "Covid19" AND "<the name of the media outlet>". The retrieved list is presented in **Table 1**. Articles that did not have any social media engagement were excluded.

Scraping Social Media Comments.

We focused on three sources of public engagement with articles: comments on the Facebook pages of the media outlet, comments on Reddit, and comments on the permanent websites of the articles. Data from Facebook was scraped using FacePager, a python based open-source application for automated data retrieval or on the main article website. Data from Reddit was scraped using Simple Scraper to extract all comments. Comments on the main websites were small and were copy pasted into our datasheets.

Two raters examined all comments and cleaned the data to exclude irrelevant content, such as single response words, advertisements, unrelated political commentary and performed qualitative analysis on the remaining 3390 cases.

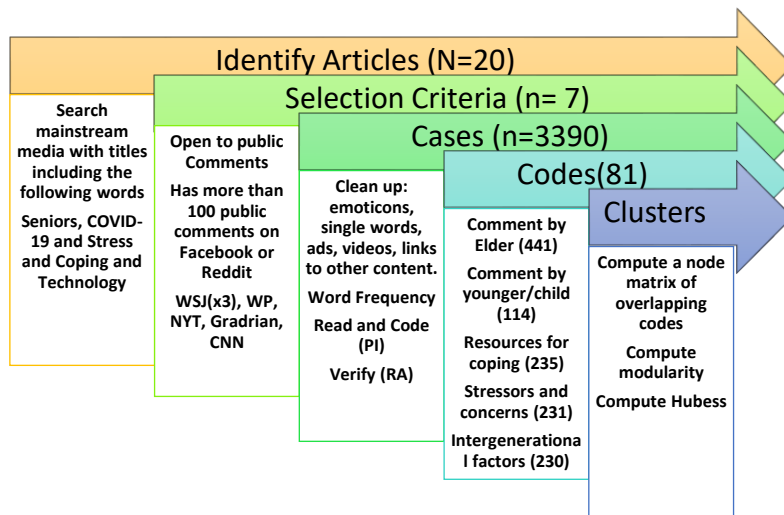


Fig. 2. Overview of Social Media Data Mining Procedure

Table 1. Mainstream media articles about older adults coping with COVID-19 (retrieved between April 2020-Sept 2020)

<i>Title</i>	Source	Date of publication	# of comments
<i>Ways Older Adults Can Cope With the Stress of Coronavirus</i>	WSJ	Mar 28 2020	2500
<i>The grandparents who dropped everything to help during COVID</i>	WSJ	Dec 27 2020	315
<i>For isolated older people, pandemic is 'a cruel event at this time in our lives'</i>	WP	May 9 2020	226
<i>These seniors are turning to cutting edge technology to stay connected during the pandemic</i>	CNN	Jul 14 2020	216
<i>Ok Zoomer: how seniors are learning to lead more digital lives</i>	The Guardian	Apr 30 2020	212
<i>It's Grandparents to the Rescue for Stressed Working-From-Home Parents</i>	WSJ	May 5 2020	133
<i>Just What Older People Didn't Need: More Isolation</i>	NYT	Apr 13 2020	129
<i>Coronavirus pandemic: How to help senior citizens</i>	NBC	Apr 24 2020	NA
<i>Seniors who struggle with technology face telehealth challenges and social isolation</i>	CNN	Jul 23 2020	NA
<i>Call Grandma: Survey shows older adults want more family connection during pandemic</i>	MSN News	Apr 13 2020	NA
<i>Elderly citizens stuck in isolation reflects poorly on all Canadians</i>	Toronto Star	May 21 2020	NA
<i>Staying engaged with a parent during isolation just takes a little creativity</i>	Toronto Star	Jun 19 2020	NA
<i>In the pandemic, technology has been a lifesaver, connecting them to the outside world. But others don't have this access.</i>	Washington Post	Aug 3 2020	NA
<i>Internet could help isolated seniors out of their loneliness</i>	Deutsche Welle	Mar 7 2014	NA
<i>From Lockdown to Loneliness: Old Age in the Age of Coronavirus</i>	Haaretz News	May 3 2020	NA
<i>Elderly more worried about others than themselves during pandemic - study</i>	Jerusalem Post	Jun 2 2020	NA
<i>La technologie, remède pour rompre l'isolement des aînés</i>	Le Soleil	Apr 11 2020	NA
<i>La santé des aînés intéresse les géants de la technologie</i>	Le devoir	Jan 21 2019	NA
<i>Se maintenir à domicile grâce à la technologie</i>	Le devoir	May 25 2019	NA
<i>Coronavirus: How can we stay in virtual touch with older relatives?</i>	BBC	Mar 18 2020	NA

2.3 Qualitative Content Analysis

Model-Free Content Analysis.

Qualitative analyses were done using NVivo for Mac (2020, QSR Inc.). We first explored the word-frequency of the comments on each article. Because of thematic similarity, we merged comments from two articles dealing with elder isolation. In addition to default stop words (transition verbs, pronouns, adjectives, prepositions), we also removed words like "people", "just", "like" and verbs unless they conveyed a specific meaning in relation to the subject of our inquiry (e.g., "connect", "play", "miss", "lose").

Word frequency was depicted using word-clouds in order to identify the most salient themes emerging from readers interaction with the content of the article.

Thematic Coding.

Comments from each of the included media outlets (3900 cases) were coded at two stages. First, we created the following general categories:

Who commented: 'Elder' node was used to code whether the person who commented considered themselves as targeted by the article as a 'senior'. The 'Younger' node was used to code whether the person who commented referred to examples of a senior person (e.g., their parent, grandparent, older friend, family member, etc.).

Generation: Any comments that referred to one or other form of intergenerational relationship, be it actual care for one another (e.g., grandparents take care of grandchildren, or anyone having an opinion or thought about another generation) were coded under this node.

Resources: Any comments that referred to one or other form of coping mechanisms (be it conceptual, e.g., beliefs, or practical, e.g., specific activities) were coded as resources.

Concerns: Any comments that expressed a skeptical, anxious or worrying opinion about the ramifications of the COVID-19 pandemic were coded under this node.

In the second reading, we coded any specific coping strategies that were explicitly stated by commenters. we also coded concerned generational expectations or interactions as they emerged in the comments.

Emerging Themes from Social Media Comments.

We used a network visualization strategy, similar to the method described in [27] in order to examine the overlap in thematic categories emerging from the qualitative content analysis of the comments. The four major themes were further sub-coded to provide a more detailed view of specific topic categories discussed in the comment. This revealed 81 thematic categories (nodes), which we have presented hierarchically in the results section. We then created a node matrix whose cells indicated the number of times that any two theme categories (nodes) were expressed in the same comment. This node matrix can be understood as a correlation matrix which can be represented as a network, with the weight of an edge corresponding to the number of co-occurrences of any two nodes.

We then used the software Gephi 0.9.2 for computing the network modularity (i.e., network components that were more likely to form a community of interconnected nodes). We also computed eigenvector centrality (which is a measure for detecting networks hubs, i.e., nodes that have the highest degree of connectivity, not only in terms of the number of other nodes that are connected to them, but how far reaching those connecting edges go). For the purpose of illustration, network communities are depicted with different colours and the font size of the node label (weight logarithmically) corresponds to the centrality of the node.

3 Results

3.1 Survey Results

Subjective Perception of COVID-Related Stress.

Fig. 3 depicts the age-related response frequencies to the questions of subjective feelings about COVID-19. We draw attention to the fact that the number of older adults (65+) taking the survey was larger than the younger older adults (55+) and the youngest respondents (<25). We did not find any statistically significant age-related differences in subjective feelings about COVID-19 ($\chi^2_{(df=4)} = 6.92, p=.14$). In all age categories, more than 91% of the respondents were concerned about COVID-19. However, it is worth noting that reporting themselves as 'Very Stressed' was most frequent in those in 25-34 year age group (36%), and least frequent in the 65+ age category (21%).

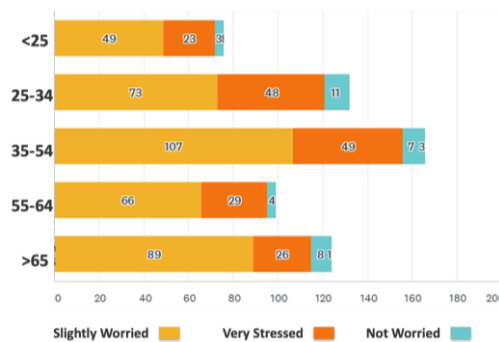


Fig. 3. Age distribution of the sample and the number of responses to the question: "Which one of these statements best describe how you feel about the COVID-19: 'I am ...'". We also provided the option of "I am excited about it" (selected by 1 in <25 and 65+ and 3 in 35-54 categories).

COVID-Related Changes in Media Usage.

Fig. 4 depicts that patterns of change in media use after COVID-19 lockdowns. Kruskal-Wallis tests did not reveal any statistically significant differences in age groups in relation to the patterns of change in using Facebook ($\chi^2_{(df=4)} = 4.43, p=.35$); Telephone ($\chi^2_{(df=4)} = 2.6, p=.62$). Across all ages, the likelihood of increasing Facebook use was higher than remaining unchanged or decreasing. However, age-related differences in using Teleconferencing, Twitter and Instagram were all significant ($\chi^2_{(df=4)} > 10, p=.02$), mainly driven by the fact that these were less used by older groups, with the exception of Print media that was more likely to have increased in older adults ($\chi^2_{(df=4)} = 18.6, p<.001$). All age groups significantly increased their teleconferencing activities (Zoom, Facetime, Skype, etc.). Those younger than 35 were more likely to have increased their Instagram use.

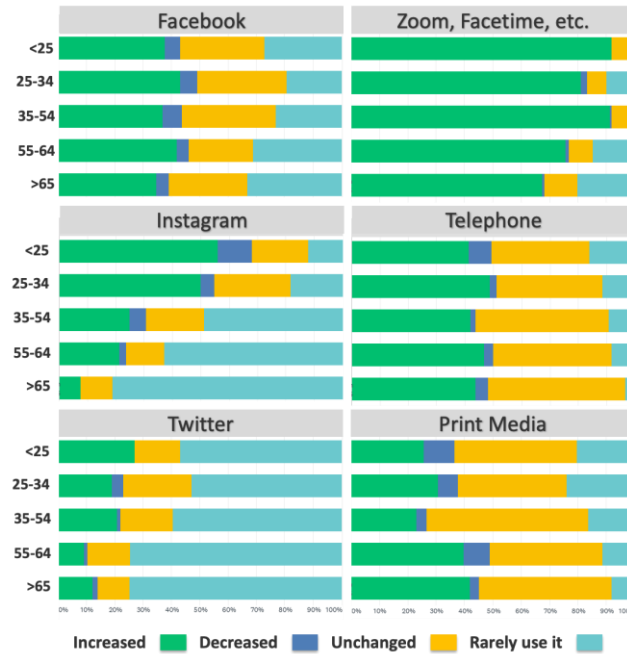


Fig. 4. Patterns of change in media use across different age categories. The Likert chart depicts percentage of responses within each age category.

Age related Differences in Reasons for Using Social Media.

Fig. 5 depicts different age-group's relation to social media content related to COVID-19. Kruskal-Wallis test revealed significant age related differences in all questions: Connection to Global News ($\chi^2_{(df=4)}=25.2$, $p<.001$); Alternative Connection While Social Distancing ($\chi^2_{(df=4)}=18.5$, $p=.001$); Provides Knowledge and Control ($\chi^2_{(df=4)}=29.8$, $p<.001$); Avoid COVID-19 News ($\chi^2_{(df=4)}=29.3$, $p<.001$); Source of Fake and False News ($\chi^2_{(df=4)}=13.1$, $p=.01$); Overwhelms Me ($\chi^2_{(df=4)}=42.5$, $p<.001$).

The following age-related patterns are noteworthy:

1. Compared to the 65+ age group, the youngest group had significantly higher reliance on social media for Connection to Global News; for Alternative Connection While Social Distancing. At the same time, compared to the 65+ age group, the <25 group also had significantly higher negative appraisals (Avoid the News, and finding the content Overwhelming, and finding it as a Source of Fake and False News.)
2. Compared to the younger generations, the 65+ age group had significantly higher reliance on social media for gaining Knowledge and Control, and significantly less reliance on it for Alternative Connection While Social Distancing. This was consistent with the observation that more than 45% of this age group did not Avoid the COVID-19 News, and that more than 20% of this age group did not know whether Social media was a Source of Fake and False News.

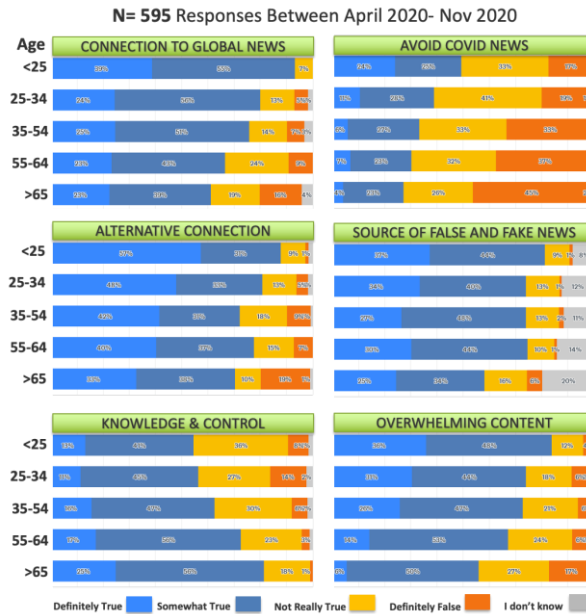


Fig. 5. Patterns of personal beliefs about positive and negative aspects of social media in the context of COVID-19. The Likert chart depicts within-group percentage of responses to the following questions: *Social media connects me to what is happening in the world (Connection to Global News)*; *I use social media to be connected while social distancing (Alternative Connection)*; *Following COVID-19 news gives me a sense of knowledge and control (Knowledge and Control)*; *I try to avoid the COVID-19 news as much as I can (Avoid COVID News)*; *Social media spreads false information about COVID-19 (Source of False and Fake News)*; *COVID-19 news and social media posts overwhelm me (Overwhelming Content)*.

Mainstream Media Outlet's Coverage of the Senior's Stress

Fig. 6 illustrates the frequency of words detected in comments on the mainstream media articles. Word clouds are generated from the first 1000 most-frequently used words. The purpose of this exploration was to detect whether there was a high prevalence of referring to social media technologies as a coping strategy. This was not the case. In the WSJ's article providing advice about *Ways Older Adults Can Cope with the stress of Coronavirus*, reading emerged as the most frequently used word (e.g. reading the news, the bible, books, blogs). Even in articles that were specifically talking about technologies of communications for assisting older adults while social distancing (e.g. The Guardian's *Ok Zoomers! How seniors are Learning to lead more digital lives*), discussions focused on Computing (often in the context of rejecting the 'ageist' notion that seniors were technologically naive). In the context of intergenerational connections (WSJ's articles about *The grandparents who dropped everything to help during COVID-19*, or *It's grandparents to the rescue of stressed working-from-home parents*, the usage of technology (mainly Zoom or other teleconferencing tools) was how older generations supported their children and grandchildren (e.g. by virtual schooling or virtual baby-sitting.)

Generations: When the topic of intergenerational relations was raised in the comments, the most salient theme was the resilience of older adults in the face of the pandemic. Those who identified themselves as the senior audiences of the media expressed more concern for the younger generation, indicated their contribution to de-stressing their children and grandchildren, and also rejected ageist notions that presumed seniors lack self-efficacy. In general, there were more comments about the value of the wisdom gained through living hardships prior to COVID-19, and about the 'weakness' of the young, as well as acknowledgement from seniors that the young working adults bore the brunt of the burden of the pandemic (employment, economy, child-care, and care for older parents--when the comments came from those who identified themselves as a child or caregiver to a senior).

Resources: References to existing and effective coping strategies was the most salient of all themes in the comments. The most common resource was family, friends and community. Numerous activities were listed as coping strategies, especially walking, gardening, reading, finding the time to learn new things. Culture (collectivism, mentioned comparatively to individualism) and religion were also mentioned as resources that made going through the pandemic easier. Technology (especially teleconferencing tools such as Zoom, WhatsApp and Skype) were mentioned often as one of the many other tools for coping, with its value being mainly in connecting individuals socially (especially to their families).

Concerns: Relative to the number of comments discussing resources, there were fewer comments about concerns. The most salient concern was lack of social connections, especially loss of time to be together with grandchildren. When the disease COVID-19 was a health or economic concern, it was often in reference to worrying about the well-being of the children in the workforce, or about the acceptance of the necessity of lockdowns for keeping safe or blaming the politicians.

Co-occurring themes: In order to better understand the interrelations between the emergent themes, we performed a network analysis and partitioned it based on modularity. Fig. 8 depicts the themes that were more likely to cluster together. The network modularity was low (0.163) meaning that there were overlaps in edges that connected the nodes of each community. The font size of each node corresponds to the eigenvector centrality of the node, meaning the importance of the node in the entire network. This partitioning revealed three communities:

The first cluster (depicted in orange) included nodes corresponding to comments by elders, resources (activities, family, and wisdom and resilience). The second cluster included comments by the younger, community, connection and technology, specifically Zoom, phone, and issues of accessibility of technology to older adults (whether comment by or about Nerdy elders, or inaccessibility of technology). In the third cluster, concerns about loneliness, isolation and lost time co-occurred.

The low modularity of the network suggests that there was a significant co-occurrence of different themes (meaning that the clusters are interdependent). For example, the theme "Ageism" had connections both to the Elder and to the Younger nodes. Or Technology, which was a central hub in the second cluster was also linked with Resources and Generation which were important hubs in the first cluster.

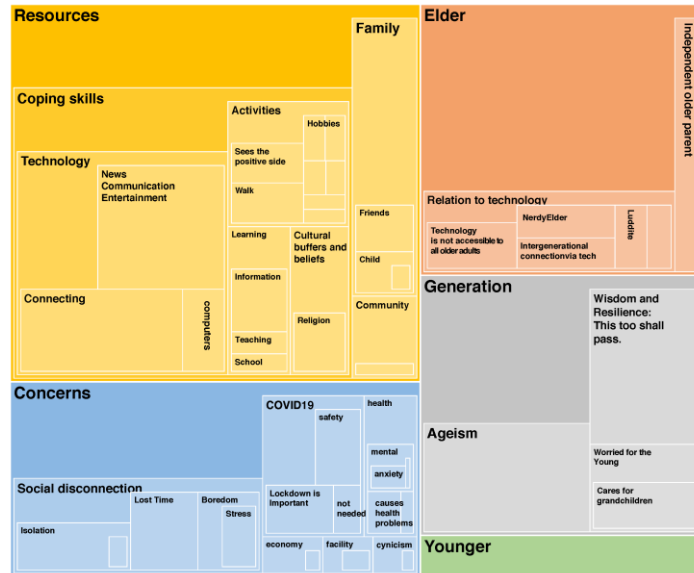


Fig. 7. Hierarchical representation of coded content from Social Media comment scraping.

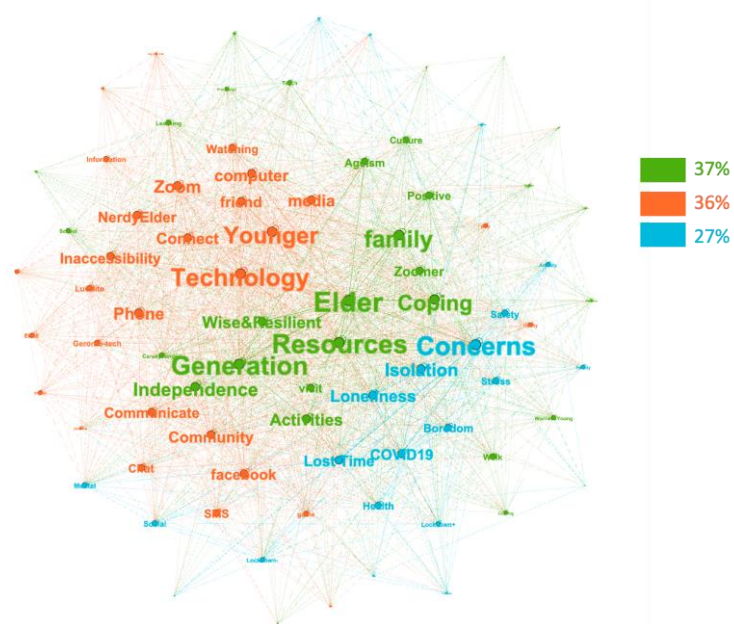


Fig. 8. An exploratory network analysis to assess the overlap between themes. Colors represent network partitions emerging from computing modularity ($Q=0.16$, weighted by edge).

4 Discussions

In the aftermath of the COVID-19 pandemic, socializing distantly, via Zoom and social media, became the only available option for us to continue our intergenerational activities in ELL. In that context, we examined intergenerational understandings of how seniors can cope with COVID-19 stress and isolation. Focusing on social media, in an anonymous survey, we asked questions about the relevance of social media to coping with COVID-19, and also scraped social media comments on mainstream media articles that dealt with the topic of "seniors" and "coping" with the "stress of COVID-19".

4.1 Principle Findings

Older adults were less stressed, less dependent on, and less skeptical about social media

We conducted two independent inquiries about COVID-19 stress and social media, and they both suggest that older adults are not particularly stressed about COVID-19 nor overly dependent on technology for coping with it.

We observed significant generation-related effects from the survey indicating that those older than 65 years of age were significantly less stressed than the younger groups, and used social media differently (for knowledge and gaining a sense of control) than the younger group (using it mostly as an alternative source of connection while social distancing.)

Similarly, scraping the social media comments did not reveal any significant expression of feeling stressed; *au contraire*, the pandemic seemed to have provided an opportunity for them to express and communicate their resilience and wisdom in the face of this event). Interestingly, while commenting on social media, there was no explicit mention of it being of relevance to coping with pandemic, but relevant to reading the news.

For example, in the WSJ article "*Ways older adults can cope with the stress of COVID-19*" (which provided a list of coping tools and techniques), the word 'reading' was most frequently mentioned. In the CNN article "These seniors are turning to cutting edge technology to stay connected during the pandemic", an article about potential affordances of VR to facilitate socially-distant communications, the word Trump and cynical comments likening the prospect to Black Mirror (a Sci-fi TV series about a dystopic machine-dominated virtual future) were most frequent.

Generational differences in coping with COVID-19 stress are determined by the relationship to technology as well.

While a significant portion of older adults increased their usage of Facebook, and teleconferencing tools after COVID-19, older adults are less represented in social media networks (especially Twitter and Instagram) (**Fig 4.**) But it is not only their ability to access the technology that explains their lower dependence on such media. In the context of coping with the pandemic, it is explicitly their ability to draw on 'generational' wisdom and experience from having survived previous stressors.

Our exploratory cluster analysis of the co-occurrence of themes from social media comments reveals an interesting picture, where the important nodes of Technology and

Young belong to the same cluster (which also includes references to Facebook, Zoom, and connection), but nodes Elder, Resource, and Generation belong to a different cluster that also includes family, independence and wisdom and resilience. Yet, the concerns for COVID-19 seem to form a third cluster which also includes worrying about the young, and taking care of the young (e.g., by babysitting or homeschooling grandchildren via Zoom).

The fact that technology is not a 'big deal' for older adults becomes clear in the comments on The Guardian's article that directly deals with the question of older adults adopting technology after COVID-19. "*Ok Zoomer: how seniors are learning to lead more digital lives*" is an article about providing tech support to previously technology-avoiding seniors who are now forced to use teleconferencing technologies for social connection. This article received many irritated responses by tech-savvy older adults, who emphasized that they were the pioneers of computing in the 60's-80's. Many of those indicated that the reason for not becoming comfortable with recent technologies is because it does not serve a meaning in their already fulfilled life.

Overall, technology was more important to the younger generation for enabling them to connect to their elders. Numerous comments were about parents or grandparents who had picked up Zoom or Facebook to stay connected to their grandchildren.

4.2 Comparison to Previous Work

Our results are not directly comparable to previous studies because we have not undertaken any formal psychometric evaluation to assess anxiety and stress, and instead have relied on subjective self-evaluation (in the case of the survey) and data-driven extraction of expressions of concern about COVID-19. Our findings indirectly support the observations of Boursier *et al.* [17] and Zhong *et al.* [18] who showed a positive association between COVID-19 stress and increased usage of social media (mainly in the younger generation.) Our findings also indirectly support the finding by Yang *et al.* [19] that social media can provide a positive relief from COVID-19 stress. Especially, for older adults it provided an outlet for self-expression (as was evident from engagement of seniors with the mainstream media articles) and information exchange (as was evident from the survey), although neither in the survey nor in the social media comment analysis, did it appear as a major 'hub' in the network of resources for coping.

Our findings strongly support Vittadini's position that 'generationing' is an important consideration when analysing the social media landscape [14]. While the pandemic is creating an unprecedented opportunity for different generations to experience a global catastrophe in a common social media space, generational divisions still manifest in relation to the past experiences of the older generation, with important generalizations and stigmatizations to overcome--not only those that criticize older adults about their technological inaptitude (or praise them for nerdiness), but also those perspectives that disparage the younger generations wisdom in relying on technology for coping,

5 Conclusion

5.1 Summary of Findings

The aim of this study was to examine the intergenerational differences vis a vis reliance on social media for coping with COVID-19 stress. We investigated this question from two angles: 1) A cross-sectional anonymous survey study announced in the context of a specific research study (What Media Helps, What Media Hurts: Coping with COVID-19 Through screens) which did not specifically focus on age-related differences; 2) A targeted but data-driven examination of the public engagement with the question of seniors coping with COVID-19 as presented in the mainstream media.

Both studies give a similar conclusion: Differences between generations stem from differences in life experiences that change their perception of stress, and as a result, differences in appraisal of technology as a coping tool.

Whereas the younger generations have a higher expectation from technological solutions to coping with COVID-19 stress (and therefore resort to them more), the older generation (so called seniors) use technology as one of the many other resources for coping that they have developed without reliance on technology.

5.2 Limitations and Future Work

Interpretation of findings above must consider several limitations. First, the interpretation of these results should consider that our sample is taken from those who can read English (mainly the US, Canada, and the UK). Second, this sample is biased by older adults who already have access to social media, and enough digital literacy to be filling an online survey and leave comments on social media. Finally, qualitative research is always subjective and to mitigate investigators' bias, therefore the social media analyses should be repeated by other coders who are blind to the objective of this particular inquiry to explore other themes that may be present in the data.

Irrespective of these limitations, our mixed methods approach to the question on intergenerational perspectives on social media reveals important gaps in different generations understanding of each other's needs and preferences. Whereas for the young, technology provides an important tool to remain connected to elders during the pandemic, for the older adults, technology is one of the many other tools for coping with the pandemic, and one that does not replace the loss of time to spend together, physically. Our study also reveals a certain degree of intergenerational bias: Whereas many older adults were acknowledging the financial and emotional stressfulness of this pandemic on younger adults and tried to assist them; many others blamed the young for 'weakness' and over-reliance on virtual coping (even before the pandemic hit).

In future work, we intend to undertake a qualitative study to ask the opinions of our local community of seniors on the topic of intergenerational connections in social media.

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