The Impact of COVID-19 on LGBTQIA+ Individuals' Technology Use to Seek Health Information and Services

Taylor Schell Martinez(✉) and Charlotte Tang

University of Michigan-Flint, Flint, MI 48502, USA
{tschell,tcharlot}@umich.edu

Abstract. Fear of discrimination and stigma has often led many LGBTQIA+ individuals to seek out health information and services online and rely on digital sources. Has the LGBTQIA+ community's heavy reliance on digital use prior to the COVID-19 pandemic lessened the impact on their experience in seeking health information and services compared to the general population? Were the already existing health disparities and inaccessibility issues exacerbated?

An online survey study was conducted with 155 people who self-identified as LGBTQIA+. The goals were to investigate the technologies used by LGBTQIA+ individuals to manage their health and well-being during the COVID-19 pandemic and its impact on how they used technology to find health information, seek health services, and interact with their providers. The challenges and barriers that LGBTQIA+ respondents experienced when accessing health information and services during the pandemic were also identified, along with how these challenges may be alleviated through new or improved technological and non-technological solutions.

Our findings indicate an increased reliance on Internet-based health information seeking, mail order prescriptions, virtual appointments, and telehealth. Most participants were satisfied with the changes in format including the virtual platform used for interacting with healthcare providers. However, a substantial decrease or delay in healthcare and pharmaceutical access have been identified. We also found an increased, recurrent access to mental healthcare for coping with the pandemic. COVID-19 impacted almost every aspect of the LGBTQIA+ community's health.

Keywords: LGBTQIA+ · Health accessibility · COVID-19 pandemic · Virtual appointments

1 Introduction

Discrimination and stigma fears lead many LGBTQIA+[1] individuals to seek out health information and services online and through other digital sources despite the design

[1] "LGBTQIA+" is an inclusive umbrella term for all non-heteronormative gender identities and sexualities [43].

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of these avenues not being inclusive of the community [1]. Has the LGBTQIA+ community's heavy reliance on digital use prior to COVID-19 lessen the impact they have experienced? Did the LGBTQIA+ community handle health-related platform transitions and the increased reliance on digital technologies for healthcare better than the general population or were the already documented disparities exacerbated? Could new technologies or improvements to existing ones improve not only LGBTQIA+ individuals' health information seeking experiences and access to health services, but also facilitate the provider-patient relationship?

Our study investigates the COVID-19 pandemics' impact on how LGBTQIA+ individuals use technology to find health information, seek health services, and interact with their medical care professionals. Online surveys were conducted with 155 people who self-identified as LGBTQIA+ to acquire a better understanding of their health information seeking behaviors, their interactions with healthcare providers, and the technologies they used to manage their health and well-being, and how these might have been impacted by the recent COVID-19 pandemic. The goal was to identify possible challenges and barriers LGBTQIA+ individuals experienced during the COVID-19 pandemic when seeking health information and accessing health care services. How these challenges may be alleviated through new or improved technological solutions were also discussed.

2 Background

The Lesbian[2], Gay[3], Bisexual[4], Transgender[5], Queer[6], Intersex[7], and Asexual[8] (LGBTQIA+) community has historically struggled to access LGBTQIA+ related health information, services, and care, forcing them to often seek alternative sources of health care information. Despite the gradually growing acceptance, the LGBTQIA+ community still experiences exclusions, prejudices, and discrimination when seeking health information and services [2–7]. Thus, the Internet has long been considered a safe, accessible, and private way to find health information and services by many LGBTQIA+ individuals of every age category [8–14].

Health disparities between LGBTQIA+ individuals and the general population have been well documented in literature (e.g., references). Long before COVID-19, the LGBTQIA+ community, "especially youth, reported higher rates of anxiety, depression, suicidal ideation and non-suicidal self-injury" [15]. The transgender community is particularly impacted, with nearly 50% reported postponing health care because they

[2] "Lesbian" is a woman who is sexually and emotionally attracted to another woman [43].
[3] "Gay" individuals are sexually attracted to the same sex or same gender as themselves [43].
[4] "Bisexual" means to be attracted to two genders, the same gender, and others [43].
[5] "Transgender" or "trans" is a person whose gender is different than the sex they were assigned at birth [43].
[6] "Queer" is an umbrella term to describe anyone who is not heterosexual and/or cisgender [43].
[7] "Intersex" people are "born with variations of sex characteristics that may involve genital ambiguity and/or combinations of chromosomal genotypes and sexual phenotypes other than XY-male and XX-female [43]".
[8] "Asexual" people do not experience sexual attraction or desire [43].

were unable to afford it [16]. Almost 40% of trans reported having at least one negative experience with a medical professional including "being refused treatment, verbal harassment, physical or sexual assault or having to teach the provider about transgender health in order to get appropriate care", 28% had postponed care due to discrimination and 28% had experienced harassment in the medical settings due to their gender identity [6, 16]. Within the transgender community, those of color experience even harsher disparities when attempting to find health professionals who are both LGBTQIA+ friendly and not racist, with feelings that they would be treated better if they were white or cisgender [17].

Despite recommendations from the Institute of Medicine as well as over 150 other health institutions in the United States to collect and document gender identity and sexual orientation information in electronic health records, this information is still not uniformly collected that has led to inaccuracies in statistics and missed opportunities to "assess, track, and combat population-level health disparities" [16, 18–20]. Given the clear lack of inclusion of LGBTQIA+ individuals within the medical setting and health records, they expressed that they often feel invisible. Thus, many internalize and interpret the failure to collect sexual orientation and gender identity information as a way that health professionals reinforce heteronormative, cisgender societal norms or hold possible negative attitudes or beliefs towards the LGBTQIA+ community itself [15].

Prior to the pandemic, LGBTQIA+ individuals were found to more likely use the Internet to find health information, to fill a prescription, and to communicate with their health providers via email [10]. Seeking health information and services online provides a convenient, affordable delivery that also allows privacy and safety from fears of discrimination for many LGBTQIA+ individuals [14]. Online support from social media is commonly reported as a main support mechanism for LGBTQIA+ individuals [14]. LGBTQIA+ individuals even turn to the Internet when experiencing a crisis. For example, 44% of text messages sent to CrisisTextLine, a text message-based crisis support line, were from LGBTQIA+ individuals [13]. Multiple studies have shown a pre-pandemic heavy reliance on the Internet by LGBTQIA+ individuals when seeking health information and services through online LGBTQIA+ communities and social networks [8–14].

The lack of affordable, easily accessible, credible, and representative health information and services for the community without experiencing discrimination or harassment has also caused many to seek out other LGBTQIA+ individuals and their experiences online as their main source of LGBTQIA+ related health information and services [1, 21, 22]. Many use their fellow online community members to find LGBTQIA+ friendly and knowledgeable health information, experiences, providers, and services.

Could this heavier reliance on the Internet for health information have prepared LGBTQIA+ individuals to navigate the new digital workarounds of the pandemic better than the general population? Or were the documented pre-pandemic health disparities already experienced by the LGBTQIA+ community exacerbated by the pandemic [6, 15–17, 19, 22–26]? Our study investigates the impact the COVID-19 pandemic has had on how LGBTQIA+ individuals use technology to seek health information, interact with their health care professionals, and find and access health services.

3 Methodology

3.1 Data Collection

An online survey was conducted using Qualtrics Software between November 2020 and May 2021 to acquire a better understanding of the impact of the COVID-19 pandemic on LGBTQIA+ individuals' use of technology for interacting with their health care professionals and seeking health information and services. Participants were recruited through direct emails and digital flyers posted on local, university, regional, and national LGBTQIA+ organizations', centers', clubs', and support groups' websites, social media platforms and newsletters across the United States. We received 155 completed surveys.

Both qualitative and quantitative data were collected from respondents over the age of 18 and self-identified as LGBTQIA+. There were 70 close-ended questions and 19 short answer, open-ended questions to elicit information about their demographics, LGBTQIA+ identity, health information seeking behaviors, health insurance access, and prescription drug access. Questions related to their mental health and primary care access in relation to the pandemic and technology use were also investigated. Not all questions were answered by each participant; questions may have been skipped based on their earlier responses.

3.2 Data Analysis

Descriptive statistics were used to analyze the quantitative data. Bivariate analysis was then conducted between the general population and our LGBTQIA+ respondents. Affinity diagramming was used to analyze the narrative data to identify emerging themes.

4 Findings

Our findings indicate an increased reliance on Internet-based health information seeking, mail order prescriptions, virtual appointments, and telehealth. Most participants were satisfied with the changes in format including the virtual interaction with their healthcare providers. However, a substantial decrease or delay in healthcare and pharmaceutical access have been identified. We also found an increased, recurrent access to mental healthcare for coping with the pandemic. COVID-19 impacted almost every aspect of the LGBTQIA+ community's health.

Among the participants who were unemployed, 3% were not seeking employment and 2% were unemployed due to a disability. The participants we surveyed were highly educated, significantly higher than the general U.S. population's education attainment rate. Nearly 70% of the survey participants had earned an associate degree or higher, far higher than the general population (45%) [27].

4.1 Demographics

Table 1 shows the participants' demographics: age, race/ethnicity, relationship status, education, pronouns, LGBTQIA+ identification, and employment. Sixty-two percent of

Table 1. Demographics, pronouns, LGBTQIA+ identification, race, and ethnicity

Age		**Pronouns**	
35 and under	62%	She/her/hers	43.15%
36–45	13%	He/him/his	36.99%
46–55	28.1%	They/them/theirs	12.33%
56–65	20.6%	Combination	7.53%
66–75	8.4%	**LGBTQIA+ Identities**	
76–85	2.6%	Bisexual	33.6%
Race & ethnicity		Queer	32.2%
Caucasian	66.7%	Gay	28.1%
Black	6%	Lesbian	20.6%
Asian	9%	Pansexual[a]	16.4%
Hispanic	8%	Demisexual[b]	6.9%
Relationship status		Heterosexual or straight	6.2%
Single (never married)	61%	Asexual	5.5%
Married	24%	Same-gender loving[c]	2.7%
Divorced/separated	9%	Sexual orientation changed	56.9%
Widowed	2.74%	**Employment**	
Registered domestic Partnership	2.74%	Employed	69.5%
Legally recognized Civil Union	0.68%	Retired	7%
Not currently in a relationship	37%	Students	19%
Education		Unemployed	14.3%
Graduate degree	25%	Homemaker/caregiver	1%
Bachelor's degree	40%	Illegal work	1%
Associate degree	5%	Work under the table	1.5%

[a]"Pansexual" a person who is attracted to people of all genders and sexualities [43].
[b]"Demisexual" only experience a sexual attraction to people they have a strong emotional connection with [43].
[c]"Same-gender loving" individuals are attracted to the people of the same gender [43].

the participants were aged 35 and under. This skew is likely due to the use of digital media for recruitment and conduct of the survey.

Sixty-five percent held a bachelor's degree or higher and 25% held a graduate degree. In contrast, the U.S. Census Bureau found in 2020 that the general population's educational attainment was far lower: only 45% of the general population held an Associate degree, 35% held a bachelor's degree and 12.67% held a graduate degree [27].

Despite increased acceptance, inclusion, and representation of LGBTQIA+ individuals nowadays, only 58.9% considered themselves "fully out[9]" in their personal and public lives' while 26% were out to some but "closeted[10]" to others, 11% were out to friends but closeted to family, 10% were out in their private life but closeted in their public or professional life, and 1.4% were fully in the closet.

4.2 A Comparison of Perceived Health Conditions Between LGBTQIA+ participants and General Population in the United States

Physical Health. Our findings, shown in Table 2, indicated that nearly 78% of the LGBTQIA+ participants felt they were in good to excellent health, lower than 84% of the U.S. general population who reported the same perception to the Peterson-KFF Health System Tracker [28]. Only 5.8% of our LGBTQIA+ participants felt they were in excellent health, significantly lower than the 24% of the general population who felt the same, especially considering the LGBTQIA+ population surveyed had a higher percentage covered by health insurance than the general population [28].

Table 2. Self-assessed health

Self-assessed health	General [28]	LGBTQIA+
Poor health	4%	1.65%
Fair health	12%	21%
Good health	27%	44%
Very good health	33%	28%
Excellent health	24%	6%

Nearly 21% of our respondents considered themselves to be in fair health, nearly double the 12% of the general population who felt the same [28]. Notably, 4% of the general population felt they were in poor health, substantially more than the 1.65% of LGBTQIA+ participants who felt that way in our study. The Peterson-KFF Health System Tracker found the general population were more likely to perceive their health status as excellent, very good and poor, placing more of the general population's perceived health status at either ends of the spectrum of health [28]. Our research found LGBTQIA+ individuals are more likely to perceive their health status as fair or good, placing their perceived health status in the middle of the health spectrum despite a higher percentage having insurance coverage.

Mental Health. According to the PRNewswire survey in April 2020, 75% of the general population in the U.S. reported that the COVID-19 pandemic had negatively impacted

[9] "Out" refers to being openly and publicly LGBTQIA+, "coming out of the closet" occurs when they publicly begin to announce their LGBTQIA+ identity [43].

[10] "Closeted" refers to not publicly disclosing their LGBTQIA+ identity [43].

their mental health [29]. The mental health of 87% of the LGBTQIA+ individuals we surveyed had been negatively impacted by COVID-19. While the American Psychiatric Association reported 36% of the general population had faced issues with their mental health [30], our study showed that over 40% of our LGBTQIA+ respondents had experienced a great deal of mental health challenges due to COVID-19. Forty percent of the respondents had sought out mental health services to cope with the impact caused by the pandemic. Ten Percent of the LGBTQIA+ respondents seeking mental health services were first timers in seeking mental health assistance. Several respondents indicated that their mental health issues had greatly interfered with their daily lives. For example, "*I am lucky to get anything done these days. Depression has really been holding me back"* (r115).

Three main themes emerged from Costa et al. on the suggested ways to help the mental wellbeing of the general population during the COVID-19 pandemic: 1) the accessibility to mental health care, 2) self-care strategies, and 3) the continued need for community support and relationships [31]. Some of these same themes emerged within our surveyed LGBTQIA+ community as well.

4.3 Health Information Seeking

Strategies Used. COVID-19 impacted health information seeking strategies and accessibility for 27% of our LGBTQIA+ respondents. Due to decreased in-person access to medical providers, libraries, community, and health centers or organizations, some participants had to change the way they sought health information to becoming more heavily reliant on the Internet. In fact, some respondents resorted to solely seeking health information on the Internet, "*Just internet research. No longer going to or contacting doctors, libraries or other in person services."* (r58). In contrast, other respondents have become more reliant on family and friends for health information which was not the case before the pandemic, "*I have discussed medical conditions with friends that I did not discuss such matters before Covid-19"* (r199). Unfortunately, a small number of participants found the health information they needed inaccessible due to the constraints rendered by the pandemic.

Information Sought. The pandemic impacted not only the ways information was sought by LGBTQIA+ respondents but also the types of information sought. General COVID-19 information was the third most searched topic by our LGBTQIA+ respondents, just behind general health information and prescription drug information.

A few LGBTQIA+ respondents mentioned specifically increasing their research on how to stay safe from the COVID-19 virus itself. A few others mentioned the addition of researching in-person appointment safety procedures and protocols instated due to COVID-19, *"I have had to read extensively online about the procedures necessary to set up appointments for my place of testing due to covid which really limited availability for appointments"* (r149). A few of those researching COVID-19 expressed the need for more credible information sources such as official health sites, *"I have been observing more official health sites and offices for information"* (r154).

4.4 Health Care Accessibility

Transportation. The main forms of transportation used by the LGBTQIA+ respondents varied and were considerably different from the general population's main forms reported by the Bureau of Transportation Statistics as shown in Table 3 [32]. Sixty percent of our LGBTQIA+ participants owned their own vehicle considerably less than the 85% of the general population in the U.S. who owns a vehicle [32]. Over twice the number of our LGBTQIA+ respondents relied on public transportation than did the general population: 9.1% of our respondents relied on subway and 2.4% relied on public buses. Another 12% walked, 8.5% relied on rides from family and friends, and 2.4% relied on car hires (e.g., Uber) for their main form of transportation.

Table 3. Main forms of transportation

Transportation type	General [32]	LGBTQIA+
Own vehicle	84.8%	60%
Public transportation	5%	11.5%
Subway	–	9.1%
Public buses	–	2.4%
Family & Friends	–	8.5%
Walking	2.6%	12%
Car hire service	0.2%	2.4%

Transportation has often been cited as a barrier to health care access which undoubtedly was further complicated by the pandemic. A few respondents indicated that they no longer used public transportation or ride shares while others expressed an increased reliance on walking, roommates, and Uber; *"Non-pandemic-NJ transit and subway; pandemic-Walking and uber (because I'm in NJ and not commuting to NYC)"* (r111).

Health Insurance. Slightly more LGBTQIA+ respondents had health insurance coverage (92%) than did the general population (89.2%) [33]. Table 4 illustrates the COVID-19 pandemic's impact on health insurance coverage of our LGBTQIA+ respondents compared to the general population of the U.S. Pre-pandemic, the LGBTQIA+ community had a higher percentage of individuals covered by health insurance, more than the general population, but were experiencing significantly more health disparities including transportation barriers, inaccessible prescriptions, inconvenient appointment times, reductions in health services, poorer perceived health status and their mental health was more negatively impacted [23]. Nearly 21% of the general population had lost their employer-sponsored insurance due to COVID-19 [34], while only 3.4% of the LGBTQIA+ respondents had, significantly less than the general population. It appears that COVID-19 had a lesser impact on health insurance coverage for our LGBTQIA+ respondents than the general population. This may be due to the higher education level of our respondents, thus possibly providing the LGBTQIA+ group with higher job security.

Table 4. COVID-19 pandemic's impact on health insurance

Health insurance	General	LGBTQIA+
Insured	89.2%	92%
Lost due to COVID-19	21%	3.4%

Fourteen percent of LGBTQIA+ participants surveyed stated their insurance plans had changed, premiums had increased, and for some there was a reduction in overall coverage. Others were pleased that COVID-19 related expenses were covered by insurance and COVID-19 testing was free. Some discussed how their insurance began covering telehealth and virtual medical appointments for the first time due to COVID-19, with some insurance companies even waiving copays for virtual appointments to encourage their use during the critical period of the pandemic.

Some respondents had trouble getting prescriptions after losing their health insurance:

> *"The challenge was once I lost my health insurance, during the pandemic was horrible, and I contacted my local health center after the state opened up and they help me with a prescription patient assistance program, and I got approved or allowed to continue receiving my medication. It was a long process but worth it now that I don't have health insurance just lucky that I had resources with-in my own community."* (r137)

Prescriptions. The LGBTQIA+ community experienced a disproportionately higher rate of inaccessibility to prescriptions due to the pandemic, significantly more so than the general population and is shown in Table 5. Nearly a quarter of the LGBTQIA+ respondents had to change how they received their prescriptions due to COVID-19. Of those who changed methods to obtain their prescriptions, three-quarters began to have them delivered via U.S. Postal mail to minimize their risk of exposure to COVID-19 virus. Some LGBTQIA+ individuals had experienced lengthy fights with their insurance companies to get their mail ordered prescriptions covered, sometimes weeks after receiving them.

> *"I tried to get mail order 90-day supplies for several of my transition-related prescriptions. Initially request was denied, and insurance claimed they needed more info and authorization from my provider, had to go back and forth with them several times and took several weeks to get order to go through. More recently, I was informed via mail that some of my prescriptions were denied - not eligible for mail order apparently. They could've told me that weeks ago."* (r102)

A small number of LGBTQIA+ individuals no longer entered the pharmacy to pick up their prescriptions; instead, they took advantage of the pharmacy's drive-thru or curbside pickup options to minimize their chances of exposure to COVID-19. However, the reduced hours of operation of pharmacies during the pandemic increased the difficulty and required better coordination with rides or family members that they already needed

pre- pandemic in order to secure their prescriptions. In addition, a few respondents had to switch pharmacies because their previous pharmacy had been near their place of employment, but they had switched to working from home virtually or were no longer employed there.

Table 5. COVID-19 pandemic's impact on health care, mental health and medication

Health care	General	LGBTQIA+
Appointments canceled or postponed due to COVID-19	12.7% [34]	23%
Not seen a doctor due to cost in past 12 months	13.4% [35]	20%
Experienced a platform change for appointments	–	58%
Satisfied with platform change	83% [33]	70%
Mental health care		
COVID-19 pandemic negatively impacted mental health	75% [28]	87%
Had a serious impact on mental health	36% [29]	41.5%
Experienced a platform change for appointments	50% [36]	90%
Satisfied with platform change	–	75%
Prescription medications		
Changed how they received their prescription medication(s)	–	23%
Had difficulty accessing their prescribed medications	3% [28]	18%
Health insurance		
Insured	89.2% [33]	92.5%
Lost insurance due to COVID-19 pandemic	21% [34]	3.4%

Our findings of over 18% of our LGBTQIA+ respondents having difficulties in getting their prescriptions due to COVID-19 was substantially higher than the 3% among the general population according to the National Center for Health Statistics [36]. Of the LGBTQIA+ respondents who had difficulties accessing prescription, 55% were individuals whose gender identity had changed over their lifetime and 35% identified as transgender specifically. The higher percentage was due to increased challenges during the pandemic in getting the unique medications required by these LGBTQIA+ individuals.

> *"Estradiol valerate vials for injections have been scarce for years now, and this seems to have become even more profound during covid (though this may be happenstance). I spent weeks (without receiving a dose in the meanwhile) attempting to jump through hurdles with my healthcare provider, pharmacies, and online sources trying to get ahold of a vial. Compound pharmacies refused to make it as they claimed there was evidence of stock, while every major pharmacy attempted to order it only to send a notice a few days later that their supplier could not provide any. The only reason I was able to get a vial is one particularly dedicated pharmacist who kept on it throughout looking for sources."* (r117)

As such, some alternatives were prescribed as an attempt to work around the inaccessibility issues and prescription shortages. Some of the workarounds included switching from hormone replacement therapy shots to topical testosterone cream, which unfortunately have impacted both the patients' mental and physical health because of the abrupt change that their body had a difficult time adjusting to the new medication. Worse still, such workarounds were not available to some of our respondents forcing them to go without their medication at all for some time until the pharmacy had stock again. One respondent described the multifaceted, unsuccessful attempt in securing their prescriptions and the subsequent physical toll on their body:

> *"I couldn't get an appointment with a trans clinic to save my soul. I saw an ad on Facebook for Planned Parenthood advertising trans care. I made an appointment. I had to download an app. I couldn't connect because the internet in my area was awful and [an internet provider] couldn't improve it for months. PP had no tech support line. I had to put a message into their portal to get them to call me. They refused to give me a regular phone appointment until I literally screamed at them. What should have been an hour-long appointment was a 20-min appointment. I got T gel instead of shots because if I had wanted to get shots, I would have needed to schedule another appointment and no way in hell was I going to go through that again. I did not get good advice about microdosing. When changes happened too fast, I went off abruptly. A few days later, I almost threw myself off of a highway overpass. At least that got me an appointment with the trans clinic at one of the hospitals in my city. Literally. People just need to a) prioritize the care of the marginalized b) listen to, and believe us, the first time we tell them what we need and c) make themselves easy to access be it by phone, webcam, in person, whatever and d) give us reliable information. Reddit should not be more informative than someone who's spent $300,000+ on med school."* (r13)

Some respondents were unable to get their needed prescriptions due to transportation issues. For example, some had been relocated due to COVID-19 which forced them to have to drive to different towns to access their prescriptions. Others could not travel to a pharmacy that would accept their insurance. Others delayed getting their prescriptions until absolutely necessary because of the fear of exposure to the virus. Another respondent, who was forced to move back home with family due to the pandemic, had not filled or taken their prescription since returning home because they worried their family would discover their need for antidepressants. Another participant had been relocated to a different state which required them to get a prescription reconfirmation before they could get their prescriptions in the new state, making it more prone for them to forego their medications.

Care Accessibility. Twenty-five percent of our LGBTQIA+ respondents had trouble seeking health services due to COVID-19. Medical facilities, like LGBTQIA+ health centers, shut down and offered very limited or eliminated access entirely to in-person appointments. For many, in-person appointments were replaced by virtual consultations as safety regulations rendered the facilities to close or reduce their hours.

However, transgender people were negatively affected substantially by the reduction or elimination of in-person appointments because it also changed, reduced, or eliminated their access to their normal hormone replacement therapy. Some ended up with no hormone replacement medications at all. For others, it resulted in prescription changes that often involved transitioning from injectable hormones to an orally or topically administered hormone. As a result, many respondents experienced exceptional stress to the body, both physically and mentally, due to the sudden change or stopping of hormone treatments. Thus, the patients often needed additional care to combat the adverse effects.

Mental Health Care. Twenty-two percent of the general population experienced a reduction in mental health services during the pandemic [37], whereas over one-third of LGBTQIA+ respondents had their mental health appointments postponed or canceled due to the COVID-19 pandemic (Table 5).

Primary Health Care. "Organizations have cancelled, rescheduled or turned away 31.0% of patients" [38]. Nearly a quarter of our LGBTQIA+ survey respondents had their appointments canceled or postponed by their primary care providers (PCPs) due to the COVID-19 pandemic and one-third of our respondents have canceled or postponed appointments themselves with their PCPs to minimize possible exposure to COVID-19. The LGBTQIA+ respondents had experienced a more significant reduction in access to health care than the general population [38] (Table 5).

Appointment Platform Changes. Our LGBTQIA+ respondents experienced an increased platform change with their mental health provider than they were with their primary care providers. In October 2020, 41% of the mental health appointments for the general population were conducted via telehealth after peaking at 50% in May 2020 [38, 39]. Ninety percent of our LGBTQIA+ respondents who received mental health care during the pandemic, experienced a change in the platform for their mental health appointments which was twice the number experienced by the general population [40]. Only 58% of LGBTQIA+ respondents had experienced a platform change with their primary care provider. The platform change rates, satisfaction levels and group comparisons can be found in Table 5.

Satisfaction Level. Over 70% of our respondents were satisfied with their primary care provider's appointment platform change. Over 75% of our respondents who saw a mental health professional were satisfied with the change in platform, slightly less than the 80% satisfaction level of the general population [39, 41]. Eighty-two percent of our LGBTQIA+ respondents were satisfied with how their mental health professional handled the pandemic and 70% were satisfied with how their primary care providers did. Six percent of our LGBTQIA+ respondents were extremely dissatisfied with their mental health platform change and only 2% were extremely dissatisfied with their primary care platform change.

Benefits. Several benefits of telehealth were mentioned by our LGBTQIA+ respondents. Several respondents mentioned not having to commute or "fight traffic", thus reducing their travel time and the time needed off from work. Another respondent pointed out the cost savings from the lack of travel and therefore transportation costs. Others experienced cost savings through waived insurance copays for telehealth and virtual visits.

Some respondents enjoyed maintaining their health through telehealth from the comfort and safety of their own homes. For other respondents, it created a nation-wide pool of virtual LGBTQIA+ friendly and knowledgeable providers. Some LGBTQIA+ respondents felt empowered with the ability to quickly end well-documented condescending, discriminatory, or offensive interactions from both new and seasoned health professionals.

Drawbacks. Not all LGBTQIA+ respondents enjoyed the platform changes. Some respondents struggled with privacy issues, since finding a private space for virtual health appointments was extremely challenging and sometimes impossible. Some sat in their car to ensure privacy from roommates and neighbors during their appointments.

Many LGBTQIA+ respondents felt the telehealth experience was impersonal, uncomfortable, and minimized the ability to read body language. A few respondents even deemed virtual health less productive than in-person:

> *"I experienced a few Tele-Medicine appts and they were okay. It felt like there were more barriers to connect with the physician but once we cleared those it was relatively fine. I flourish in in-person environments, especially when referring to or referencing my body/medical needs so the experiences were lackluster and didn't every really FEEL confident in how to move forward with recovery, etc…"* (r147)

The virtual or telehealth appointment experiences exhausted a few respondents more than their normal in-person appointments did. Our respondents who had experienced technical issues became frustrated as some of their providers, in attempt to improve care, had constantly changed appointment formats, leaving the patient to struggle with new technology at each appointment.

4.5 Recommendations for Improving Healthcare Experiences During Pandemic

Technology Improvements. Despite their relatively young age and high education level, many LGBTQIA+ respondents experienced technology difficulties when interacting with their health care professionals virtually. For some, poor Internet connections and slow speeds affected their ability and experience in the virtual appointment; for others it was the poorly functioning video or telehealth software. In particular, technical support is often absent in these virtual platforms. Thus, timely technical support must be available to healthcare providers and their patients before and during virtual appointments.

In general, patients were not allowed to choose a preferred platform, greatly impacting their comfort level and experience with virtual appointments. Thus, we recommend allowing patients to choose from multiple platforms options for conducting virtual appointments.

Our respondents also criticized how disorganized the online meetings were. Some complained of the long wait times for virtual appointments. A few suggested displaying activities or educational health information pertinent to the patient while they were waiting.

Non-technical Recommendations. Most respondents were satisfied with how both their primary care and mental health providers handled the pandemic making no suggestions for improvements and applauding their providers for keeping them safe. A few LGBTQIA+ respondents offered suggestions on how providers could improve care.

One of the suggestions made by our respondents was to improve health care access for the LGBTQIA+ community during a pandemic since the inability to get an appointment has left some feeling hopeless and desperate. Many respondents also felt that their providers could have improved their outreach to patients. For example, they would like their providers to actively check on how the pandemic was impacting their life and to offer more assistance including increased appointment availability and conveying important information like procedural changes due to COVID-19, hour reduction, staff reduction, change in format, and closures. They also wanted more post-appointment follow-up calls.

5 Discussion

Our study found, as we anticipated, that technology use to seek health information and services was greatly impacted by the COVID-19 pandemic for our LGBTQIA+ respondents, thus further increasing the health disparities they experienced during this vulnerable period. Many of our LGBTQIA+ respondents not only relied on technology for health information but, due to the pandemic, also depended on it for most of their other health needs. Our LGBTQIA+ respondents experienced a significant increase in health disparities due to COVID-19 including increased transportation barriers, inaccessible prescriptions, inconvenient appointment times, reductions in health services, and their mental health was negatively impacted.

Our study found several unexpected findings. Despite a higher percentage of our LGBTQIA+ respondents being covered by health insurance; their self-assessed health statuses were lower than those of the general population. Surprisingly, only few of our LGBTQIA+ respondents had lost their health insurance due to COVID-19. But due to enacted safety protocols and fears of the virus, they were still unable to access health services despite having the coverage. Another surprising finding was the physical and mental trauma some of our LGBTQIA+ respondents suffered when they were unable to access their needed medications and health services.

Other studies have looked at the impact COVID-19 has had on the general population's access to health services and health information [25, 30–32, 36–39]. Several have studied how the pandemic affected the mental health of the general population, but none have focused on the LGBTQIA+ population during the pandemic as ours did [13, 26–28, 34]. Many have studied LGBTQIA+ health and how it could be improved with technology, but that research was conducted before the impact of the pandemic and the new heavy reliance on technology for their health care [5, 8, 11, 21, 40–42]. Unlike earlier research, our study was able to investigate the impact COVID-19 had on LGBTQIA+ respondents' mental health, health services and the experiences they had with increased technology reliance for health needs.

Our study found that the pandemic heavily impacted LGBTQIA+ respondents' technology use to seek health information and health services while simultaneously increasing health disparities within the community. Key findings should be used to improve access to health information and health services for the LGBTQIA+ community and to improve technology design to better serve both the LGBTQIA+ individuals and the general population.

6 Conclusion

Our study had several limitations that should be considered. Our sample was not representative of the population demographics in the U.S. with respect to age, race, ethnicity and education level. The racial and ethnic makeup did not align with the respective ratios in the population. Caucasians and Asians were overrepresented and Black, Hispanics, and Native Americans were underrepresented in our sample, as indicated in [42]. Our study's cohort was very young, 62% of our respondents were under the age of 35 and 77% were under the age of 45, and they were highly educated. These two factors may have increased their comfort level with and use of technology.

Due to the pandemic, respondents were only recruited via digital technology like emails and digital flyers. Therefore, we may have left out those who are less tech-savvy and those who have limited to Internet access. This may also explain why many of our respondents were young, highly educated, and comfortable with technology. Future research should include those who are less tech-savvy such that they may not use technology for their heath needs and those who do not have reliable access to the Internet.

Despite these limitations, our study revealed aggravated health disparities and inaccessibility already experienced by LGBTQIA+ respondents. Our study also identified many areas that the impact of the pandemic was experienced to a greater extent by the LGBTQIA+ respondents than the general population.

References

1. Martinez, T.S., Tang, C.: Design implications for health technology to support LGBTQ+ community: a literature review. In: PervasiveHealth: Pervasive Computing Technologies for Healthcare, pp. 367–370 (2020)
2. Pereira, G.C., Baranauskas, M.C.C.: Supporting people on fighting lesbian, gay, bisexual, and transgender (LGBT) prejudice: a cirtical codesign process. In: IHC 2017: Proceedings of the XVI Brazilian Symposium on Human Factors in Computing Systems, Joinville Brazil (2017)
3. AIChE. AIChE Diversity Report Highlights Gaps in Inclusion, CEP, pp. 4–5, October 2019
4. Subramony, D.P.: Not in our journals - digital media technologies and the LGBTQI community. TechTrends **62**, 354–363 (2018). https://doi.org/10.1007/s11528-018-0266-9
5. Kodadek, L.M., et al.: Collecting sexual orientation and gender identity information in the emergency department: the divide between patient and provide perspectives. Emerg. Med. J. **36**, 136–141 (2019)
6. National Center for Transgender Equality. 2015 U.S. Transgender Survey: Michigan State Report, Washington, DC. (2017)

7. McConnell, E.A., Clifford, A., Korpak, A.K., Phillips, G., II.: Identity, victimization, and support: Facebook experiences and mental health among LGBTQ youth. Comput. Hum. Behav. **76**, 237–244 (2017)
8. Dahlhamer, J.M., Galinsky, A.M., Joestl, S.S., Ward, B.W.: Sexual orientation and health information technology use: a nationally representative study of U.S. adults. LGBT Health **4**(2), 121–129 (2017)
9. Freund, L., Hawkins, B., Saewyc, E.: Reflections on the use of participatory mapping to study everyday health information seeking by LGBTQ youth. Proc. Assoc. Inf. Sci. Technol. **53**(1), 1–10 (2016)
10. Lee, J.H., Giovenco, D., Operario, D.: Patterns of health information technology use according to sexual orientation among US adults aged 50 and older: findings from a national respresentative sample - national health interview survey 2013–2014. J. Health Commun. **22**, 666–671 (2017)
11. Mitchell, K.J., Ybarra, M.L., Korchmaros, J.D., Kosciw, J.G.: Accessing sexual health information online: use, motivations and consequences for youth with different sexual orientations. Health Educ. Res. **29**(1), 147–157 (2014)
12. Perry, G.: Health information for lesbian/gay/bisexual/transgendered people on the internet. Internet Ref. Serv. Quart. **6**(2), 23–34 (2001)
13. Schueller, S.M., Hunter, J.F., Figueroa, C., Aguilera, A.: Use of digital mental health for marginalized and underserved populations. Curr. Treat. Options Psychiatry **6**(3), 243–255 (2019). https://doi.org/10.1007/s40501-019-00181-z
14. Strauss, P., Morgan, H., Toussaint, D.W., Lin, A., Winter, S., Perry, Y.: Trans and gender diverse young people's attitudes towards game-based digital mental health interventions: a qualitative investigation. Internet Interv. **18**, 100280 (2019)
15. Bosse, J.D., Leblanc, R.G., Jackman, K., Bjarnadottir, R.I.: Benefits of implementing and improving collection of sexual orientation and gender identity data in electronic health records. CIN: Inform. Nurs. **36**(6), 267–274 (2018)
16. Donald, C., Ehrenfeld, J.M.: The opportunity for medical systems to reduce health disparities among lesbian, gay, bisexual, transgender and intersex patients. J. Med. Syst. **39**(178) (2015). https://doi.org/10.1007/s10916-015-0355-7
17. Howard, S.D., et al.: Healthcare experiences of transgender people of color. J. Gen. Intern. Med. **10**(34), 2068–2074 (2019). https://doi.org/10.1007/s11606-019-05179-0
18. Cahill, S., Makadon, H.: Sexual orientation and gender identity data collection in clinical settings and in electronic health records: a key to ending LGBT health disparities. LGBT Health **1**(1), 34–41 (2014)
19. Dichter, M.E., Ogden, S.N.: The challenges presented around collection of patient sexual orientation and gender identity information for reduction of health disparities. Med. Care **57**(12), 945–948 (2019)
20. Grasso, C., McDowell, M.J., Goldhammer, H., Keuroghlian, A.S.: Planning and implementing sexual orientation and gender identity data collection in electronic health records. J. Am. Med. Inform. Assoc.: JAMIA **26**(1), 66–70 (2019)
21. Hawkins, B.W., Morris, M., Nguyen, T., Siegel, J., Vardell, E.: Advancing the conversation: next steps for lesbian, gay, bisexual, trans, and queer (LGBTQ) health sciences librarianship. J. Med. Libr. Assoc. **105**(4), 316–327 (2017)
22. Faulkner, S.L., Lannutti, P.J.: Representations of lesbian and bisexual women's sexual and relational health in online video and text-based sources. Comput. Hum. Behav. **63**, 916–921 (2016)
23. Hsieh, N., Ruther, M.: Despite increased insurance coverage, nonwhite sexual minorities still experience disparities in access to care. Health Aff. **36**(10), 1786–1794 (2017)
24. McKay, B.: Lesbian, gay, bisexual, and transgender health issues, disparities, and information resources. Med. Ref. Serv. Q. **30**(4), 393–401 (2011)

25. Price-Feeney, M., Ybarra, M.L., Mitchell, K.J.: Health indicators of lesbian, gay, bisexual, and other sexual minority (LGB+) youth living in rural communities. J. Pediatr. **205**, 236–243 (2019)
26. Trinh, M.-H., Agenor, M., Austin, S.B., Jackson, C.L.: Health and healthcare disparities among U.S. women and men at the intersection of sexual orientation and race/ethnicity: a nationally representative cross-sectional study. BMC Public Health **17**(962), 1–11 (2017)
27. United States Census Bureau. Educational Attainment in the United States: 2020 (2021)
28. Peterson-KFF Health System Tracker. Self-reported health. https://www.healthsystemtracker.org/indicator/health-well-being/self-reported-health-8/. Accessed 6 June 2021
29. Cision PRNewswire. Mental health concerns skyrocket, 75 percent of Americans report negative impact from the pandemic, 01 May 2020. https://www.prnewswire.com/news-releases/mental-health-concerns-skyrocket-75-percent-of-americans-report-negative-impact-from-the-pandemic-301050725.html. Accessed 25 May 2021
30. American Psychiatric Association. New Poll: COVID-19 Impacting Mental Well-Being: Americans Feeling Anxious, Especially for Loved Ones; Older Adults are Less Anxious, 25 March 2021. https://www.psychiatry.org/newsroom/news-releases/new-poll-covid-19-impacting-mental-well-being-americans-feeling-anxious-especially-for-loved-ones-older-adults-are-less-anxious. Accessed 25 May 2021
31. Costa, M., Reis, G., Pavlo, A., Bellamy, C., Ponte, K., Davidson, L.: Tele-mental health utilization among people with mental illness to access care during the COVID-19 pandemic. Community Ment. Health J. **57**(4), 720–726 (2021). https://doi.org/10.1007/s10597-021-00789-7
32. Bureau of Transportation Statistics. Principal Means of Transportation to Work (2020). https://www.bts.gov/content/principal-means-transportation-work
33. ASPE Office of Health Policy. Trends in the U.S. Uninsured Population, 2010–2020, February 2021. https://aspe.hhs.gov/system/files/pdf/265041/trends-in-the-us-uninsured.pdf. Accessed 25 May 2021
34. Banthin, J., Simpson, M., Buettgens, M., Blumberg, L.J., Wang, R.: Changes in health insurance coverage due to the COVID-19 recession: preliminary estimates using microsimulation. Urban Institute, Washington, DC (2020)
35. Kaiser Family Foundation. Adults Who Report Not Seeing a Doctor in the Past 12 Months Because of Cost by Sex (2019). https://www.kff.org/other/state-indicator/could-not-see-doctor-because-of-cost-by-sex/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D
36. National Center for Health Statistics. Reduced Access to Care During COVID-19 (2020)
37. Centers for Medicare & Medicaid Services (CMS). CMS Data Shows Vulnerable Americans Foregoing Mental Health Care During COVID-19 Pandemic, 14 May 2021. https://www.cms.gov/newsroom/press-releases/cms-data-shows-vulnerable-americans-forgoing-mental-health-care-during-covid-19-pandemic. Accessed 21 June 2021
38. Busch, A.B., Sugarman, D.E., Horvitz, L.E., Greenfield, S.F.: Telemedicine for treating mental health and substance use disorders: reflections since the pandemic. Neuropsychopharmacology **46**, 1068–1070 (2021)
39. Orrange, S., Patel, A., Mack, W.J., Cassetta, J.: Patient satisfaction and trust in telemedicine during the COVID-19 pandemic: retrospective observational study. JMIR Hum. Factors **8**(2), 1–13 (2021)
40. Fischer, S.H.: The transition to telehealth during the first months of the COVID-19 pandemic: evidence from a national sample of patients. J. Gen. Intern. Med. **36**, 849–851 (2021)
41. Nelson, H.: COVID-19 Telehealth Delivery Reaps High Patient Satisfaction, 15 April 2021. https://mhealthintelligence.com/news/covid-19-telehealth-delivery-reaps-high-patient-satisfaction#:~:text=April%2015%2C%202021%20%2D%20Almost%2080,the%20COVID%2D19%20Healthcare%20Coalition. Accessed 25 May 2021

42. United States Census Bureau, Quick Facts United States (2019). https://www.census.gov/quickfacts/fact/table/US/PST045219
43. Davis, C.O.: The Queens' English: The Lgbtqia+ Dictionary of Lingo and Colloquial Expressions. Clarkson Potter, New York (2021)