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# Transgender Individuals and Digital Health

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## Abstract

**Purpose of review** The goal of this review is to assess the use of digital technologies to promote the health and well-being of transgender and gender diverse (TGD) people.

**Recent findings** TGD individuals experience numerous health disparities, including low uptake of HIV prevention strategies, such as pre-exposure prophylaxis, increased HIV incidence, and suboptimal HIV-related outcomes. These health disparities are the result of widespread intersectional stigma on the basis of gender identity, gender expression, socioeconomic class, race, and ethnicity, which negatively impact access to general medical and transgender-specific health care. TGD individuals often delay or avoid essential medical services due to fear of discrimination. Clinicians frequently lack training, competence, and skills in transgender medicine, further exacerbating the health disparities faced by TGD people. Digital technologies have been used to improve research and clinical care for TGD populations through various modalities; telemedicine, telehealth and mHealth.

**Summary** Digital health technologies, including HIT-enabled clinical decision support, telehealth, telemedicine, and mHealth, offer innovative ways to improve health care access, improve quality of care, and reduce health disparities for TGD populations, including and beyond HIV outcomes, through enhanced care delivery, clinician education, and enhancing social support networks.

**Keywords** Transgender · Digital health · mHealth · HIV · Telehealth · Telemedicine

Transgender and gender diverse (TGD) individuals have a gender identity that differs from their sex assigned at birth [1]. This includes transgender men and women as well as an increasing number of individuals whose gender falls outside of the gender binary, including nonbinary and agender individuals [2]. The most recent data estimate there are over 1.3 million transgender adults in the USA [3••]. TGD individuals worldwide face health disparities such as higher rates of mood disorders, substance use, HIV, sexually transmitted infections, as well as underutilization of preventive health services, including suboptimal uptake of pre-exposure prophylaxis (PrEP) [4–11]. These adverse health outcomes are related to multilevel syndemic factors, such as verbal harassment, physical violence, transphobia, and denial of health services, experienced by TGD individuals due to their gender identity [12, 13]. The use of digital health, i.e., mobile health (mHealth), health information technology (HIT)–enabled clinical decision support (CDS), telehealth, and telemedicine, provide important innovations that have the potential to improve health access, improve quality of care, and reduce health disparities for TGD persons.

In this review, we summarize the current state of digital health utilization relevant to TGD individuals, including the increase in telemedicine use during the COVID-19 pandemic, and the impact on access to gender-affirming care and HIV services.

## Identification of Transgender Individuals for Research and Clinical Care

One of the largest barriers to having valid and reliable outcomes data for transgender individuals is that most national surveys do not include options to identify people who are

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transgender or gender diverse, instead defaulting to male and female sex markers [14, 15]. There are robust data that support the use of a two-step question, i.e., asking both gender identity and sex assigned at birth (Table 1), to improve identification of transgender individuals for both clinical care and research [16–18]. The Centers for Medicare and Medicaid Services (CMS) and the Office of the National Coordinator for Health Information Technology (ONC) currently require electronic health record (EHR) systems to include the ability to record gender identity and sexual orientation for patients [19]; however, institutional implementation is often hampered by inconsistent medical terminology standards and clinical systems that do not meaningfully address sex and gender diversity [15, 20, 21]. In addition, providers' discomfort asking these questions, and lack of training and resources further limit an accurate collection of these data [22, 23]. In the absence of a two-step question, health facilities can leverage electronic health record (EHR) content to improve identification of TGD people. The International Classification of Disease (ICD) codes for gender dysphoria or other medical transition–related codes (Table 2) have often been used to identify TGD people within health systems although use these of codes may undercount individuals who are unable to access gender-affirming interventions, which disproportionately impacts those of lower socioeconomic status and people of color [24]. The Veterans Hospital Administration (VHA) validated ICD codes to identify TGD veterans and subsequent analyses revealed numerous health disparities including higher rates of suicide, housing instability, economic hardship, and substance use in transgender individuals compared to cisgender veterans [25–27]. Other entities have utilized algorithms that include ICD codes, pharmacy data (provision of gender-affirming hormones, e.g., testosterone or estrogen), and natural language processing (NLP) with key words, including "transgender," "gender dysphoria," and "genderqueer" to identify TGD people within their patient populations [28–31, 32••].

**Table 1** Assessing gender identity using a two-step question

| 1. Current gender identity |
|---|
| How do you describe yourself? (check one) |
| Male/Man |
| Female/woman |
| Transgender male/man |
| Transgender female/woman |
| Genderqueer/gender nonbinary |
| Another gender _____ |
| 2. Sex assigned at birth |
| What sex were you assigned at birth, on your original birth certificate? |
| Male |
| Female |

Two-step Question for Gender Identity, Callen-Lorde Community Health Center, New York

**Table 2** Transgender-related ICD codes

| ICD code | |
|---|---|
| F64 | Transsexualism |
| F64.2 | Gender identity disorder of childhood |
| F64.8 | Other gender identity disorders |
| F64.9 | Gender identity disorder, unspecified |
| Z87.890 | Personal history of sex reassignment |
| Z43.7 | Attention to artificial vagina |

A recent study used such an algorithm to explore viral suppression rates among transgender individuals accessing New York State Medicaid. First, the authors used transgender-related ICD-9 and ICD-10 codes, and prescription data discordant with assigned sex (e.g., estrogen therapy for a person designated male) to create a cohort of 6335 TGD persons who accessed Medicaid in 2013–2017, of whom 1764 (28%) were living with HIV [32••]. Further examination of NYS Medicaid beneficiaries revealed lower HIV viral suppression rates among transgender people living with HIV compared to cisgender women and men (76% vs. 80.4%, 83.3%), except among those who obtained gender-affirming surgery (86.3%) [33].

In the VHA database, receipt of both gender-affirming hormone therapy and surgical interventions (chest and genital reconstruction) was associated with lower rates of suicidal ideation and symptoms of depression compared to not receiving any interventions or receiving only hormones [34]. Both the NYS Medicaid and the VHA studies show the importance of establishing cohorts through the use of HIT to obtain data about transgender health outcomes. The creation of larger cohorts and registries may also provide needed information about the long-term risks and benefits associated with gender-affirming interventions [35, 36].

## Telehealth and Electronic Consultations

One of the greatest barriers to TGD people accessing healthcare is health care providers' lack of knowledge of their unique needs, including provision of gender affirming care [37]. TGD people, especially in rural areas, may have difficulty accessing competent care close to where they live [38]. Numerous studies have shown that medical providers, at both the undergraduate and postgraduate level, lack sufficient training in transgender health [39, 40]. Improved competency and comfort delivering transgender care is associated with increased exposure to transgender clients during training [41]; however, this level of exposure may be

difficult to attain, especially in rural areas. Telehealth has transformed transgender health-related medical education by facilitating access to online trainings, webinars, and workshops that provide content critical to providing competent care to TGD patients [42, 43]. An exciting new development in telehealth is the ability for transgender medicine content experts to mentor clinicians through electronic consultations (eConsults). eConsults are typically provided promptly and securely through the electronic medical record software [44]. The use of eConsults minimizes the need for specialty referrals and has been shown to be both efficient and cost-effective [45]. eConsults in transgender health have been used to assist with hormonal therapy management, management of bloodwork, and behavioral health–related care [44, 46, 47]. Studies have also pointed to the educational value of eConsults in the training of PCPs in transgender care, with most PCPs reporting increased knowledge, improved comfort caring for transgender clients, and improved patient care plans [47, 48]. Although we did not find any studies that evaluated the use of eConsults to improve HIV care and prevention specifically for TGD patients, there is evidence that when TGD patients are comfortable addressing gender-related issues with their HIV providers, i.e., the cultural competence and skills that can be attained through telehealth, there are associated improvements in adherence to antiretroviral regimens and viral suppression [49]. Similarly, clinicians who provide primary care and gender affirming care to TGD patients living with HIV can improve their knowledge and confidence providing HIV-related care through the use of warmlines and other types of remote consultations [50–52].

There are a variety of electronic resources available to facilitate access by TGD people to health and support services that have the potential to positively impact social determinates of health. One example is the TransAtlas in New York City that allows patients to locate diverse health-related services, including gender-affirming hormone care, gender-affirming surgery, mental health, legal aid, housing, food and nutrition services, primary care, and HIV prevention and treatment services [53].

## Telemedicine

Telemedicine uses electronic information and telecommunications technology, including telephone and video chats, to allow medical care to be provided remotely. Telemedicine has been proposed as a means to expand transgender care access, as it has been widely used to overcome geographical and access barriers to health care in disadvantaged communities [54]. With the onset of the COVID-19 pandemic in 2020, many community-based and hospital-based health centers implemented or scaled-up telehealth primary care and specialty services across the US [55–57]. During the pandemic, there was a parallel increase in telemedicine services for gender-affirming care [58, 59].

Telemedicine during the COVID-19 pandemic offered many benefits for TGD patients beyond a reduction in coronavirus transmission risk, including not needing to arrange transportation, navigate the use of public restrooms, and avoidance of negative interactions while in public and in clinical settings [60]. On the other hand, use of telemedicine can be challenging for those who are older or less computer literate, lack of broadband access or computer hardware, or a safe and confidential space to conduct telehealth visits [61]. From a clinical perspective, there are practical limitations such as not being able to adequately conduct physical examinations, a perceived negative impact on the provider–patient relationship as well as an unpredictable regulatory and reimbursement environment [57, 62].

Even before the pandemic, there were several companies that offered telehealth specifically to transgender clients, including Folx Health, Plume, Queer Med, and QueerDoc [58, 63–67]. The majority of these were founded by transgender individuals, employ transgender medical providers, and have acquired a large client-base due to their reputations of providing judgment-free, affirming services, even though they often require monthly payment plans, which may not be reimbursed by insurance.

The majority of TGD patients express satisfaction with telemedicine services as evidenced by improved uptake in care that is provided remotely [68]. A study of gender diverse youth indicated that patients were significantly more likely to prefer a video visit instead of an in-person office visit [69]. A separate study in people of transgender experience between 12 and 26 years showed as many as 50% expressed interest in receiving gender care via telemedicine, including a majority preferring to receive primary medical care that way [70]. Furthermore, surveys have also indicated satisfaction with the care provided via telemedicine and willingness to continue using it [71]. There are limited data to examine health outcomes using telemedicine delivery [72]; however, transgender patients during the COVID-19 pandemic who received telemedicine services reported improved mental health outcomes [68]. The use of telemedicine is particularly relevant to TGD people living with HIV. Although there are no HIV outcomes data specific to this population, the benefits of telemedicine for people living with HIV during the COVID-19 pandemic have included fewer barriers related to transportation and greater flexibility in scheduling of appointments. An evaluation of care retention at a San Francisco HIV clinic found that the overall nonattendance rate declined from 16.5% in the pre-pandemic period to 13.1% during the pandemic when most visits (86.9%) had switched to virtual [73]. A community health center in Boston that serves the lesbian, gay, bisexual, and transgender (LGBTQ) communities did

not observe any adverse impact of telehealth visits on retention in care or viral suppression, although these results were not stratified by gender identity [74]. There are still gaps in knowledge about the long-term impact of telehealth visits on HIV-specific outcomes, such as HIV viral suppression, cancer screening, STI screening, as well as access to wrap-around services, such as case management. These services are essential to the health and wellbeing of TGD people living with HIV, who experience due to higher rates of housing instability, food insecurity, and have more mental health needs compared with their cisgender counterparts.

## Mobile Health (mHealth) Technologies

In recent years, mobile health technology (mHealth) interventions have emerged as an important and innovative approach for providing prompt and confidential health information, referrals, and behaviorally based motivationally supportive messages employing various digital communication technologies (text messaging, mobile apps, social media messaging) [75, 76].

A variety of both evidence-based and novel characteristics are offered by mHealth and other technology-mediated interventions for TGD individuals, with particular emphasis on improving health outcomes along the HIV Care Continuum [77, 78] (Table 3). Although any mobile devices that can transfer data are considered part of the mHealth category, cell phones are currently the most widely used platform for mHealth distribution. With the advent of the smartphone, mobile technology has become widespread, with populations of all socioeconomic strata, races, and ethnicities incorporating it into their daily lives [79, 80]. MHealth interventions exhibit considerable potential but are currently underutilized for underserved and populations placed marginally from health systems, such as transgender women, who persistently experience complex and concurrent systemic and individual barriers to engaging in the HIV care continuum [81].

A recent systematic review [77] identified 24 mHealth interventions tailored for TGD youth of which 7 were HIV related (HIV testing, prevention, or HIV services for people living with HIV). TechStep is an ongoing RCT that aims to evaluate if mHealth interventions such as text messaging or the web app are as or more efficient than traditional health interventions to reduce sexual risk behaviors and increase PrEP uptake among transgender youth and young adults (ages 15–24) [82]. Project Moxie used a remote video-chat counseling intervention to facilitate HIV self-testing that was found to be highly acceptable to participants and increased willingness to use PrEP [83]. Text Me, Girl!, an RCT, which provided trans-feminine young adults (ages 18–34) living with HIV with supportive text messages, demonstrated significant outcomes for increased antiretroviral treatment (ART) uptake, engagement in care, excellent ART adherence, and viral suppression by the 18-month follow-up [84]. A third study, Trans Women Connected, showed preliminary usability and acceptability of the mobile phone app as well preliminary effects in self-efficacy seeking transgender and queer-friendly health services, intentions to find online support, and knowledge of pre-exposure prophylaxes (PrEP) as HIV prevention [85]. LifeSkills Mobile is the adaption of a CDC EBI (evidence-based intervention), Project

**Table 3** mHealth HIV-related interventions for transgender and gender diverse populations

| Focus | Name | Description | Population |
|---|---|---|---|
| HIV testing | | | |
| | Project Moxie [83] | Video chat, online | Transgender youth, 15–24 |
| | TechStep: web app/SMS [82] | Web app, chat, SMS | Transgender youth, 15–24 |
| | Trans Women Connected [89] | Smartphone app | Transgender women, 18–49 |
| | MyPEEPS YTM [90] | Web app | Transgender men, 15–19 |
| HIV prevention (condom use and PrEP) | | | |
| | LifeSkills Mobile [91] | Mobile app | Transgender women, 16–29 |
| | TechStep: web app/SMS [82] | Web app, chat, SMS | Transgender youth, 15–24 |
| | Project Moxie [83] | Video chat, online | Transgender youth, 15–24 |
| | Trans Women Connected [85] | Smartphone app | Transgender women, 18–49 |
| | MyPEEPS YTM [90] | Web app | Transgender men, 15–19 |
| | MES-PrEP/YaCool (Thailand) [92] | Web app/SMS | Transgender women, 16–29 |
| | MyLink2Care (Malaysia) [93] | Smartphone app | Transgender women, 18 + |
| | SHINE [94] | SMS, web app | African-American transgender women, 18 + |
| HIV engagement/retention/viral suppression | | | |
| | Text Me, Girl [84]! | SMS | Transgender women, 18–34 |

Life Skills, to reduce HIV risk among young transgender women [86]. Both usability ratings and ratings for satisfaction and accessibility were in the good to excellent range [86].

Research documenting the utilization of technology among TGD communities, particularly among youth, showed high uptake of using online platforms for health-seeking behaviors and health information, making this an encouraging avenue to deliver gender-affirming health interventions [87].

MHealth interventions may provide an opportunity for more engagement in sexual health care and the HIV care continuum as it helps alleviate some of the stigma surrounding sexual health care [87]. However, there is currently a lack of information on how to employ digital technology to fulfill the health requirements of TGD persons engagement in the HIV care continuum [88].

One question to be explored, given the importance of social cohesion and community connection in promoting positive health outcomes [12], is whether the unique, interactive online support network features of some mHealth applications offer a critical role for many TGD communities to establish social support networks that may buffer negative structural and environmental factors.

## Conclusion

Digital health technologies, including HIT, telehealth, telemedicine, and mHealth, offer innovative ways to improve health care access and improve quality of care for TGD populations, including and beyond HIV outcomes. Using these interventions to receive health education and support and to locate resources to improve social determinants of health (e.g., housing and employment) may translate to improved health outcomes for TGD individuals. Furthermore, these interventions are desired by the community. By harnessing and tailoring these multifaceted features, along with direct ethical engagement with TGD communities [95, 96] and investments in development, implementation, and dissemination, these technologies offer a potential way to address multilevel socioecological barriers to care engagement and improve health outcomes of TGD communities. Further research is needed to determine the impact of digital health on health outcomes for TGD people living with HIV.

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## Declarations

**Conflict of Interest** The authors declare no competing interests.

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