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## Investigating the Content of #UequalsU on Twitter

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### ABSTRACT

Undetectable = Untransmittable (U = U) is the scientific fact that HIV cannot be transmitted when an individual is virally suppressed. This breakthrough discovery has the potential to greatly reduce HIV stigma and its negative effects. However, U = U is not widely known. Given that Twitter has the potential to raise awareness of health issues, the purpose of this study was to analyze the content of the #UequalsU on Twitter. The results showed that mentioning sex and mentioning love were strong predictors that a tweet would be liked and retweeted. This information could help to spread the message of U = U more widely and potentially lessen HIV stigma.

The U.S. HIV epidemic continues to afflict roughly 40,000 individuals per year, with the CDC (2019) noting that progress in preventing HIV has slowed. One of the most significant challenges to ending HIV is that the life-saving treatments and preventive measures are not reaching the groups most affected by the disease (CDC, 2019). A Twitter-based campaign called #UequalsU (Prevention Access, 2021) was designed to promote the fact that people who are HIV positive and virally suppressed cannot pass HIV on to sexual partners (CDC, 2021). This fact is referred to as Undetectable = Untransmittable (U = U) (National Institutes of Health [NIH], 2019). U = U could dramatically improve the lives of people living with HIV by reducing HIV stigma. This is because U = U removes a great deal of the fear surrounding HIV: U = U keeps HIV positive people healthy and prevents them from transmitting HIV during sex (CDC, 2021). In many ways, U = U renders fear of HIV, and HIV stigma, illogical. However, research shows that U = U is not widely known (Okoli et al., 2021).

The purpose of this study was to analyze the content of the #UequalsU campaign, focusing on the components of campaign tweets, such as whether tweets mentioned love, sex, or contained a personal narrative, that might predict likes and retweets. Understanding what makes #UequalsU tweets appealing enough to retweet and like could help to spread the U = U message. Although other studies have investigated likes and retweets on Twitter (Cappella et al., 2015; Kim, 2015; Kim & Yang, 2017; Zhu et al., 2020), none have done so in the context of U = U. This is important because Twitter has the potential to diffuse information widely (Ross & Dumitrescu, 2019), and could spread information that may be able to correct misperceptions about HIV and reduce HIV stigma. Additionally, research shows that U = U is relatively unknown (Okoli et al., 2021), which reinforces the need for messaging about it through a variety of channels, including Twitter. Twitter is a source of health information for many people (Perashad et al., 2018).

### HIV campaigns

In the beginning of the AIDS epidemic, messaging about HIV in the U.S. faced a variety of barriers, including the government's refusal to acknowledge the deadly disease (Shilts, 1987). In 1986, to fill the void left by the government's inaction, the American Red Cross launched a national campaign called *Rumors are Spreading Faster than AIDS*, a series of public service announcements featuring celebrities correcting misperceptions on how HIV is spread (Davis, 2006). From 1987 to 1991, the CDC sponsored a public information campaign titled *America Responds to AIDS*, that addressed a wide range of topics, including understanding AIDS, humanizing AIDS, the risks associated with multiple partners, and how to prevent infection (Woods et al., 1991).

These campaigns utilized testimonials and individuals telling stories, as personal narratives have been shown to be especially effective at influencing audience judgment of an issue (Krämer & Peter, 2020), particularly when it comes to health (Krämer & Peter, 2020). However, while effective at educating the population about HIV, these campaigns failed to target the most at-risk group: men who have sex with men (MSM) (Davis, 2006). This was likely due to homophobia and a reluctance to discuss same-sex intimacy (Fitzsimmons, 2018). Later, more targeted messaging was then employed, often created by activist groups such as ACT UP (Davis, 2006; Fitzsimmons, 2018), and, as technology changed, campaigns evolved to match new delivery platforms, resulting in more targeted and sophisticated messaging.

A popular platform for health messaging is Twitter, due to its open access and the use of likes and retweets, which allows for engaging with and freely sharing information (Ross & Dumitrescu, 2019). Kim and Yang (2017) explained that "liking" a social media post involves a relatively low level of effort and minimal commitment to the content and tends to be emotionally driven. On the other hand, sharing content

through retweeting involves a higher level of effort and a greater level of commitment to the content because when individuals share content with others, it becomes part of the user's profile. As such, individuals may share content, in part, for purposes of self-presentation. Sharing tends to be both an emotional, cognitive, or a combination of emotional and cognitive response to content.

Researchers have investigated the features of a message, such as a tweet, that predict the act of "liking" the message. For example, Cappella et al. (2015) noted that information that is perceived as new, unusual, or surprising tends to be liked. Additionally, Cappella and colleagues explained that information regarded as useful and information that is considered persuasive is often liked.

Similarly, researchers have also investigated the features of a message that predict that the message will be shared with others. Cappella et al. (2015) explained that information with an emotional component, particularly information involving positive emotions, is likely to be shared widely because it can reflect favorably on the sender. Messages that focus on topics such as love, contentment, and sexual desire tend to evoke positive emotions (Shiota et al., 2017). However, other researchers have found that messages that trigger negative emotions (Zhu et al., 2020) or messages without an emotional appeal (Zhang & Peng, 2015) were more likely to be shared. The role of emotion in information sharing is likely influenced by topic (Kim, 2015). Kim (2015) suggested that positive emotions tend to predict sharing of information linked to individual well-being and negative emotions tend to predict sharing of messages about others, such as information about politics, accidents, and crime. Researchers have also examined other factors that influence information sharing. For example, information that is novel or surprising is likely to be shared (Cappella et al., 2015; Kim, 2015). Additionally, information that is perceived as useful is likely to be shared (Zhu et al., 2020).

Twitter likes and retweets have important implications for health communicators. Likes are a way of measuring the popularity of a particular type of message or messaging strategy (Klassen et al., 2018). For example, if tweets about a specific topic that shared a personal story received significantly more likes than tweets that did not share a personal story, health communicators might consider using personal stories in their social media efforts (Klassen et al., 2018). Retweets involve sharing a message with other people and are therefore a means of disseminating information, potentially widely (Zhang & Ahmed, 2019). For example, if an anti-stigma message was tweeted widely, it could be read by millions of people for a very low cost, possibly creating positive change (Parrott et al., 2020). Better understanding the types of messages about U = U that are retweeted could aid health communicators in promoting information about U = U. Additionally, when tweets are liked and retweeted, they become part of a user's profile, which could further spread information.

### Undetectable = Untransmittable

U = U refers to the scientific fact that a person with HIV who is adherent to their HIV medication cannot transmit HIV to HIV negative partners (CDC, 2021). A great deal of research,

employing samples of couples in which one partner is HIV negative and one partner is HIV positive, has shown overwhelming support for U = U (CDC, 2020). This research involved hundreds of people throughout the world and has included both same-sex and opposite-sex couples (CDC, 2020).

After decades of HIV-based stigma, U = U has the potential to dramatically improve the lives of people living with HIV (Fauci et al., 2019). However, many people have not heard of U = U (Okoli et al., 2021) or do not have confidence in it (Carneiro et al., 2021). Explanations for this include unclear, inconsistent, or absent communication between healthcare workers and patients (Okoli et al., 2021), healthcare provider mistrust of U = U (Ngure et al., 2020), lingering impacts of nearly 40 years of HIV-related fear (Grace et al., 2021), and inaccurate or confusing messaging about U = U (Rendina et al., 2020).

Research demonstrates that U = U improves the lives of people living with HIV. Rendina et al. (2020) surveyed over 30,000 sexual minority men living with HIV. Eighty percent of respondents reported that the U = U message had a positive effect on their self-image. Further, over 40% of respondents believed that the U = U message would greatly reduce HIV stigma. There are other benefits to U = U, as well. For example, Smith et al. (2021) found that people exposed to U = U messaging were twice as likely to get tested for HIV than people not exposed to U = U messaging. This is important because knowing one's HIV status can be the first step in obtaining treatment, if necessary, or reinforcing HIV prevention messages (CDC, 2020).

### HIV stigma

HIV stigma refers to "irrational or negative attitudes, behaviors, and judgments towards people living with or at risk of HIV" that can adversely impact individuals' health (HIV.gov, 2021). Along with important issues such as poverty, lack of education, and lack of access to HIV testing and treatment (NIH, 2021), HIV stigma has been identified as a major barrier to ending the HIV epidemic (Sullivan et al., 2020). HIV stigma has been linked to avoiding HIV testing (Gamarel et al., 2018), missing medical appointments (Christopoulos et al., 2019) and poor or inconsistent medication adherence (Reif et al., 2019). Additionally, HIV stigma can negatively impact mental health. Fekete et al. (2018) found that HIV stigma was connected to reduced sleep quality, depression, and loneliness. Ferlatte et al. (2017) found that HIV stigma was associated with suicide ideation and suicide attempts. HIV stigma can also be a barrier to finding sources of social support that help people living with HIV better cope with their illness (Quinn et al., 2018).

Corrigan (2004) identified three strategies that may function to reduce stigma: protest, education, and contact. Protest involves stigmatized groups fighting against their stigmatization to the public and through media representations. Though protest directed toward media outlets has been effective in some situations, protest directed toward the public may result in reactance and an amplification of negative attitudes (Corrigan & Wassel, 2008). Education consists of providing the public with information that corrects misperceptions about

stigmatized groups and has been found to be effective in reducing stigma, though the effects of education may be short term (Corrigan, 2004). Lastly, contact involves creating opportunities for people to encounter members of stigmatized groups, thus humanizing and possibly creating compassion for stigmatized individuals (Corrigan, 2004). Research shows that contact can be a highly effective way of reducing stigma (Corrigan & Wassel, 2008).

Using Twitter may be an effective way for health advocates to combat HIV stigma because it offers the possibility for education (Corrigan & Wassel, 2008) through the spread of information (Ross & Dumitrescu, 2019; Zhang & Ahmed, 2019), and contact (Corrigan & Wassel, 2008) through the sharing of personal narratives (Klassen et al., 2018). Twitter's low cost and potentially extensive reach make it especially appealing (Park et al., 2016). Anti-stigma messaging is a part of a variety of social media discussions, including mental health (Berry et al., 2017), anorexia nervosa (Bowen et al., 2020), and PrEP (Schwartz & Grimm, 2017). In their analysis of tweets about PrEP, Schwartz and Grimm (2017) found that tweets fighting PrEP stigma were most likely to be retweeted or liked, suggesting that addressing stigma was particularly important to users.

## The Sexual Health Model

The Sexual Health Model emphasizes the idea that “sexual health affirms sexuality as a positive force, enhancing other dimensions in one's life” and prioritizes sexual pleasure (Robinson et al., 2002, p. 45). It provides a critique of other strategies of HIV prevention that have “desexualized” HIV and neglected the socio-emotional realities of HIV (Coleman, 2011, p. S22). Crossley (2002) argued that approaches to HIV prevention that rely solely on providing affected populations with information tend to struggle with effectiveness because they do not consider the meaning sexual practices have for target populations.

The Sexual Health Model is composed of multiple components, including talking about sex, sexual healthcare and safer sex, positive sexuality, and intimacy and relationships (Robinson et al. (2002). Research demonstrates that interventions that utilize a Sexual Health Model approach to HIV prevention can be highly effective (Becasen et al., 2015; Hogben et al., 2015; Mustanski et al., 2015). For example, Becasen et al. (2015) analyzed 58 studies that were guided by sexual health principles. They found that sexual health-focused interventions were successful across a variety of domains, including improving communication with sexual partners, reducing risk behaviors, reducing stigma, and increasing participants' access of health resources.

Similarly, recognizing that LGBT youth's needs are typically overlooked in sexual education, Mustanski et al. (2015) developed an online intervention called Queer Sex Ed to teach LGBT youth relationship and sexual education skills. The intervention utilized Sexual Health Model principles. In a pretest, posttest design, participants who completed the intervention scored significantly higher than baseline on a variety of measures, including STI knowledge, HIV knowledge, sense of belonging, and communication skills.

One reason why interventions that employ insights from the Sexual Health Model have been successful might be because they reinforce positive emotions such as love, and pleasurable experiences, such as sex (Shiota et al., 2017). In other words, they make an effort to acknowledge the socio-sexual realities of the audiences they are attempting to reach (Crossley, 2002). Although messaging utilizing positive emotional language involving love and sex has not been studied on Twitter, the fact that it has been effective elsewhere (Becasen et al., 2015; Hogben et al., 2015; Mustanski et al., 2015) suggests that these types of tweets might resonate with users, which could prompt likes and retweets.

## Summary and research questions

The research reviewed above establishes the importance of likes and retweets in health communication (Klassen et al., 2018; Zhang & Ahmed, 2019). Given that HIV stigma is a significant barrier to ending HIV (Sullivan et al., 2020) and that knowledge U = U can lessen the effects of HIV stigma (Rendina et al., 2020; Smith et al., 2021), spreading information about U = U, including on Twitter, is important.

Tweets that contain useful information (Zhu et al., 2020), emotionally evocative content (Cappella et al., 2015), personal narratives (Krämer & Peter, 2020) and anti-stigma messaging (Parrott et al., 2020; Schwartz & Grimm, 2017) are likely to be liked and retweeted. Interventions that employed insights from the Sexual Health Model have been successful (Becasen et al., 2015; Hogben et al., 2015; Mustanski et al., 2015), likely because they involve love and sex, which evoke positive emotions (Shiota et al., 2017). Content involving positive emotions is often liked and shared on Twitter (Cappella et al., 2015).

For these reasons, our analysis focused on the presence of information, mentions of love, mentions of sex, mentions of stigma, and use of a personal narrative in #UequalsU tweets. We endeavored to explore the extent to which these elements predicted whether a tweet was liked or retweeted. The study's RQs are listed below:

RQ1: To what extent does the presence of information, love, sex, stigma, and use of personal narratives predict number of retweets in #UequalsU tweets?

RQ2: To what extent does the presence of information, love, sex, stigma, and use of personal narratives predict number of likes in #UequalsU tweets?

## Method

To address the RQs listed above, a content analysis of #UequalsU tweets was conducted. The sample of tweets analyzed for this study were collected using Brandwatch, a social media analysis tool. We ran a query in Brandwatch to gather all tweets using #UequalsU from July 21, 2016 (the launch of the UequalsU hashtag) to Jan 30, 2021, yielding 227,746 tweets. We exported 2,000 randomly selected tweets from Brandwatch to code. After excluding tweets with broken links, tweets from suspended accounts, tweets that were not in English, and tweets

that had nothing to do with the hashtag, the total number of tweets coded was 1,578. If a tweet included a photo or video, the text associated with that material was coded as well. For example, if a tweet included an image with the text “U = U means that undetectable people cannot spread HIV to their sexual partners” the text was coded along with the content of the tweet.

In addition to the tweets themselves, information exported by Brandwatch included the username of the person who authored the tweet, their number of followers, the number of times the tweet had been retweeted, and the number of people that were following the user. All Brandwatch-supplied information was verified. The number of “likes” was not included, and so the authors manually looked up that information on Twitter using each tweet’s link.

Coding categories were developed from research that suggested that including sex (Cappella et al., 2015), love (Cappella et al., 2015), stigma (Parrott et al., 2020), personal narratives (Krämer & Peter, 2020) and information (Zhu et al., 2020) would encourage message sharing and appeal. The two authors conducted the study’s coding. To identify themes from the data set, we open-coded 100 tweets not included in the sample. A different sample of 100 tweets was used to establish inter-coder reliability which were also not included in the study’s sample. Krippendorff’s alpha was used to measure agreement.

For each tweet, we coded the following information: the number of retweets a tweet had ( $\alpha = 1.0$ ), the number of likes a tweet had ( $\alpha = 1.0$ ), and the number of followers the author of the tweet had ( $\alpha = 1.0$ ). Additionally, we coded whether the tweet mentioned sex ( $\alpha = 1.0$ ), whether a tweet mentioned love ( $\alpha = 1.0$ ), whether a tweet mentioned stigma ( $\alpha = 1.0$ ), and whether a tweet contained a personal narrative ( $\alpha = .97$ ). Lastly, we coded the number of instances of U = U information in the tweet ( $\alpha = .94$ ). We supplemented the “instances of information” category by coding whether a tweet mentioned a U = U medical study ( $\alpha = 1.0$ ).

We coded a tweet as mentioning sex if the word “sex” was used in the tweet. We coded a tweet as mentioning love if the word “love” was used in the tweet. We coded a tweet as mentioning stigma if the word “stigma” was used in the tweet. We coded a tweet as containing a personal narrative if the tweet used the word “I” and shared personal information about the author of the tweet. We coded “instances of U = U information” by counting the number of times a tweet stated that people who are undetectable cannot pass HIV to their sexual partners. Additionally, if a tweet included a link to external resources about U = U, we counted that as an instance of information, after verifying its contents with CDC data (CDC, 2021). We coded whether a tweet mentioned a U = U medical study described by the CDC as evidence supporting U = U (CDC, 2020). The studies identified by the CDC were the HTPN052 study, the PARTNER study, the Opposites Attract Study, and the PARTNER 2 study (CDC, 2020). Examples of coding categories are listed in Table 1.

## Results

In the sample, 11.6% of tweets ( $n = 184$ ) employed a personal narrative, 22.1% of tweets ( $n = 350$ ) mentioned sex, 4.9% of tweets ( $n = 77$ ) mentioned love, and 22.7% ( $n = 357$ )

mentioned stigma. Tweets contained an average of 1.15 incidents of information per tweet. This information, along with a full description of the sample of tweets, is presented in Table 2.

RQ1 queried the extent to which the presence of love, sex, stigma, use of personal narratives, and information in #UequalsU tweets predicted number of retweets. To address RQ1, a multiple regression analysis was conducted. The dependent variable was “number of retweets.” Predictors were whether a tweet mentioned love, whether a tweet mentioned sex, whether the tweet mentioned stigma, whether the tweet used a personal narrative, the total number of incidents of information in the tweet, and the user’s number of followers. The linear combination of measures was significantly related to the number of retweets,  $F(6, 1572) = 60.15$ ,  $p < .001$ . The sample multiple correlation coefficient was .43, indicating that approximately 19% of the variance can be accounted for by the linear combination of variables. The two strongest predictors were whether a tweet mentioned love and whether a tweet mentioned sex. Tests to determine if the data met the assumption of collinearity indicated that multicollinearity was not a concern. This information is presented in Table 3.

RQ2 queried the extent to which the presence of love, sex, stigma, use of personal narratives, and information in #UequalsU tweets predicted number of likes. To address this question, a multiple regression analysis was conducted. The dependent variable was “number of likes.” Predictors were the same as above. The linear combination of measures was significantly related to the number of likes,  $F(6, 1572) = 70.00$ ,  $p < .001$ . The sample multiple correlation coefficient was .46, showing that about 21% of the variance can be accounted for by the linear combination of variables. As was the case for RQ1, the two strongest predictors were whether a tweet mentioned love and whether a tweet mentioned sex. Tests to determine if the data met the assumption of collinearity indicated that multicollinearity was not a concern; this information is presented in Table 4.

## Discussion

The results of this study showed that mentioning love and sex predicted that #UequalsU tweets would be liked and retweeted. For organizations interested in promoting U = U, this study yielded information that could help to spread the message of U = U. Given that U = U is not widely known (Okoli et al., 2021), this information could help to reduce the impact of stigma on people living with HIV (Fekete et al., 2018; Ferlatte et al., 2017) and slow the rate of new HIV infections by educating people about U = U and providing opportunities for virtual contact with individuals impacted by HIV, two strategies shown to reduce stigma (Corrigan, 2004). Beyond U = U, this study showed that investigating the content of tweets can be a valuable way of assessing the kinds of messages that encourage likes and retweets on Twitter. Given that Twitter messages potentially have a wide reach (Ross & Dumitrescu, 2019), this information may be useful for other health campaigns, particularly for ones that seek to raise awareness of a lesser-known or novel health issue.

**Table 1.** Examples of coding categories.

Category	Example
Tweet mentions sex	Princess Diana said you could hug someone with HIV without risk. This needed to be said. Now: You can have sex, without condoms, with someone who has HIV and is on treatment, without risk. This needs to be understood. #UequalsU HIV has changed. Tell everyone. (@LucasJV_, 2020).
Tweet mentions love	YES! U = U I = I K = K M = M N = N S = S O = O B = B etc flourished around the world because of 950 partners in 99 countries united around truth, science, social justice, and a passion to love without fear! The solidarity has been astonishing! #UequalsU #UUnity #LeaveNoOneBehind. (@johnfrancisleo2, 2019).
Tweet mentions stigma	Hey guys, did you know that HIV is not sexually transmittable with effective treatment? It's time to end HIV stigma once and for all. #NoHIVstigma #UequalsU Learn more here <a href="https://t.co/FDgiyeVmge">https://t.co/FDgiyeVmge</a> <a href="https://t.co/kkzaOHTb9N">https://t.co/kkzaOHTb9N</a> (@zulukester, 2019).
Tweet uses a personal narrative	my bf and i are a discordant couple. he's HIV poz and i'm negative. we've been together for 13 years. i love him and we've come out telling people our short story. #lovewins #UequalsU #fightthestigma #HIV #AIDS (@benpadero, 2020).
Tweet contains zero instances of information about U = U	Join the Campaign#endHIVstigma A positive attitude toward PLHIV could save thousands of lives in future. #endhivstigma #UequalsU (@d_moraa, 2019).
Tweet contains one instance of information about U = U	Merce takes his meds every day to stay #undetectable! Did you know that if you have #HIV, staying undetectable means that you have no risk of transmitting HIV to your sex partners? [1]. (@fabulousSanchez, 2019).
Tweet contains two instances of information about U = U	When the level of HIV in a person's blood is so low that it cannot be detected, it means that person has an undetectable viral load and cannot transmit the virus to others [1]. Visit <a href="https://t.co/WHfrp8xZCe">https://t.co/WHfrp8xZCe</a> and learn more [2]. #KnowYourStatus #UequalsU. (@babayan_rosa, 2019).
Tweet contains three instances of information about U = U	Today is #WorldAIDSday and EMMA International wants to help bring #awareness to how effective #HIV treatments are in stopping the #spread of HIV [1]. We want to celebrate #UequalsU and remind everyone that undetectable = untransmittable [2]. Learn more at <a href="https://t.co/MloL0dSV22">https://t.co/MloL0dSV22</a> [3]. (@EMMAintl, 2020).
Tweet mentions a U = U medical study	The PARTNER2 study found no transmission of #HIV between gay couples where one is HIV-undetectable and the other is HIV-negative. They had condomless anal sex 76,000 times. Someone who is HIV-undetectable cannot pass on the virus through sex #UequalsU <a href="https://t.co/lMkyntZrbo">https://t.co/lMkyntZrbo</a> . (@theysaydom, 2019).

Given the predictive power of mentioning sex and love in #UequalsU tweets, this study's findings suggest that emphasizing the human elements of a health issue could be an effective

**Table 2.** Descriptive statistics.

Number of Twitter followers	<i>M</i> = 3966.33 <i>SD</i> = 27191.52 <i>Mdn</i> = 876.00 <i>Mo</i> = 35
Number of retweets	<i>M</i> = 149.56 <i>SD</i> = 543.13 <i>Mdn</i> = 8.00 <i>Mo</i> = 0.00
Number of likes	<i>M</i> = 731.53 <i>SD</i> = 3542.22 <i>Mdn</i> = 19.00 <i>Mo</i> = 0
Tweet used a personal narrative	<i>n</i> = 184 (11.6%)
Tweet mentioned sex	<i>n</i> = 350 (22.1%)
Tweet mentioned love	<i>n</i> = 77 (4.9%)
Number of incidents of information in tweet	<i>M</i> = 1.15 <i>SD</i> = .92 <i>Mdn</i> = 1.00 <i>Mo</i> = 1
Tweet mentioned a U = U medical study	<i>n</i> = 67 (4.3%)
Tweet mentioned stigma	<i>n</i> = 357 (22.7%)

**Table 3.** Predictors for number of retweets.

Predictor	Beta	SE	t	Tolerance	VIF
Tweet mentioned sex	.20***	31.63	8.45	.93	1.04
Tweet mentioned love	.33***	59.67	14.22	.97	1.08
Tweet mentioned stigma	-.04	30.50	-.85	.98	1.03
Tweet used a personal narrative	.06*	39.98	2.57	.97	1.03
Total number of incidents of information in tweet	.06**	14.22	2.63	.94	1.07
Number of Twitter followers	-.02	.000	-1.04	1.00	1.00

\**p* < .05.\*\**p* < .01.\*\*\**p* < .001.**Table 4.** Predictors for number of likes.

Predictor	Beta	SE	t	Tolerance	VIF
Tweet mentioned sex	.23***	199.06	9.92	.92	1.08
Tweet mentioned love	.36***	375.45	15.85	.97	1.04
Tweet mentioned stigma	-.07**	191.92	-3.00	.98	1.03
Tweet used a personal narrative	-.02	251.55	-.75	.97	1.03
Total number of incidents of information in tweet	.01	89.48	.49	.93	1.07
Number of Twitter followers	-.01	.01	-.97	1.00	1.00

\*\**p* < .01.\*\*\**p* < .001.

way to stimulate discussion about it. Integrating insights from the Sexual Health Model of HIV prevention (Robinson et al., 2002) may work to raise awareness of U = U. For example, interventions could make a point of acknowledging that sex is pleasurable and is often about making connections with others (Robinson et al., 2002). These types of efforts have proven successful in the past (Becasen et al., 2015; Hogben et al., 2015; Mustanski et al., 2015). This perspective has been embraced by the World Health Organization and is employed in a number of countries, but not in the U.S. (Ford et al., 2017)

Hemingway (2012) argued that health interventions will not achieve their goals without acknowledging their target audience's humanness. She wrote, "to be successful, [health interventions] need to function as social movements designed to transform reality for players within a particular context" (p. 452).

Emphasizing sex and love may be a way to transform reality for people living with HIV who have long lived with the fear of transmitting HIV to others (Peyre et al., 2019) and the effects of HIV stigma (Fekete et al., 2018; Ferlatte et al., 2017).

The findings of this study also reflect the ways in which the reality of HIV has changed. In the beginning of the AIDS epidemic, treatments for HIV were nonexistent (Shilts, 1987). Messages about HIV emphasized fear, death, and dying (Fitzsimmons, 2018; Geiling, 2003). Although HIV remains a serious illness, messages such as “How many of us will be alive for Stonewall 35?” (Fitzsimmons, 2018) and “A bad reputation isn’t all you can get from sleeping around” below the image of a tombstone (Geiling, 2003), are less relevant, and arguably inappropriate, in the age of U = U.

It is important to point out that access to HIV treatment and prevention remains a pressing issue. Despite the promise of U = U, for some people, particularly people of color, HIV remains a life-threatening disease (Millet, 2020). According to the CDC, HIV disproportionately impacts Black Americans, who make up 13% of the population but 42% of new HIV diagnoses in the U.S. (CDC, 2021). Additionally, striking racial disparities exist in access to HIV prevention (Goedel et al., 2018) and HIV treatment (Landovitz et al., 2017). Any effort to promote U = U must take these race-based disparities into account.

Interestingly, whether a tweet mentioned stigma was not a significant predictor for retweets and weakly predicted not liking #UequalsU tweets. This may have been because the whole #UequalsU campaign focuses on stigma and retweeting or liking may have felt redundant to Twitter users. Alternatively, positively valenced tweets may have been more appealing to users. This is an issue to explore in future research.

Although tweets that feature health information are clearly important in spreading the message of U = U, “incidents of information” was not a powerful predictor of likes and retweets. This may reflect the idea that tweets about love, sex, and personal narratives were more interesting to users than tweets that focused on information. This finding also suggests that relying on health information-focused messages may not be enough to capture the interest of audiences. A variety of models in health communication suggest that providing health information to audiences will help create healthier populations. For example, the Health Belief Model posits that if audiences have information about the severity of a health issue and feel susceptible to it, they are more likely to engage in behavior change, provided that they also have information about the benefits of a behavior change and information about how to overcome barriers to behavior change (Noar, 2004). Social Norms Theory suggests that if health messages provide information that corrects audience misperceptions of a health issue, they will make healthier choices (Reid et al., 2010). The concept of tailoring in health communication hypothesizes that the key to reaching audiences is providing them with personally relevant health information (Rimer & Kreuter, 2006). While these interventions based on these theoretical ideas can be effective, the results of this study suggest that health communication efforts may benefit from including human-focused content in their messaging to reach and engage with audiences, especially in an information-saturated environment like Twitter.

As described by Meisenbach (2010), one way to manage stigma is to contest the fact that a stigmatizing message applies to oneself and to challenge the public’s understanding of a particular type of stigma. By tweeting and liking #UequalsU posts, users are acknowledging that HIV stigma exists, but are attempting to demonstrate that stigmatizing attitudes toward HIV are illogical given the scientific discovery of U = U. Further, by sharing personal stories and discussing sex and love, users are emphasizing their humanness and are actively rejecting narratives that define HIV positive people are dangerous or unfit romantic or sexual partners (Hibbert et al., 2018).

Additionally, Meisenbach (2010) suggested that individuals may manage stigma by employing “logical denials” that use specific evidence to challenge stigma (p. 284). Examples of logical denials include exhibiting behaviors and/or traits that discredit the stigma or engaging in discursive strategies such as directly questioning someone’s stigmatizing beliefs. On Twitter, logical denials can take a different form – users have the ability to hyperlink to scientific evidence that renders stigmatizing beliefs about HIV positive people unfounded. While infrequent ( $n = 67$ , 4.27%) users did cite and link to studies that demonstrated that HIV could not be sexually transmitted by undetectable people (CDC, 2020). This method of issuing logical denials is made possible by Twitter’s functionality, an idea that other researchers have observed as well (O’Shay-Wallace, 2020). Future research efforts may find it useful to examine other ways social media and its many unique affordances may be used for stigma management.

## Limitations and conclusions

Although it yielded potentially useful results, this study is not without limitations. Because this sample spanned five years and was not gathered in real time, some tweets that would have likely been seen by audiences came from accounts that have now been suspended, and there is no way of knowing the content of those tweets. Additionally, given the method, we can only examine the content. We have no way to determine audience reactions to the tweets themselves, and while we can see the increased likelihood of a tweet appearing in someone’s Twitter feed, there is neither a guarantee that they saw the tweet. Lastly, although we did employ a random sample, we analyzed a very small fraction of the population of #UequalsU tweets.

HIV continues to be a serious issue (CDC, 2021). HIV stigma continues to negatively impact people living with HIV (Fekete et al., 2018; Ferlatte et al., 2017). U = U presents an opportunity to meaningfully shape perceptions of the disease moving forward and improve the lives of people living with HIV (Fauci et al., 2019; Rendina et al., 2020). Given the ability of social media to reach audiences on issues of stigma (Parrott et al., 2020; Schwartz & Grimm, 2017), #UequalsU on Twitter has the ability to increase awareness of U = U. The results of this study showed that tweets that mentioned love and sex were most likely to be liked and retweeted. This knowledge may be helpful in disseminating the message of U = U more broadly, which may help to reduce, or even eliminate, HIV stigma.

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