

Privacy Concerns About Genetic Testing: Does Ethnicity Matter?

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Abstract

The direct-to-consumer genetic testing market is predicted to reach \$340 million by 2020¹⁵. DTC genetic tests (DTC-GTs) are DNA kits purchased and taken by consumers in their homes to learn about their ancestry, trait/disease propensity, etc. Although, many companies state in their privacy policies they share genetic information with third parties, it's not evident consumers completely understand how their information will be used e.g., for research or law enforcement. Prior research has found some ethnicities have low awareness of DTC-GTs e.g., African Americans and Hispanic Americans but it's not clear if this also impacts their privacy concerns¹⁴. The role of ethnicity is important due to historical reasons e.g., the case of Henrietta Lacks¹², medical experimentation on slaves, and the Tuskegee Syphilis Study⁸. This research aims to address this research gap, by examining the impact of ethnicity and attitudes toward privacy on consumers' purchase of DTC-GTs. After reviewing literature, the researcher developed a conceptual model and testable hypotheses. The researcher then surveyed 103 participants and deployed statistical techniques e.g., t-tests. Based on the study's findings, non-users of DTC-GTs don't possess higher privacy concerns about genetic testing than users. Also, while African Americans are more aware of unethical medical experimentation involving African Americans, the study revealed they're unlikely to have higher privacy concerns about genetic testing and as likely to purchase DTC-GTs. This research contributes to our understanding about privacy-related challenges in the rapidly evolving DTC-GT market.

Keywords: Direct-to-Consumer Genetic Testing, Consumer Attitudes, Genetic Data Privacy

1. Introduction

According to the MIT Technology Review, over 26 million people have shared their genetic information with one of four leading direct-to-consumer (DTC) genetic testing companies. In 2018, consumers purchased the same number of DTC genetic tests as the previous years since 2012 combined. At this rate, the MIT Technology Review predicts these companies, which include AncestryDNA, 23andMe, Family Tree DNA, and MyHeritage, will possess the genetic information of over 100 million people in the next two years⁴. DTC genetic tests are DNA kits purchased and taken by consumers in the privacy of their homes. By 2020, the DTC genetic testing market is predicted to reach a market revenue of \$340 million¹⁵. The origins of this rapidly growing market trace back to when entrepreneur Bennett Greenspan and researcher Dr. Michael Hammer founded Gene by Gene, the first commercialized DNA ancestry testing service, in the late 1990s. Family Tree DNA, a subsidiary of Gene by Gene, now competes with market giants, AncestryDNA and 23andMe, to provide consumers with unique opportunities to discover their ethnicities, long-lost relatives, and propensities to carry certain genetic disorders³.

An unexpected result of DTC genetic testing has been the offspring of sperm donors discovering their biological fathers through 23andMe or Ancestry.com. For example, NBC News spoke with over a dozen sperm donors, their children, and families about how DTC genetic tests brought them together. Peter Ellenstein, a fifty-seven-year-old theater director in Los Angeles, donated sperm decades ago. He recently met 20 of his biological children through DTC genetic tests and other online tools⁵.

While some sperm donors have welcomed the opportunity to meet their biological children through DTC genetic testing, many prefer to remain anonymous and view these tests as an invasion of privacy. This past January, CBS News interviewed Danielle Teuscher, a woman who received a “cease and desist” letter from Northwest Cryobank, the sperm bank from which she had purchased to conceive her daughter. When Teuscher saw a DNA match on her five-year-old daughter’s 23andMe profile listed as open to messaging, she messaged the relative. Soon after, Teuscher received the letter from Northwest Cryobank warning her not to contact the donor or attempt to “learn more information about his identity, background or whereabouts.” Northwest Cryobank viewed Teuscher’s act of messaging her donor’s relative on 23andMe as a breach in the contract she had signed online and a violation of the donor’s genetic privacy¹⁸.

These examples illustrate how consumers’ genetic information stored in public databases has developed into an increasingly public form of personally identifiable information. Genetic information now links back to individuals not only through their own DNA samples, but also through the genetic information they share with others. While genetic testing allows consumers to attain a deeper understanding of themselves and helps connect them with family members, it also raises several ethical and legal conundrums, especially given there are no clear guidelines regarding the privacy of consumers’ genetic information.

Further, it is unclear whether there is widespread awareness in the U.S. of privacy laws, violations of privacy, and informed consent surrounding genetic privacy. Current legislations pertaining to genetic privacy include the Health Insurance Portability and Accountability Act (HIPAA) of 1996 and Genetic Information Nondiscrimination Act (GINA) of 2008. In addition, the Common Rule of 1981 establishes standards for research involving human subjects and obtaining informed consent from participants. Notable historical examples of medical research in the U.S. involving violations of informed consent include the gynecological studies of Dr. J. Marion Sims (1845 - 1849), the case of Henrietta Lacks (1920 -1951), and the Tuskegee Syphilis Study (1932 – 1972). A gap in research exists regarding if consumers’ awareness of these events influences their willingness to consent to participating in genetics research or take DTC genetic tests. This research studies the role of privacy concerns in consumers’ adoption of genetic testing services. The research also examines the relationship between ethnicity and the adoption of genetic testing services.

2. Literature Review

2.1 Genetic Privacy Concerns

2.1.1 legislations

In the U.S., the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule sets standards for the protection of individuals’ personal health information. This legislation permits companies to store and use consumers’ personal health information for research purposes if the data is anonymized to prevent the identification of specific individuals. Since genetic data is classified as personal health information, the sharing of consumers’ genetic data with third parties is legal in the U.S. However, the fact an individual’s genetic code always links back to them, if a second DNA sample is available, invalidates the notion the data is completely anonymized¹⁵. As a result, Seward recommends “these threats to patient privacy can be mitigated through the institution of regulations offering genetic testing–specific requirements for deidentification and to ensure genetic data held by DTC companies are classified as PHI and protected by the Privacy Rule”¹⁵.

Currently, the only legislation in the U.S. directly pertaining to genetic privacy is the Genetic Information Nondiscrimination Act (GINA) of 2008. GINA protects U.S. citizens from genetic discrimination based on health insurance and employment. This law amends HIPAA to include genetic information as a type of health information. GINA also prohibits health insurers from requesting or requiring individuals or their family members to provide genetic information or undergo genetic testing. In addition, the law prohibits employers from using genetic information in employment decisions¹⁷.

Regarding the consent of participants in genetics research, the U.S. Department of Health and Human Services enacted the “Common Rule” of 1981 to establish standards for research involving human subjects in the U.S. Under the Common Rule, researchers must obtain the informed consent of participants and “must provide the research subject with information about the potential risks and benefits of participating in research”¹². Therefore, informed consent presents the issue of genetic privacy in the DTC genetic testing market. One topic this research attempts to address is

the relationship between knowledge of the above-mentioned legislations and consumers' willingness to consent to genetics research. In addition, this would also provide insights on the level of awareness of such legislation.

2.1.2 informed consent

In the DTC genetic testing market, informed consent refers to the extent to which customers understand the purposes genetic testing companies use and share their genetic information with third parties. While most companies state in their privacy policies they share genetic information with third parties, it's unclear to many customers the exact purposes for this usage. For instance, 23andMe recently implemented a marketing campaign offering customers with two DNA testing options, a "research" edition and a "traditional" edition. The research edition, priced lower than the traditional edition, offers fewer services. This leads customers to assume the research edition would utilize their genetic information for research purposes, while the traditional edition would not. However, both editions use customers' genetic information for research purposes, which customers miss unless they carefully read the privacy policy¹⁵.

In addition, Anderson and Agarwal² argue the willingness of individuals to consent to sharing personal health information, for electronic storage, is affected by different factors, such as health status and emotion, and likely to change over time. For example, the authors found individuals who experience negative emotions regarding their health status, like anger, sadness, or anxiety, are more willing to provide access to their personal health information. Since individuals' health status and emotions change over time, they concluded "consent granted by individuals should be valid only for a specific time"². This relates back to the DTC genetic testing market, because individual customers' attitudes toward their genetic information being used in research can change over time.

The fact companies can edit their privacy policies, at any point in time, presents another concern for customers¹³. Thus, an important part of gaining consent from customers is respecting their right to withdraw their genetic information from databases. While major genetic testing companies, like AncestryDNA and 23andMe, offer customers' the opportunity to withdraw their consent at any time, through their account settings, this may not apply to genetic data already processed before the withdrawal. For example, 23andMe states the following in their privacy policy,

"Any research involving your data that has already been performed or published prior to your withdrawal from 23andMe Research will not be reversed, undone, or withdrawn"¹.

This reinforces why it's critical for customers to carefully read privacy policies, before participating in genetic testing services, and stay up-to-date on any revisions to these policies. Another question this research addresses is the extent to which consumers are aware of and read privacy policies of DTC genetic testing services.

2.1.3 cybersecurity risks

Cybersecurity breaches present another concern for users of genetic testing services. On June 4, 2018, a private researcher notified the Chief Information Security Officer of MyHeritage he had uncovered a file, on a private server outside of MyHeritage, containing the email addresses and passwords of 92 million users. The same day, the company posted a statement on their blog stating the intrusion was limited to user email addresses and they had "no reason to believe that any other MyHeritage systems were compromised." MyHeritage explained how they store users' genetic information and family trees "on segregated systems, separate from those that store the email addresses, and they include added layers of security." To reduce the likelihood of data breaches, the company is working toward providing users with a two-factor authentication feature¹⁰. Accordingly, this research seeks to evaluate the extent to which consumers of DTC genetic testing services are concerned about the privacy and security of their genetic information.

Informed consent and cybersecurity risks are aspects of privacy concerns that would likely impact the purchase of DTC genetic testing kits. In fact, privacy has been defined as "the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others"⁹. Based on the above, the following hypothesis is offered:

H1: The higher the privacy concerns, the lower the propensity to purchase DTC genetic testing kits.

2.2 Ethnicity

In 2018, a team of researchers at Vanderbilt University conducted a literature review about individuals' concerns about genetic privacy and factors influencing these concerns. The team analyzed 53 studies involving 47,974 participants. During the literature review, the researchers found "in almost all studies reporting differences in perspectives by race or ethnicity, non-White individuals had greater concerns about privacy, including more desire for control over use of their data and less willingness to share data than their White counterparts⁶."

A 2011 study found African Americans were more likely to be very concerned about losing privacy from participating in psychiatric genetic studies than White Americans. Of the 1,253 patients with bipolar disorder surveyed, 41.9% of African American participants reported being very concerned, while 24.6% of White participants reported being very concerned¹¹. In 2015, researchers surveying surrogates and patients found African Americans were less receptive to participating in critical illness genetic research. They were also more likely to view the loss of confidentiality, discrimination based on genetic information, and genetic information being shared with insurance companies as major concerns of participating in genetic research⁷.

Similarly, a 2000 study, which assessed public reactions to scientists' announcement of completing the Human Genome Project, revealed African Americans were more likely to report negative reactions than White Americans. The study surveyed 407 Maryland residents with 66.7% of African American participants and 34.6% of White participants having initial negative reactions about the project. At the turn of the century, privacy, discrimination, and human cloning were common concerns participants had about genome mapping¹⁶. This study investigates whether ethnic differences have an impact on consumers' privacy concerns regarding DTC genetic testing and their purchase of such services. We also investigate whether knowledge of historical events that have undermined the privacy of African Americans in medical testing could be a reason for African Americans having greater privacy concerns.

According to Gamble⁸ feelings of being undervalued in American society and knowledge of historical instances of unethical medical experimentation lead African Americans to be more distrustful of and less willing to participate in medical research. For instance, the Tuskegee Syphilis Study, provides an example of a historical event which "predisposed many African Americans to distrust medical and public health authorities." During the government study, which took place between 1932 and 1972, 399 African American men living in Macon County, Alabama, were denied treatment for syphilis, so researchers could document the natural progression of the disease. The researchers did not inform the subjects of the purpose of the study or of their condition.

While the study greatly impacted many African Americans' attitudes toward medical research, Gamble⁸ argues this "mistrust predated public revelations about the Tuskegee study" and "the narrowness of such a representation places emphasis on a single historical event to explain deeply entrenched and complex attitudes within the Black community." Instead, she states African Americans' apprehensions date back to the antebellum period, when researchers used slaves and free African Americans as subjects for medical experimentation. During this period, the U.S. government considered slaves as property and denied them the legal right to refuse to participate⁸.

An example of medical experimentation on slaves were the gynecological studies conducted by Dr. J. Marion Sims, the father of modern gynecology. Between 1845 and 1849, Sims operated on three enslaved women in Alabama to develop a cure for the vesicovaginal fistula. Each woman "underwent up to 30 painful operations" and "Only after his experimentation with the slave women proved successful did the physician attempt the procedure, with anesthesia, on White women volunteers." After the Civil War, African Americans continued to experience medical exploitation. In the late 19th century, a grave robbing ring operated in Philadelphia, which "provided bodies for the city's medical schools by plundering the graves at a Black cemetery"⁸.

The case of Henrietta Lacks (1920 - 1951) provides another example of African Americans being utilized as subjects in medical research without consent. Lacks, an African American woman who died from cervical cancer, was the source of the HeLa cell line, the first immortalized cell line in medical research. Her cancer cells were essential to scientific advancements, such as the polio vaccine, cloning, in vitro fertilization, and gene mapping. After her death, a sample of cells were shipped from the John Hopkins Hospital to the lab of cancer researcher Dr. George Gey and subsequently sold to labs around the world. The researchers did not obtain consent from Lacks or her family to use her cells in research. In 2013, researchers published the HeLa cell line genome in open-access databases. This sparked a debate over Lacks' family's right to privacy, regarding their shared genetic sequence with her cells¹².

Reverend Floyd Tompkins of Stanford University Memorial Church once stated the following about African Americans' attitudes toward medical research,

"There is a sense in our community, and I think it shall be proved out, that if you are poor or you're a person of color, you were the guinea pig, and you continue to be the guinea pigs, and there is the fundamental belief that Black life is not valued like White life or like any other life in America⁸."

Historically, feelings of being exploited and treated as though their lives don't matter, have resulted in many African Americans being more distrustful and less willing to participate in medical research. Since genetic information is a form of health information, these existing attitudes may have implications for African Americans' attitudes towards genetic privacy. This study investigates whether ethnic differences have an impact on consumers' privacy concerns regarding DTC genetic testing services and therefore, on their purchase of such services. In particular, this study investigates whether knowledge of historical events that have violated the privacy of African Americans in medical testing, could be a reason for African Americans having greater privacy concerns.

H2: African Americans will be more aware than other ethnicities of unethical medical testing conducted on African Americans in the past.

H3: Higher awareness of unethical medical testing instances will result in African Americans having higher privacy concerns about genetic testing.

3. Research Methodology

This study's research objectives are (1) To understand attitudes towards genetic testing services; (2) To evaluate privacy concerns related to genetic testing services; (3) To examine the role of ethnicity in privacy concerns related to genetic testing services. To answer these research objectives, a literature review of secondary sources relating to the direct-to-consumer (DTC) genetic testing market, current privacy issues within the market, and the ethnic implications of medical research, was conducted. After that, a 27-question survey was developed in Qualtrics to gather primary data and distributed to participants online through a reusable link. The survey includes attitudinal questions, demographic questions, and questions built from established scale items for measuring privacy concerns. In addition, the study utilizes a correlational research design to measure the statistical significance of relationships between four independent variables and one dependent variable. The independent variables measured include (1) privacy concerns, (2) ethnicity, (3) knowledge of privacy policies, and (4) knowledge of unethical medical research. The dependent variable measured is the adoption of genetic testing services.

Furthermore, the sample population of this study was defined based on age as adults ages 18 and over. Both users and nonusers of genetic testing services were surveyed, and 120 responses were obtained. Of these, 17 responses had to be removed from the data, yielding a final sample of 103 participants. Responses were removed from the data due to respondents selecting they did not consent to participating in the study, they had no prior awareness of genetic testing services, or they had no prior awareness of any genetic testing brands. Most of the study's participants included students at Kennesaw State University, where the researcher attended school, and within her personal and professional network. As a result, a convenience sampling technique was implemented to gather participants.

The two largest age groups in the sample included people ages 18 to 24 (72%) and over the age of 65 (10%). In addition, the two largest ethnic groups included African Americans (39%) and White Americans (47%). Based on gender, women comprised 69% of the sample and men comprised 31% of the sample. The sample population was also composed of 17% users of genetic testing services and 83% non-users of genetic testing services.

4. Data Analysis and Findings

The study's findings revealed insights on participants' awareness of genetic testing brands, the brands they purchased, satisfaction with their purchases, reasons why they hadn't purchased a genetic test, perceptions of how customers' genetic information are used by companies, and awareness of privacy policies. AncestryDNA had the highest brand awareness at 101 out of 103 participants (98.1%). Next, 80 participants (77.7%) were aware of 23andMe (see Figure 1). Of the 18 participants who had purchased DTC genetic tests, 14 participants had purchased AncestryDNA and 4 had purchased 23andMe. Moreover, 15 of the 18 users of genetic testing services reported being satisfied with their purchases.

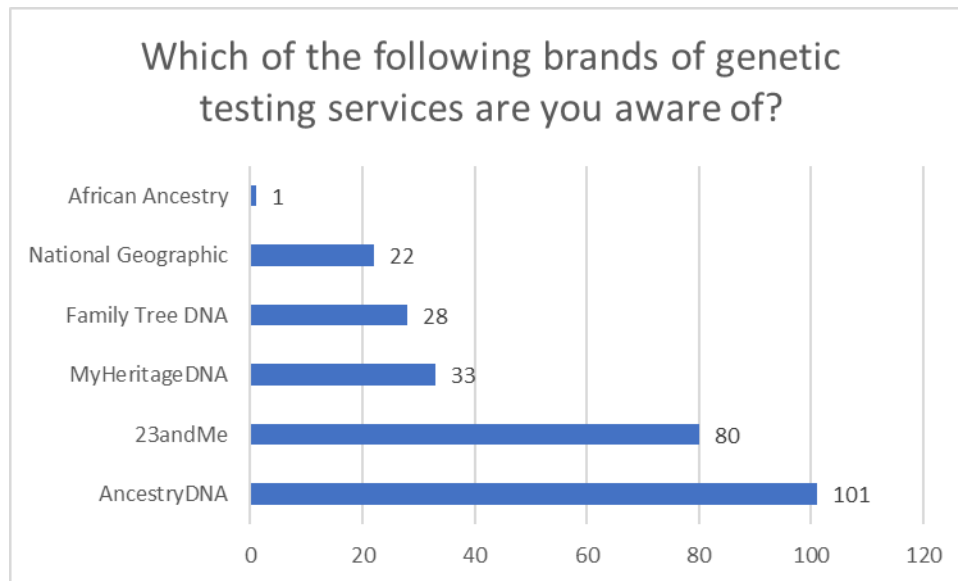


Figure 1. Brand awareness of major direct-to-consumer genetic testing brands

The two primary reasons non-users had not purchased a genetic test included price (37.9%) and having no desire to learn about their genetic information (37.9%). Privacy issues were the third most cited reason (17.5%). Other reasons included participants not seeing the benefits in purchasing a genetic test, never making time to purchase one, already seeing family members' results, and feeling skeptical of the tests' accuracy (see Figure 2).

The majority of users (72.2%) also did not believe DTC genetic testing companies use consumers' genetic information for only the purposes they advertise. When asked about their awareness of privacy policies concerning genetic information, nearly half of the total participants were aware of HIPAA (49%), but less than a fifth (14%) were aware of GINA.

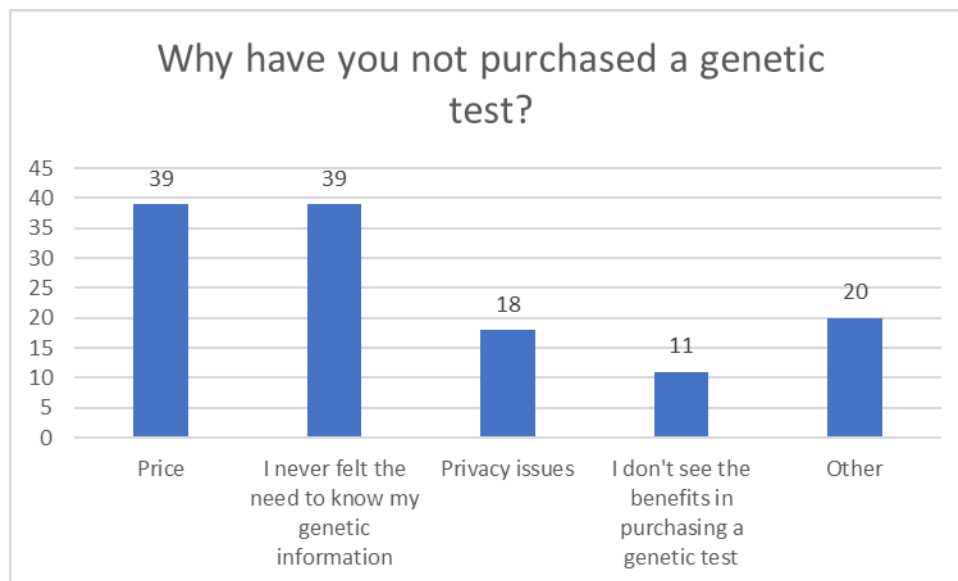


Figure 2. Reasons participants did not purchase a direct-to-consumer genetic test

4.1 H1

This study's first hypothesis states, "The higher the privacy concerns, the lower the propensity to purchase DTC genetic testing kits." To determine if non-users of genetic testing had higher privacy concerns than users, the researcher conducted an independent samples t-test in SPSS. The t-test measured users and non-users' privacy concerns using a summary score of their responses to questions about their attitudes toward genetic privacy. In each question, participants rated statements on a scale from 1 to 7, with 1 meaning they strongly disagreed with the statement and 7 meaning they strongly agreed with the statement.

Based on the null hypothesis, there would not be a significant difference in the mean privacy scores of the two groups, users and non-users. In contrast, the alternative hypothesis predicted there would be a significant difference between the two groups' privacy scores, with non-users having a greater privacy score. The t-test revealed an insignificant difference between users and non-users' privacy scores ($p > 0.05$). Users had a mean privacy score of 5.4618, while non-users had a privacy score of 5.4605. The difference between these scores is negligible. Therefore, the t-test demonstrates users and non-users' of genetic testing services possess similar levels of privacy concern. So, H1 is not supported.

4.2 H2

The second hypothesis of this study states, "African Americans will be more aware than other ethnicities of unethical medical testing conducted on African Americans in the past." The researcher utilized another t-test to compare the levels of awareness between the study's two largest ethnic groups, African-American and White participants. In the questionnaire, participants were asked to select the degree of their awareness of the Henrietta Lacks story, Tuskegee Syphilis Study, and gynecological studies of Dr. J. Marion Sims. The questions were based on a six-point Likert scale with responses ranging from "Definitely Unaware" to "Definitely Aware." A summary score of these questions was computed to measure participants' overall awareness of these events using a six-point interval scale, with 1 meaning "Definitely Unaware" and 6 meaning "Definitely Aware."

The null hypothesis of this t-test argues there will be insignificant differences between African American and White participants' awareness of unethical medical testing conducted on African Americans. On the contrary, the alternate hypothesis asserts there will be a significant difference between African-American and White participants awareness of unethical medical testing conducted on African Americans. The test's results demonstrated a significant difference between African American and White participants' awareness of these events ($p < 0.05$).

On a scale of 1 to 6, African American participants had a mean awareness score of 3.15, or "Slightly Unaware" of unethical medical testing conducted on African Americans. In contrast, White participants had a mean awareness score of 1.50, or "Somewhat Unaware." As a result, African American participants were significantly more aware of the Henrietta Lacks story, Tuskegee Syphilis Study, and gynecological studies of Dr. J. Marion Sims than White participants. Based on the analysis, H2 is supported.

4.3 H3

This study's third hypothesis predicts, "African Americans have higher privacy concerns about genetic testing." To test this hypothesis, the researcher conducted a t-test. The t-test compared African American and White participants' mean privacy scores. According to the null hypothesis, there would not be a significant difference between African American and White participants' privacy scores. In contrast, the alternative hypothesis argues there would be a significant difference between African American and White participants' privacy scores.

The t-test's results indicated an insignificant difference between African American and White participants mean privacy scores ($p > 0.05$). On a scale from 1 to 7, the mean privacy scores for African Americans and White participants were 5.54 and 5.40. Consequently, there is insufficient evidence to reject the null hypothesis. Based on these results, African American and White participants possessed similar levels of privacy concern about genetic testing.

5. Conclusions

This study's findings conclude non-users of genetic testing services do not possess higher levels of privacy concern, regarding sharing their genetic information with DTC genetic testing companies, than users. Participants selected price

and having no desire to know their genetic information as the two most common reasons they hadn't purchased a genetic test. Privacy issues were the third most selected reason by participants. The study also revealed while African Americans are more aware of historical instances of unethical medical testing involving African Americans, this is unlikely to result in this group having higher privacy concerns about genetic testing than other ethnic groups. This awareness is also unlikely to deter them from purchasing DTC genetic tests.

5.1 Implications

A possible reason the study did not demonstrate a connection between African Americans' awareness of unethical medical testing and privacy concerns about genetic testing is the generation gap between when the events took place and age demographics of the sample. For example, the largest age group of participants included people ages 18 to 24, born between 1994 to 2001. However, the Tuskegee Syphilis Study took place between 1932 to 1972. This study, and other well-known cases of unethical medical testing occurring prior to the 21st century, would've more likely deeply affected the attitudes of people who lived through them. People alive during these studies may have heard about them, or even knew people directly connected to them. While traumatic experiences have a way of being passed down through generations, sometimes the exact opposite occurs. African Americans who experienced, or witnessed the ramifications of these studies, may have been hesitant to have conversations with younger generations about the studies, due to not wanting to relive negative experiences. Even if younger African Americans learned about the studies from family members, the events are already two to three generations removed for many participants. In addition, individual knowledge of African American history varies amongst African Americans. Excluding the generation gap, some individuals are more likely to seek out and research information about their history than others. Online communities passionate about Black history on social media or Black student organizations on college campuses may possess higher concentrations of younger African Americans knowledgeable about African American history.

Moreover, awareness of the Henrietta Lacks story spread after the publishing of *The Immortal Life of Henrietta Lacks* by Rebecca Skloot in 2000. Prior to the publishing of this biography about Lacks' role in medical research and her family, many Americans outside of the biomedical research community were unaware of her story. In 2017, "The Immortal Life of Henrietta Lacks," a television adaptation of the book, premiered on HBO. While this further increased awareness, there may not be widespread awareness of Lacks' story. The previously mentioned reasons may also explain why participants reported low awareness of the gynecological studies of Dr. J. Marion Sims.

Another possible reason this study did not establish a connection is the sample size. For instance, 103 participants were surveyed, many of whom identify as either African American or White and reside in Kennesaw, GA. If a larger sample size had been collected from participants living in a variety of geographic locations, there may have been more ethnic diversity within the sample. Sampling from more diverse communities would've also increased the proportion of participants who identified as other ethnicities, such as Hispanic American and Asian American groups. This would've allowed for more comparisons of participants' privacy concerns about genetic testing across ethnic groups.

5.2 Recommendations

For future studies, the researcher provides the following recommendations. First, the researcher recommends sampling participants living a variety of geographic areas to increase the likelihood of gathering an ethnically-diverse sample. Furthermore, targeting online communities passionate about topics related to the study, such as genealogy and African American history, would increase the likelihood of gathering participants knowledgeable about the topics mentioned. In addition, the researcher recommends identifying locations or online communities where participants of a variety of ages can be targeted. This would increase the diversity of participants' ages within the sample. Lastly, the researcher recommends increasing the sample by 200 to 300 participants to improve the accuracy of the study's results.

5.3 Limitations

Limitations of this study included sampling bias, time constraints, and financial constraints. Sampling bias occurred due to a greater proportion of non-users than users of genetic testing being sampled. If more users of genetic testing services had been sampled, the accuracy of the study's results would've improved. Furthermore, the researcher utilized a convenience sampling technique to gather participants for the study, which may have affected the accuracy of the study's results. Most of the participants were individuals within the researcher and her faculty advisor's personal and professional networks. In addition, time constraints created another limitation, because the researcher collected responses based on the project's deadlines. The researcher had approximately two months to collect responses, before

beginning the data analysis phase. Lastly, financial constraints comprised a limitation, because this limited the researchers' ability to provide incentives to potential participants. Many of the study's participants at Kennesaw State University received academic incentives to participate in the study. If the researcher had provided financial incentives to potential participants outside of the institution, the response rate may have improved.

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