

NEEDS-BASED STANDARDS OF PRACTICE FOR THE USE OF FORENSIC GENETIC
GENEALOGY IN INVESTIGATIONS OF VIOLENCE TOWARD MARGINALIZED
VICTIMS

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Dedication

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Abstract

The purpose of this qualitative narrative study was to identify strategies by which forensic genetic genealogy can be applied to cases of unidentified decedents who are from marginalized populations. Three research questions guided this study: (1) What is each affected group most concerned about regarding the use of forensic genetic genealogy to identify marginalized unidentified decedents or perpetrators of violent crime against marginalized group members?, (2) How have the past experiences of individuals in the affected groups contributed to their stance on the use of forensic genetic genealogy?, And (3) How do stakeholders' opinions on the use of forensic genetic genealogy change when applied to cases involving marginalized victims of violent crime versus white, heterosexual, cisgender European-descended victims? Dual process theory and terror management theory were the basis of the theoretical framework.

Narrative surveys were used to gather data. Marginalized respondents were aware of the greater difficulties faced in resolving cases involving a marginalized victim, while non-marginalized respondents generally took a tone of asserting that there are not, or should not be, any differences in the difficulty of resolving these cases. Respondents were unaware of what can and cannot be done with an individual's autosomal DNA, fueling anxiety and hesitation to contribute genetic genealogical information to forensic investigations. Marginalized respondents were also more likely to respond with empathy to prompts regarding hypothetical victims that belonged to their

same marginalized communities, while non-marginalized respondents tended to respond with greater interest in their own personal genealogy following the prompts.

Keywords: forensic genetic genealogy, DNA, human identification, LGBTQ+, racial minorities, homicidal violence

CHAPTER 1: INTRODUCTION

There are many unidentified decedents in the United States, and not enough people capable or motivated enough to deal with the problem. The National Missing and Unidentified Persons System (NamUs), a government-funded program that allows law enforcement and medical examiners to enter cases of missing and unidentified people from their area into a nationwide database, was created in 2007 (*The National Missing and Unidentified Persons System (NamUs)*, 2021). According to NamUs, 600,000 individuals go missing every year. Every year around 4,400 unidentified remains are found, with around 1,000 of those unidentified decedents remaining unidentified after every year (*The National Missing and Unidentified Persons System (NamUs)*, 2021). As of July 2021, NamUs contained 20,282 entries of missing persons throughout the United States (*The National Missing and Unidentified Persons System (NamUs)*, 2021). Of these, 40.46% were listed as races other than White, including Black, Hispanic, Asian, Native, or Other. The database also contained 13,640 unidentified decedent entries, of which 65.51% were non-White or unknown, and 5.65% were reported with their assigned sex being unsure, other, or not provided (*The National Missing and Unidentified Persons System (NamUs)*, 2021).

While this quantity of unresolved missing and unidentified persons cases entered in the NamUs database was already large and continues to grow, not every state has specific legislation regarding entering missing or unidentified cases into NamUs (Case Ravel, 2019). An estimated 93% of law enforcement agencies nationwide do not use NamUs, sometimes because of being

wholly unaware of its existence (Boncek, 2017), so the actual statistics may be much higher. With limited time and resources available, the missing and unidentified who are economically marginalized, older adults, people who are homeless, LGBTQ+ people, Black, Indigenous, or people of color are often ignored. This population, known as the “Less-Dead”, are so called due to prevailing social attitudes that result in them being devalued, marginalized, and unreported (Hickey, 2003).

These cases of the “Less-Dead” may stand a chance at being resolved if given another look using more modern investigative techniques. Advances in forensic sciences, such as fingerprinting and DNA (deoxyribonucleic acid) comparison, have led to more accurate methods of human identification for over a century. Fingerprint comparison was used as early as 1858 for human identification (Crime Scene Forensics, 2018). In 1903, an African American man named Will West entered Leavenworth Prison. When his measurements and photographs were taken, it was noticed that he bore a remarkable similarity to another inmate in both name and appearance, William West. It was by using fingerprint analysis that the two were differentiated, and Will West was exonerated of the crimes committed by his lookalike, making him one of the earliest exonerations of a wrongfully convicted Black man based on scientific evidence (Dickinson College, 2021). In 1911, fingerprinting was first accepted as forensic evidence by the United States in the case of Thomas Jennings, who was convicted of murder and sentenced to death based on fingerprint evidence (Murderpedia, 2021). Today, the Automated Fingerprinting Indexing System (AFIS) contains over 70 million fingerprint cards in its database (Thales Group, 2021).

The first arrest based on DNA evidence took place in 1987 (James, 2009). Seven years later, the Combined DNA Indexing System (CODIS) was established in 1994 as a means of indexing DNA samples collected at crime scenes for comparison to suspects and apprehended felons (*Combined DNA Index System (CODIS)*, 2021). The CODIS system uses short tandem repeats (STRs), small sections in an individual's genetic sequence which change quickly from generation to generation and can prove with a greater than 99% accuracy that an individual is the same as the contributor of an unknown DNA sample. Familial searching, the practice of using the CODIS system to find partial matches with more distant relatives, has a far lower margin of accuracy and is not permitted in several states (Debus-Sherrill & Field, 2017).

Fingerprinting and DNA comparison via CODIS have been the gold standard of positive identification for decades (Roberts, 2017, p. 20). However, these methods can only confirm an identification and cannot produce a suspect where there is not one. Individuals convicted of a felony are required to have their DNA entered into CODIS. In 2016, 38% of state prisoners were White, while 59% were Black or Hispanic. In 2019, it was determined that 52% of perpetrators of hate crimes are White (*Hate Crime Statistics*, 2020). This unbalanced under-representation of White individuals in the CODIS database proves that there is a lack of data necessary to resolve most cases of hate-based fatal violence. This information coupled with the de-prioritization of marginalized missing, murdered and unidentified people (Hickey, 2003) and the steady incline of race, gender identity and sexual orientation related hate crimes (*Hate Crime Statistics*, 2020), shows that new methods of producing suspects for unsolved violent crimes, and candidates for identification of unidentified decedents must be explored independent of standardized confirmatory testing methods to aid in the identification of vulnerable populations.

On April 24, 2018, A new breakthrough in forensic DNA investigation became public when Joseph James DeAngelo was arrested at his home in California and charged with multiple counts of burglary, sexual assault and murder attributed to the perpetrator previously known as the Golden State Killer, Original Night Stalker, East Area Rapist and Visalia Ransacker (Wickenheiser, 2019). Joseph DeAngelo was identified as a suspect using forensic genetic genealogy, an investigative method that combines aspects of traditional and genetic genealogy with forensic investigation and next generation genetic sequencing to locate the identity of an unknown decedent or perpetrator of a violent crime (United States Department of Justice, 2019).

Forensic genetic genealogy is an interdisciplinary field that combines the methodology and practices of several related disciplines (Callaghan, 2019). It combines elements of investigative research, genomic science, and mathematical probability, as well as aspects of forensic psychology, anthropology, and digital forensics in an effort to reach the identification of either an unidentified deceased individual or the perpetrator of violent crime (United States Department of Justice, 2019). Forensic genetic genealogists compare autosomal DNA data, the portion of a person's genetic sequence that is inherited from the 22 autosomal chromosomes, sequenced from unidentified human remains or biological evidence left by a perpetrator at a crime scene to voluntarily submitted DNA data from genealogical DNA test consumers via online databases where forensic comparison is permitted (Murphy, 2018). The amount of shared genetic data between the unknown contributor and their genetic cousins is compared to statistical probability data to estimate a potential actual relationship between the two (Murphy, 2018). Family trees of the unknown contributor's genetic cousins are researched and compared to each other to find common ancestors between them, with the assumption that if there are two

individuals of known ancestry who have a common ancestor, a third unknown individual who shares genetic similarities with the two known individuals must therefore descend from the same family group (Ball et al., 2020).

The following chapter introduces a study to understand the formations of opinion of forensic genetic genealogy stakeholders regarding marginalized victims of fatal violence. This study aimed to ascertain the origins of the varying opinions and misconceptions held regarding forensic genetic genealogy, such as concerns about privacy of personal and health information stemming from misunderstanding of the capabilities of autosomal DNA testing, and fears of being wrongfully accused of crimes based on DNA evidence. Respondents were asked if their opinion changed based on whether the decedent in question was a White person of European descent, or a member of a marginalized group. Through this study, the researcher intends to develop proposed standards of practice to assist in the identification of marginalized decedents.

Statement of the Problem

Forensic genetic genealogy is only just beginning to gain footing as a stand-alone field within forensic science and investigative methodology. Forensic genetic genealogy has only existed in a professionally recognized and publicly visible form since the April 2018 arrest of Joseph James DeAngelo based on his identification using forensic genetic genealogy (Wickenheiser, 2019), and writings on the topic are limited. Due to the lack of formal surveys of forensic genetic genealogists, the only available source of knowledge about the needs of forensic genetic genealogists can be found in news media interviews with the genealogists themselves. There is a continued lack of structure, regulation, and formal education on the subject, which causes concerns for many affected parties (Scudder et al., 2019). There is currently no

standardized formal education, credentialing body or clear policies on the usage of forensic genetic genealogy (Scudder et al., 2019). Public consumers of genealogical DNA testing products do not have a full understanding of what can and cannot be done with their genetic information, and many fear that their genetic information will be used by their employers or health care providers to discriminate against them (National human genome research institute, 2020). Simultaneously, fatal violence against individuals within marginalized populations has been steadily increasing (Dinno, 2017; Human Rights Foundation, 2018). The problem addressed by this study was the gaps in understanding that inhibit the resolution of unsolved homicide and unidentified decedent cases involving marginalized victims using forensic genetic genealogy.

Purpose of the Study

The purpose of this qualitative narrative study was to identify strategies by which forensic genetic genealogy can be applied to cases of unidentified decedents who are from marginalized populations that have been historically deprioritized or difficult to resolve. This study was designed to determine the needs of marginalized individuals affected by the use of forensic genetic genealogy. What was examined was not only the needs of the individuals and groups, but the ways in which their stance changed when confronted with a theoretical case of a marginalized victim as opposed to one of a heterosexual, cisgender white individual of European descent.

Forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes were interviewed to determine needs and concerns regarding the use of forensic genetic

genealogy, and the origins of those needs and concerns. A study shows that fear and gaps in understanding influence decisions relating to personal privacy or safety (Martin, 2016) but little research exists that targets connected populations with conflicting viewpoints to find the common ground between them. The study targeted 36 respondents within the United States in four categories: forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes. It was theorized that there would be many differences across the target populations, but some common themes would emerge that will help facilitate the resolution of unresolved cases of violence against marginalized individuals.

Research Questions

This qualitative, narrative study asked the following questions:

1. What is each affected group (forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes) most concerned about regarding the use of forensic genetic genealogy to identify marginalized unidentified decedents or perpetrators of violent crime against marginalized group members?
2. How have the past experiences of individuals in the affected groups contributed to their stance on the use of forensic genetic genealogy?
3. How do stakeholders' opinions on the use of forensic genetic genealogy change when applied to cases involving marginalized victims of violent crime versus white, heterosexual, cisgender European-descended victims?

These questions were based on the existing literature on the topic of forensic genetic genealogy and its predecessor, familial searching (Kaye, 2013), which show that there are rifts of opinion between advocates of its use and those who have ethical or privacy concerns on the topic. The primary goal of forensic genetic genealogy is human identification to bring about closure of law enforcement cases, to make the world a safer place (Thomson et al., 2019). By working together to find commonality between those affected by its use, the methodology can be made more effective for marginalized victims.

Conceptual Framework

This study was designed to determine the needs of marginalized individuals affected by the use of forensic genetic genealogy. The narratives considered included not only the individual stance of those with a stake in the use of forensic genetic genealogy, but also the group mentality of each affected party. What was examined was not only the needs of the individuals and groups, but the ways in which their stance changed when confronted with a theoretical case of a marginalized victim as opposed to one of a heterosexual, cisgender white individual of European descent.

Personal Interest

Since the first announced successful identifications in 2018, there have been both champions and detractors regarding the use of forensic genetic genealogy. Public users of genealogical DNA comparison databases have had mixed reactions varying from excitement to paranoia (Moran, 2018). The researcher, an experienced forensic genetic genealogist and early pioneer of the field, has participated in the resolution of over two dozen cold cases since 2018, many of which were unidentified decedents from marginalized populations (O'Neil, 2021). The

researcher is also involved in an historical project to create reference samples from enslaved African individuals buried in an 18th-century burying ground to assist in the genealogical research of modern-day Black genealogists (Barndollar, 2020). The researcher has also worked directly with law enforcement agencies that have tried to work cases of unidentified marginalized decedents themselves and required specialized assistance in their research (Michael et al., 2021a; Michael et al., 2022; Redgrave & Redgrave, 2021). Without clear standards of practice based on the needs of stakeholders and an educational standard to bring future forensic genetic genealogists to the necessary skill level to solve marginalized decedent cases efficiently and securely, the field is in danger of being hobbled by poorly developed standards based on fear and misinformation (Decker, 2021; Michael et al., 2021b; Redgrave & Redgrave, 2021).

Exponential Increase of Unidentified Decedent Cases

There has been an exponential increase in the number of unidentified decedent cold cases over the past several decades (*Murder Accountability Project*, 2021). In December of 1990, the National Crime Information Center (NCIC)'s database contained 172 unidentified decedent entries (*NCIC Missing Person and Unidentified Person Statistics for 2009*, 2009). Ten years later, in 2000, NCIC's unidentified decedent database contained a total of 71,345 unidentified deceased people. In December of 2019, that number rose to 453,683 (*2019 NCIC Missing Person and Unidentified Person Statistics*, 2019). The clearance rate of unidentified decedent cases has stayed at a steady average of 26% between 1990 and 2019 (*Murder Accountability Project*, 2021). Based upon the statistics provided by the NCIC, it can be inferred that current methodologies of identifying unidentified decedents cannot keep up with the rate of increase of new cases.

Lack of Understanding

Forensic genetic genealogists have a highly specialized skill set that goes beyond traditional and genetic genealogy and incorporates investigative techniques more prevalent in detective work (Redgrave & Bingham, 2021). The methodology is a hybrid of genealogy, forensic science, and investigation. This hybrid methodology is difficult to define in terms of what standards and policies are to be expected of forensic genetic genealogists. For example, according to the United States Department of Justice, forensic genetic genealogy is an investigative technique (United States Department of Justice, 2019) while others, notably those who raise concerns over privacy, describe forensic genetic genealogy primarily in terms of sample collection and lab process (Guest, 2019; Syndercombe Court, 2018). This difficulty in defining forensic genetic genealogy, its scope, and limitations may make it difficult to gain the support of the public and other parties affected by its use, such as forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes, including distant genetic relatives whose DNA results are used to make an identification.

Currently, because of the difficulty in defining whether forensic genetic genealogy is a science, an investigative method, or both, there is a great deal of difficulty in finding a common understanding and common language to have a clear dialogue in the direction of standardizing the practice (Scudder et al., 2019). Law enforcement agencies have a limited understanding of the use of DNA in forensic cases, but for the most part are more familiar with the use of short tandem repeat (STR) testing via the Combined DNA Indexing System (CODIS) rather than autosomal testing for forensic genetic genealogy (Callaghan, 2019). Public consumers have

varying degrees of understanding of the methodology and little insight into what is permitted and not permitted to be done with their information behind an active investigation. Families, including distant genetic relatives whose DNA results may be used to make an identification, may have to deal with sudden, conflicting feelings of grief, fear, and mourning for someone they may or may not have known in life (Basye & Abubey, 2020). Professional genealogists, detectives, or private investigators new to the field of forensic genetic genealogy may or may not have access to the breadth of knowledge that other practitioners have developed and explored before them that may be helpful in navigating conversations with any of the groups.

The interim policy developed by the US Department of Justice which is currently in place outlines loose but helpful guidelines on how to conduct a forensic genetic genealogical investigation (United States Department of Justice, 2019). This interim policy includes protections for DNA matches and instructions for the archiving of digital files upon the completion of a case. Based on research, the necessary requirements for forensic genetic genealogists to perform their duties are deficient (Callaghan, 2019). In addition, security guidelines for storing information during active cases and instructions to communicate with DNA matches or family members is currently insufficient (Syndercombe Court, 2018). If an open dialogue does not begin amongst affected parties, a future iteration of these guidelines could potentially damage the trust of the public consumer or open the possibility of information leaks.

Topical Research

As forensic genetic genealogy is a new field, there is not much in the way of research explicitly pertaining to its use. In terms of this study, several other topics are applicable,

including familial searching, the predecessor of forensic genetic genealogy (Kaye, 2013), which has been scrutinized as a possible invasion of privacy due to lack of consent from those in the database and the questionable accuracy of the method (Guest, 2019). The use of searching social networking platforms is taught to law enforcement as an investigative tool with the caveat that it may be considered unethical or an invasion of privacy by some (Martin, 2016) and education on the topic is accompanied by thorough explanation of what is considered “private information” on internet sites (Martin et al., 2014). Archival material used in genealogical research, even outside of the context of law enforcement investigation, has also been brought into question regarding who the owner of such information is and who is able to give permission for its use (McKee & Porter, 2012).

The underlying theme across all these associated topics is a concern about privacy and ownership of information, and there has not yet been a clear enough answer to this question. This is most likely due to confusion over whether genealogical DNA data can also be considered health information or identifying personal information and what can and cannot be done with this information. Federal laws such as the Genetic Information Nondiscrimination act (*Genetic Information Discrimination*, 2021) and 2013 amendments to the Health Insurance Portability and Accountability Act (HIPAA) (National human genome research institute, 2020), prevent employers and health insurers, respectively, from discriminating against individuals based on their genetic information. These facts are also not well known to consumers, according to a 2018 poll (Associated Press, 2018) in which 50% of adults stated that they were extremely concerned about their information being sold by for-profit companies to medical researchers or doctors.

Theoretical Framework

Two theories informed the conceptual framework for this study: Dual Process Theory, which explores multiple internal systems of thought that can lead an individual or a group to a decision or stance (Sowden et al., 2015), and Terror Management Theory, which explores the ways in which individuals deal with or avoid fear (Arrowood & Cox, 2020). Both theories relate to the way a person may have differing stances on a subject while permitting both to be valid even if they are in contradiction with each other. Together, the two theories revealed the reasoning behind many opinions held on the use of forensic genetic genealogy as well as the key to determining standards of practice to bring resolution to cases involving marginalized victims. These theories were chosen as the framework for the study because the researcher believed that the intersection of these two theories would reveal the thought processes that lead stakeholders to form opinions on a field of which few have a functional knowledge and therefore default to their emotional reaction, fears for their personal safety and privacy, and understanding of related fields and concepts to determine their stance.

Dual Process Theory. The use of forensic genetic genealogy is a divisive topic in general and is so recent a subject that few people have had the opportunity to fully learn the facts and implications of its use to an extent that would allow them to formulate a complete personal opinion (Guest, 2019; Kennett, 2019). Dual Process Theory asserts that an individual has two main systems of thought by which they can reach a conclusion: System 1, which is a fast process that is mainly intuitive and emotionally driven, and System 2, which is a slower process that is conscious and logical (Sowden et al., 2015). Most respondents in the beginning phase of inquiry about forensic genetic genealogy have a prevailing personal assertion mostly rooted in

System 1 and will need to be given time and minimal direction to allow for the development of a System 2 conclusion (Stephens et al., 2018).

Individual respondents, in favor of making full use of the theory, were counted as two respondents in one if their responses reveal both System 1 and System 2 thought processes. This way, any respondents who self-reported a conflicting stance or the system by which they have formulated their stance was not immediately clear, both systems and stances were applied. Respondents were grouped into categories based on their system-to-stance placement (Arrowood & Cox, 2020; Sowden et al., 2015).

Terror Management Theory. Terror Management Theory addresses an individual's personal struggle for self-preservation in contrast to their understanding that mortality is unavoidable (Arrowood & Cox, 2020). The result of this internal conflict can manifest in the formation or adoption of beliefs that offer symbolic immortality or heightened self-esteem (Rubin, 2018). The theory purports that most human action is taken in an effort to ignore or avoid the inevitability of death (Rubin, 2018). Concerns about personal privacy and safety, negative feelings regarding potentially being genetically related to a violent criminal or victim, or fears of the use of genetic surveillance for monitoring or even genocide of marginalized groups, were found to tie into these fears.

Respondents were asked further questions about their feelings and reactions towards hypothetical situations involving the use of forensic genetic genealogy to determine a terror management grouping relative to their stance. This gave further insight into their System 1 based stance (Arrowood & Cox, 2020; Sowden et al., 2015). The goal of categorizing respondents in this manner was to determine the group mentality, if any trend exists, of each

subgroup affected by the use of forensic genetic genealogy. The researcher believed that this would result in a foundation upon which to address the needs of marginalized stakeholders.

Understanding the individual and group mentality of affected parties in relation to forensic genetic genealogy as well as the reasons behind the personal stances that are formed will help inform what is needed for standardized policy and instructional goals for professional genealogists to effectively, sensitively, and securely resolve cases related to marginalized victims. A discussion on the subject of standards of practice in genetic counseling in Europe determined that declaring genetic counseling a protected title was desirable by practitioners and patients (Skirton et al., 2010). By 2018, most countries with training programs in genetic counseling had adopted a 2-year Master's degree approach (Abacan et al., 2019). The results of the study will be used to find a solution that focuses on harm reduction for all stakeholders while bringing resolution to open law enforcement cases.

Definition of Terms

Autosomal DNA: genetic data which is inherited from the autosomal chromosomes, the chromosomes of the human genome sequence numbered from 1 to 22 roughly in relation to their sizes. Autosomal DNA is approximately 99.9% identical across all human beings (International Society of Genetic Genealogy, 2020).

CODIS: The Combined DNA Index System, or CODIS, blends forensic science and computer technology into a tool for linking violent crimes. It enables federal, state, and local forensic laboratories to exchange and compare DNA profiles electronically, thereby linking serial violent crimes to each other and to known offenders (United States Department of Justice, 2019).

Common Ancestor: An individual or couple who are both present in the direct line ancestry of two DNA matches (Ball et al., 2020).

Decedent: A person who has died; a deceased person (Merriam-Webster, 2022).

Deoxyribonucleic Acid (DNA): The carrier of hereditary genetic information within living organisms (Encyclopedia Britannica, 2020).

DNA match: an individual who appears in the comparison results of a genealogical DNA database as having some significant amount of identical genetics (Ball et al., 2020).

Doe: a name used in a law court for a person whose real name is kept secret or is not known. Commonly referred to as “John Doe” for male-designated unidentified decedents, or “Jane Doe” for female, the collective “Doe” is used in this paper to include the occasional occurrence of an unidentified individual who, for a number of reasons, may not be classified as John or Jane (“John Doe,” 2021).

Familial Searching: A deliberate search of a DNA database using specialized software (separate from CODIS) to detect and statistically rank a list of potential candidates in the DNA database who may be close biological relatives (e.g., parent, child, sibling) to the unknown individual contributing the evidence DNA profile, combined with lineage testing to help confirm or refute biological relatedness (Debus-Sherrill & Field, 2017).

Forensic Genealogy: The practice of using genealogical research to identify heirs of estates in which there are no known living relatives (*Council for the Advancement of Forensic Genealogy*, 2021).

Forensic genetic genealogy (investigative genetic genealogy): The forensic genetic genealogical DNA analysis of a forensic or reference sample of biological material by a vendor

laboratory to develop a forensic genetic genealogical profile and the subsequent search of that profile in a publicly-available open- data personal genomics database or a direct-to-consumer genetic genealogy service (United States Department of Justice, 2019).

GEDmatch: A third-party website to which consumers of DNA tests may upload their raw data for comparison with others who have also done so. The primary database used for forensic genetic genealogy (*GEDmatch.Com Terms of Service and Privacy Policy*, 2019).

Genealogist: a person who traces or studies the ancestry of persons or families (“Genealogist,” 2021).

Genetic Cousin: An individual who shares a measurable amount of autosomal DNA with another individual (Ball et al., 2020).

Unknown contributor: An unidentified individual whose discarded DNA evidence was located at the scene of a violent crime (Bille et al., 2019).

Respondent: a person who answers a request for information (“Respondent,” 2021).

System 1: An individual’s decision-making process that is fast, intuitive, and emotionally driven (Sowden et al., 2015).

System 2: An individual’s decision-making process that is slower, conscious, and logical (Sowden et al., 2015).

Violent Crime: murder, nonnegligent manslaughter, aggravated rape, robbery, or aggravated assault (*GEDmatch.Com Terms of Service and Privacy Policy*, 2019).

Y-DNA: The genetic information found within an individual’s 23rd chromosome which is inherited from their direct patrilineal ancestors. This information is sometimes used to locate a potential surname of an unknown contributor (Kayser, 2017).

Assumptions, Limitations, and Scope

An assumption was made that the participants have some knowledge of the concept of forensic genetic genealogy and hold an opinion based on their experience, personal moral and ethical values, fears, and misconceptions. Other assumptions included that the participants were truthful in their responses. The study also assumed that each participant had accurately self-identified as a member of a marginalized group as well as a forensic genetic genealogist, criminal justice professional, consumer of genealogical DNA testing products, or family member of a victim or perpetrator of a violent crime.

Limitations of the study included the researcher's own bias in favor of the use of forensic genetic genealogy and the researcher's own recognition to those familiar with the field. The knowledge that the researcher is the same person who has solved many cases using forensic genetic genealogy and has gained media coverage for his successes has the potential to skew the respondents' feedback. There are also a limited number of practicing forensic genetic genealogists in the world, and there are no existing standards to determine to what extent a genealogist must have been involved in forensic investigation to be considered as such (Scudder et al., 2019). The number of practicing forensic genetic genealogists who belong to marginalized groups is unknown but assumed to be significantly few.

The scope of this qualitative study was a combination of voluntary respondents who had been asked to participate. The researcher aimed to have ten respondents in each subgroup: forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes. The study gathered responses from 13 forensic genetic genealogists, 12 criminal justice

professionals, 20 consumers of genealogical DNA testing products, and nine family members of missing persons, victims, and perpetrators of violent crimes. The study was restricted to participants within the North American continent.

Rationale and Significance

The field of forensic genetic genealogy is moving very quickly. In January of 2019, the DNA Doe Project announced the identification of six previously unidentified decedents during 2018 (*DNA Doe Project, 2021*). The organization assisted in the identification of 12 unidentified decedents in 2019, and 26 in 2020 (*DNA Doe Project, 2021*). With only minimal regulations in place to protect information security related to open investigations, to protect the wellbeing of family members of those who may be identified using forensic genetic genealogy, and to address the privacy concerns of consumers, some consumers of genealogical DNA testing services are entirely against its use (Kennett, 2019).

Several cases of human identification via forensic genetic genealogy have had egregious errors attributed to the research and media release process. For example, in 2015, one of the earliest examples of utilizing a consumer genealogy database for law enforcement searching, Michael Usry was wrongfully accused of the murder of Angie Dodge based on his Y DNA profile, which led to Ancestry DNA ceasing Y DNA testing for consumers (Mustian, 2015). In 2019, a presumed second cousin of El Dorado Jane Doe gained surprise media attention by being ousted by the genealogists working to identify her, in hopes that publicizing the presumed common ancestors would lead to further progress in the case, with no resulting identification thus far (Lohr, 2019). By identifying the motivations behind the opinions formed by target groups on the use of forensic genetic genealogy, the needs and values of those affected can be

evaluated and addressed fairly to construct standards of practice and educational programs that support harm reduction for all stakeholders (Skirton et al., 2010).

Forensic genetic genealogy has produced results in decades-old cases. The current standard in forensic genetics, the Combined DNA Indexing System (CODIS), is limited to matching unknown samples to the same individual, or their parent, child, or full sibling if a familial search is permitted (*Combined DNA Index System (CODIS)*, 2021). Processing a DNA sample of an unknown perpetrator through CODIS produces a positive identification in about 14% of cases, and DNA of unidentified decedents produces a CODIS match in less than 1% of cases (*Murder Accountability Project*, 2021). The researcher, an experienced practitioner of forensic genetic genealogy and an instructor for law enforcement, has participated in dozens of positive identifications, the oldest of which was a one hundred- and three-year-old cold case (H. Murphy, 2020). Several scares have occurred that have threatened the forward progress of the field, including major changes to the genealogical databases used by forensic genetic genealogists, and negative press by misinformed reporters repeating false information from misinformed law enforcement officers (Miller, 2020; Mustian, 2015).

Conclusion

Much has been said about forensic genetic genealogy, but different invested parties have unique needs and concerns regarding its use. The public requires a clear understanding of their own privacy rights and well-defined terms of use for any website to which they upload their DNA data (Scudder et al., 2019). This includes an understanding of whether their health information or private identifying data will be exposed. Law enforcement requires a clear understanding of what is and is not permissible in research methods (Miller, 2020; Mustian,

2015). Families of missing persons, victims, and perpetrators need to know that their privacy will be respected as case information is publicized and require some counseling on how to manage media requests. All invested parties need a clear understanding of what forensic genetic genealogy is, and how it differs from STR CODIS testing (Scudder et al., 2019).

To facilitate harm reduction in forensic genetic genealogical identification in cases relating to marginalized victims, an understanding of the needs of marginalized group members within the four subgroups of stakeholders must be determined. Forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes have unique needs and concerns in relation to forensic genetic genealogy. Once these needs are identified, standards of practice for the field can be developed that are sensitive to the most at-risk and least prioritized cases that stand to benefit from the use of forensic genetic genealogy.

Using what is known and not known based on the literature, and its factual evidence and identifiable gaps in understanding, a qualitative survey of representatives of each invested party should commence. Responses can be collected on questions of opinion, and assessment of knowledge on related topics to identify errors in understanding. Following the analysis of these responses, proper steps can be taken to educate the invested parties on what they need to know to bring everyone to a mutual understanding that serves under-served, deprioritized, and marginalized victims of violent crime.

CHAPTER 2: REVIEW OF THE LITERATURE

Forensic genetic genealogy, in the context of applying traditional and genetic genealogy skills to open law enforcement investigations for the purpose of human identification, is an interdisciplinary field that combines the methodology and practices of several related fields. There is currently no standardized formal education, credentialing body or clear policies on its usage (Scudder et al., 2019). The lack of regulation has caused concerns amongst stakeholders, such as forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes (Scudder et al., 2019). Stakeholders from marginalized populations have even greater fears towards the use of their genetic information by law enforcement, ranging from surveillance to deportation to eugenics (Krueger, 1997; Sparrow, 2014) but are also the most vulnerable populations at risk of fatal violence and deprioritization by homicide investigators. The specific needs, concerns, and misconceptions of marginalized stakeholders must be evaluated to support inclusive standards of practice and educational requirements of forensic genetic genealogists.

Conceptual Framework

This study was designed to determine the needs of marginalized individuals affected by the use of forensic genetic genealogy. The narratives included not only the individual stance of those with a stake in the use of forensic genetic genealogy, but also the group mentality of each affected party. What was examined was not only the needs of the individuals and groups, but the ways in which their stance changed when confronted with a theoretical case of a marginalized victim as opposed to one of a heterosexual, cisgender white individual of European descent.

Review of the Literature

There is a shortage of research on the process and impact of forensic genetic genealogy, therefore the core components of the methodology, such as genomic science and forensic investigation have been used as a framework for research and review. The literature review is divided into six categories: Investigations of Violence Toward Marginalized Victims, History of Forensic Investigation, Current Methodology, Needs, Concerns, and Misunderstandings. Included in the Needs and Concerns categories is a sub-category specific to those who have a stake in the use of forensic genetic genealogy: forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes. The review concludes with a summary of the findings regarding what similarities and differences there are across these needs and concerns of the invested parties, and what gaps in understanding need to be resolved to facilitate standards of practice that favor harm reduction for cases related to marginalized victims.

Investigations of Violence Toward Marginalized Victims

Investigation into the identification of marginalized decedents or the homicide of marginalized victims over the past several decades has been consistently given less effort than investigations into the deaths of white decedents of European descent (Petersen, 2017). Yearly clearance of homicide cases in the United States declined from 92 percent in 1960 to 61 percent in 2006, with significantly higher clearance rates of cases involving White victims than Black or Hispanic (Riedel, 2008). Marginalized groups have a strained relationship with the police when it comes to criminal investigation (Petersen, 2017). It is theorized that mistrust of law enforcement by marginalized groups and lesser quality of attention from police in economically

marginalized communities leads to inconsistent reporting and investigations of violence toward marginalized victims (Petersen, 2017). Marginalized groups such as LGBTQIA+ individuals or people with disabilities may feel apprehensive of submitting their DNA data due to concerns of genetic essentialism, or a connotation between genetics and life outcomes, which is used as the basis for supporting eugenics or selective abortion of pregnancies deemed genetically inferior (Dar-Nimrod & Heine, 2011).

Transgender, intersex, and gender-variant individuals represent a forensically significant population (Michael et al., 2021). Statistics on transgender homicides between the years of 2010-2016 indicate that fatal violence toward transgender people are intersectional, or at the center of overlapping systems of discrimination or disadvantage, across multiple at-risk populations (International Women's Development Agency, 2018; Momen & Dilks, 2021). Based on a study from Dinno (2017), 2.9% of transgender people murdered between 2010 and 2016 were white, while 69.6% of were Black. According to Talusan (2016), 72% of transgender homicide victims in 2016 were Black trans women, making an estimated 1 in 2,600 Black trans women the victims of homicide. In contrast, the average rate of homicide for the general population of the United States between 2010 and 2014 was 1 in 19,000 individuals (Talusan, 2016). Based on these statistics, it is over 7.3 times more likely for a Black transgender woman to be murdered in the United States than the average homicide rate (Talusan, 2016). According to a 2016 study, approximately .6% of people in the United States identify as Transgender (Flores et al., 2016). As of July 2021, there are 2,165 Black unidentified decedents listed in NamUs (*The National Missing and Unidentified Persons System (NamUs)*, 2021). There are not standardized methods of reporting the sex of an ambiguous or inconclusive sex estimation, or of

a transgender or intersex individual, so Black transgender women may be reported as any category - male, female, unsure, other, or not provided. If .6% of the United States population self-identifies as transgender, and Black transgender women are 7.3 times more likely to experience fatal violence, the number of Black transgender women entered as unidentified decedents in NamUs may be anywhere from 13 to 95 individuals.

According to a 2000 study, as many as 2% of live human births may be sexually indeterminate (intersex) based on current standards of sexual dimorphism (Blackless et al., 2000). The current estimated population of the United States is 328,239,523 (*U.S. Census Bureau QuickFacts*, 2019). Approximately 6,564,790 Americans may be intersex based on these estimates. If intersex individuals were to be at the same risk of homicide as the average United States citizen, an estimated 8,638 of homicide victims per year may be intersex (Blackless et al., 2000; *U.S. Census Bureau QuickFacts*, 2019). However, considering the heightened risk of fatal violence toward people who are perceived as gender-variant, the actual rate may be much higher (Talusán, 2016).

Some studies have been undertaken to determine forensically significant indicators of gender affirming surgical interventions in the skeleton, such as facial feminization surgery (Schall et al., 2020). However, most transgender women do not undergo facial feminization surgery as it is cost-prohibitive and will prioritize other gender affirming interventions such as genital reconstruction, which only affects the soft tissue and has no impact on the skeleton, and hormone therapy, the effect of which on the skeleton varies by age of initial usage (Delgado-Ruiz et al., 2019). Lack of postmortem indicators of an individual's gender identity in life can

contribute to difficulties in categorizing the individual in law enforcement databases and hinder identification efforts through current standardized means (Michael et al., 2021).

Many studies on fatal violence against transgender people have focused primarily on the experiences of transgender women, and little data exists on fatal violence towards transgender men. There is some literature on the experiences of transgender men. A 2016 survey showed that transmasculine men in rural areas dress and act in similar ways to the local men as they feel safety in maintaining sameness, and feel that visibly homosexual or transgender people and non-white people are more at risk of discrimination in rural areas than in cities (Abelson, 2016). A recent study of transmasculine survivors of intimate partner violence revealed that abusers of transmasculine survivors used manipulation tactics such as threats of publicly outing the survivor if he chose to report incidents of violence, or guiltning survivors out of reporting incidents by arguing that doing so would harm the LGBTQIA+ community (Shultz, 2020).

Transgender people are at a higher risk of intimate partner violence than women in the United States (Human Rights Foundation, 2018; S. James et al., 2016; Talusan, 2016). According to a 2015 study by the Center for Disease Control (CDC), 22.3% of women have experienced extreme physical violence from an intimate partner in their lifetime (Breiding et al., 2015). The 2015 U.S. Transgender survey determined that approximately 68% of transgender individuals have experienced intimate partner violence in their lifetime (James et al., 2016). In 2007, 64% of female homicides were perpetrated by an intimate partner (Catalano et al., 2009). According to the Human Rights Foundation (2018), 23% of known cases of fatal violence against transgender people were perpetrated by intimate partner. This disparity between the rate of fatal intimate partner violence against women versus transgender individuals may imply a lack

of research, reporting or investigation into the causes of death of transgender people by fatal violence (Talusán, 2016).

History of Forensic Investigation

Law enforcement investigations often turn to biometric measurements as the standard of comparison for human identification (Lennard, 2013). Alphonse Bertillon, a French police officer and biometrics researcher, was the first to standardize the use of mugshots for cataloging criminals for identification purposes (Gridack, 2009). His method, known as the Bertillon system, used five body measurements - head length, head breadth, length of middle finger, length of the left foot, and length of the cubit, or the forearm from the elbow to the extremity of the middle finger – for identification purposes (Teitelbaum, 2020). Bertillon's method was used widely for a short number of years, during which fingerprint identification techniques were being improved upon by several other biometrics researchers. Fingerprint comparison was used as early as 1858 for human identification (Crime Scene Forensics, 2018). In 1903, an African American man named Will West entered Leavenworth Prison. When his measurements and photographs were taken, it was noticed that he bore a remarkable similarity to another inmate in both name and appearance, William West. It was by using fingerprint analysis that the two were differentiated, and Will West was exonerated of the crimes committed by his lookalike, making him one of the earliest exonerations of a wrongfully convicted Black man based on scientific evidence (Dickinson College, 2021). In 1911, fingerprinting was first accepted as forensic evidence by the United States in the case of Thomas Jennings, who was convicted of murder and sentenced to death based on fingerprint evidence (Murderpedia, 2021). Today, the Automated

Fingerprinting Indexing System (AFIS) contains over 70 million fingerprint cards in its database (Thales Group, 2021).

The use of teeth and skeletal structures for human identification can be dated to as early as the late 18th century. The first recorded use of forensic odontology dates to 1775 (Bruce-Chwatt, 2010). Dr. Joseph Warren, killed during the Battle of Bunker Hill, was identified by Paul Revere amongst the remains of a mass grave by dental work, and was later reburied with his own headstone in 1776 (Bruce-Chwatt, 2010). Forensic odontology, the practice of examining the teeth for medico-legal identification, has been since used to identify unidentified decedents. Bite mark analysis has been used to identify perpetrators of violent crimes by comparing bite prints to those left on the body of a victim, as in the case of Ted Bundy, although the efficacy of the method has been disputed due to lack of data on margin of error (Pretty, 2006).

Forensic anthropology, the examination of human remains for legal identification purposes, has its origins in the mid-19th century. Some of the earliest examples of successful anthropological identification come from cases with minimal or fragmented remains, such as fragments of remains recovered from a sausage factory vat (Ubelaker, 2018). Methods of estimating age, sex, and race from skeletal remains have advanced over the centuries and providing a biological profile to investigators of unidentified decedent cases has been common practice for some time (Isa et al., 2021). Adult humans display a level of sexual dimorphism that exists on a spectrum, enabling anthropologists to determine the likelihood that a decedent is male or female, but not with 100% confidence (Isa et al., 2021). The possibility of accurately determining the binary sex (male or female) of a complete skeleton is about 94%; the likelihood is significantly less if the skeleton is incomplete (Spradley & Jantz, 2011). One example of

misclassification based on rigid adherence to binary sex estimation is that of the case of “Julie Doe,” an unidentified transgender woman whose remains were found in Clermont, Florida on September 25, 1988 (Zhang, 2019). Upon inspection of Julie Doe’s remains, Dr. William Maples of the C. A. Pound Identification Laboratory at the University of Florida deemed Julie Doe to be a “fairly strong, tall White female” (Lake County Sheriff, 2017). A later examination in 2015 by Dr. Maples predecessor, Dr. Michael Warren, revealed some understandable mistakes based on accepted scientific beliefs at the time, which led to Julie’s remains being reclassified as male (Redgrave, 2018). This determination, alongside Julie Doe’s feminine clothing and breast implants, led investigators to believe she was most likely a transgender woman (Redgrave, 2018).

The use of fluid and soft tissue for forensic human identification has a long history as well. The discovery of blood antigen typing dates to 1901, though the first usage of blood typing for forensic exclusion dates to the 1960s (Harbison, 2016). Sexual assault kits were first developed in the 1970s and have assisted in the resolution of numerous sexual assault cases, but the practice of processing this evidence has been plagued by many barriers, not the least of which is lack of resources or funds to process these kits (Keene, 2018).

The first use of DNA evidence for forensic identification was in 1987 (James, 2009), with the Combined DNA Indexing System (CODIS) being implemented between 1990 and 1994 (*Combined DNA Index System (CODIS)*, 2021). The CODIS database network has been the forensic standard of DNA comparison since this time. As of April 2021, CODIS contained over 14,541,796 offender profiles, 4,341,864 arrestee profiles and 1,103,683 forensic profiles (Federal Bureau of Investigation, 2021). The database has produced 562,412 “hits”, designated as either

offender hits, meaning the identity of a potential suspect is generate based on a match to an existing entry in the database associated with a known individual, or forensic hits, in which DNA profiles from two or more crime scenes match in the database, but the identity of the suspect is still unknown (Federal Bureau of Investigation, 2021). No breakdown between these two classifications of hits is publicly provided by the FBI. The CODIS statistics as of April 2021 only state that the database has “assisted in more than 549,516 investigations” (Federal Bureau of Investigation, 2021), with no indication of how many of these investigations have been resolved using information provided by the database. The same markers used by CODIS are also used by the National Missing and Unidentified Persons System (NamUs) as one of the biometric markers for automated comparison of unidentified remains to missing individuals, if a DNA sample from the individual’s immediate family is available (National Missing and Unidentified Persons System, 2022). In the case of Julie Doe, reclassification of her remains as assigned male led to DNA karyotyping of the remains, revealing an XY karyotype consistent with her new sex estimation as an assigned male individual (Redgrave, 2018). Prior to the determination that Julie Doe had been assigned male at birth, comparisons of her remains to missing individuals were carried out only with missing females, but following the DNA karyotyping, her NamUs profile was updated to classify her as male, and her remains have only been compared within the system to missing males ever since (National Missing and Unidentified Persons System, 2021).

Advances in genomics have led to autosomal sequencing – the digital recording of 22 numbered chromosomes in the human genetic sequence, of which 99.9% is identical across all humans (International Society of Genetic Genealogy, 2020). This remaining .1% referred to as Single Nucleotide Polymorphisms, or SNPs, are used to compare individuals to each other to

determine an estimated degree of relationship between them as distant as a sixth cousin or more (Ball et al., 2020). Autosomal DNA began to be used for forensic identification purposes in 2017, by the DNA Doe Project for identification of unidentified decedents (*DNA Doe Project*, 2021), and by the Sacramento California District Attorney's office in the identification of the Golden State Killer (Wickenheiser, 2019). Julie Doe was one of the first unidentified deceased individuals researched by the Trans Doe Task Force, a nonprofit organization dedicated to case resolution of missing, murdered and unidentified LGBTQ+ individuals and co-founded by the researcher, and deemed to be a good candidate for forensic genetic genealogical research (Redgrave, 2018). Bone samples from Julie Doe's remains were submitted for DNA lab processing, and several rounds of extraction and sequencing were necessary before a usable autosomal profile was produced (Redgrave, 2018). In January of 2020, Julie Doe's DNA profile was uploaded to GEDmatch and forensic genetic genealogical research began under the direction of the researcher, who was at that time a team leader and case manager for the DNA Doe Project (*DNA Doe Project*, 2021; Redgrave, 2018; Zhang, 2019). The researcher left the DNA Doe Project in April of 2020 and the case was transferred to a new team leader for continued research; at the time of this writing, Julie Doe remains unidentified.

Current Methodology

Technique. The basis of forensic genetic genealogy is a combination of traditional genealogical research, genetic genealogy, digital and biological forensics (United States Department of Justice, 2019). This interdisciplinary approach to human identification operates on the standard forensic procedure of comparing crime scene evidence to known samples

(Butler, 2015). The known samples in this instance are user-submitted autosomal DNA profiles uploaded to consumer databases for genealogical analysis and comparison.

After processing biological crime scene evidence into a compatible autosomal profile, the resulting file is uploaded by forensic genetic genealogy researchers with the intention of identifying the unknown contributor (Thomson et al., 2019). The unknown contributor's profile is compared to known contributors to look for matching single nucleotide polymorphism (SNP) segments. The pedigrees of clusters of matching contributors are then sourced with vital records to determine relationships that tie the shared segments to a common ancestor (Ball et al., 2020). It can then be assumed that the common ancestor between the known contributors has a high likelihood of being in the direct lineage of, or closely related to, the unknown contributor.

Multiple clusters of matching known contributors are researched until descendants of the identified common ancestors are found that lead to a potential identification of the unknown contributor (Leeds, 2020). When a candidate for identification is located by the genealogist, conventional confirmatory methods are used to verify the identification, such as fingerprints, dental records, or matching of a parent, child, or full sibling via the Combined DNA Indexing System (CODIS) (Ivany et al., 2020). By this process, forensic genetic genealogy acts as an investigative tool that produces a scientific tip to law enforcement (United States Department of Justice, 2019).

The researcher led and organized the forensic genetic genealogical research that led to the identification of Clark County Idaho John Doe as Joseph Henry Loveless (Michael et al., 2022). The partial dismembered remains of Joseph Henry Loveless, born in 1870 in Utah, were discovered in a lava tube cave near Dubois, Idaho in 1979, and another set of partial remains

matching the same individual were found in the same cave in 1991 (Thompson, 2020). The environment in the cave naturally mummified the remains as to limit the efficacy of estimating a postmortem interval, or the time in between the individual's death and the time they were recovered (Ubelaker & Scammell, 1992). Using the autosomal DNA profile of the then-unknown individual, clusters of genetic cousins relating to different sets of known ancestors were organized and examined for crossover ancestors, or descendants of said ancestors who married and had offspring together (Michael et al., 2022). By utilizing the conditional probability tool What Are The Odds (WATO) available via DNA Painter, it was determined that the unidentified was likely to have been born before the turn of the 20th century (Michael et al., 2022; Perl, 2021). The WATO tool indicated that the most likely relationship of the unidentified to his genetic cousins was as a grandson of John Loveless (1807-1880) and Rachel Mahala Anderson (1805-1981), and Samuel Scriggins (1806-1879) and Ellen Prentiss (1809-1886) (A. R. Michael et al., 2022; Price, 2020). After researching all known descendants of these grandparents and determining that Loveless and Anderson's son Joseph Jackson Loveless (1831-1883) married a daughter of Scriggins and Prentiss, Sarah Jane Scriggins, one son from this union, Joseph Henry Loveless, was found to not have a documented death date. Joseph was born in 1870, and all his siblings and children had long since passed away; his only remaining living relative was an 87-year-old grandchild, who submitted a direct-to-consumer DNA test for autosomal comparison as STR comparison between a grandparent and grandchild would be inconclusive. Using DNA Painter's shared cM calculator, the total identical DNA between the two was found to be consistent with a grandparent-grandchild relationship (Perl, 2021). Joseph Loveless' date of death was estimated to be not long after May 18, 1916, as this was the last

known sighting when he escaped from jail after being apprehended for the murder of his wife (Price, 2020). This made the estimated postmortem interval between Loveless' death and the first discovery of his partial remains to be around 63 years, and the span between his death and his eventual identification 103 years, making the identification of Clark County John Doe as Joseph Henry Loveless the oldest forensic identification at that time (NBC News, 2020).

Current Policies. The United States Department of Justice (DOJ) released an interim policy on the use of forensic genetic genealogical DNA analysis in criminal cases in November of 2019 (United States Department of Justice, 2019). The DOJ's guidelines state that before a case is submitted for forensic genetic genealogy, an attempt must be made at STR comparison, and that forensic genetic genealogy can only be used in cases of unidentified decedents or unidentified perpetrators of violent crime, with "violent crime" defined as any homicide or sex crime. The policy also states that the DNA data and database entries on genealogical DNA sites are considered to be confidential government information (United States Department of Justice, 2019). The interim policy solidifies what was already being used as best practices by the most respected forensic genetic genealogists and allows for a great deal of freedom while providing some structure to what is expected in presenting a confirmatory positive identification (United States Department of Justice, 2019). For example, agencies may use forensic genetic genealogy searches if a CODIS search and other reasonable investigative methods have produced no leads (Callaghan, 2019).

In regard to individual privacy concerns, an individual has waived their right to privacy when they have placed something they wish to be private in a place where others can see it (Rumbold & Wilson, 2019). This policy extends to searchable internet databases in which

another individual can make an account and browse user-submitted data, such as the names and email addresses associated with an autosomal DNA profile, and any family surnames in a provided Genealogical Data Communication (GEDCOM) file.

Best Practices. Forensic genetic genealogy requires a higher caliber of knowledge and different technique than is expected of professional genetic genealogy. This is due to the high stakes involved in making a positive identification, and the potential damage that can be caused by an inaccurate candidate for identification being presented to law enforcement (Mustian, 2015; Scudder et al., 2019). An understanding of the efficacy of Y DNA for paternal surname searches and known issues that may arise such as misattributed paternities or adoption causing a break in a patrilineal surname should be fully understood before utilizing the methodology or presenting a candidate to law enforcement. Potential candidate surnames derived from Y DNA data comparison have resulted in wrongful accusation (Mustian, 2015; Scudder et al., 2019) and wrongful incarceration (Syndercombe Court, 2018) as a result of this information either not being fully understood by the researchers or not being accurately communicated to law enforcement. Due diligence in researching and challenging the identification should be undertaken by the forensic genetic genealogist before ever mentioning any potential identification by name to law enforcement (Roberts, 2017).

Known Issues. According to Callaghan (2019), forensic genetic genealogy exists as a hybrid of forensics and investigatory methods. Due to the intersectional nature of the field, there is an existing gap in research regarding proposed standards of practice. These gaps in understanding are evidenced in the damaging errors that have occurred because of presenting Y DNA findings to law enforcement without ample explanation (Syndercombe Court, 2018).

Before a candidate for identification is ever presented, however, attempts may be made to contact DNA matches to gather genealogical information as evidence in research. A lack of forethought into the psychological response of those approached by law enforcement can cause errors in evidence gathering (Tyler et al., 2015) and these communications may lead to distrust or distaste of the use of forensic genetic genealogy in general. Most DNA matches of an unknown contributor can be identified and researched without the need to contact them for information at all, but better training is needed for law enforcement professionals in the gathering of intelligence evidence from social networking sites in order to ensure this route is taken before contact is deemed necessary (Martin et al., 2014).

Needs

The researcher has identified four main groups as having a particular investment in forensic genetic genealogy: forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes. These four groups have their own unique needs from standardizations in the field of forensic genetic genealogy that vary from standards of quality of work and information security to ethics and privacy concerns of the public. The study treated these three groups as unique populations to be studied.

Forensic Genetic Genealogists

Forensic genetic genealogy has only existed in a professionally recognized and publicly visible form since 2018, and writings on the topic are limited. Due to the lack of formal surveys of forensic genetic genealogists, the only available source of knowledge about the needs of forensic genetic genealogists can be found in news media interviews with the genealogists

themselves. The most common response from forensic genetic genealogists when asked what the public can do to help solve cases is to request that more people test their DNA, upload their DNA data to the databases where forensic genetic genealogists can access it, and opt in to law enforcement matching (Baker, 2021; Murphy, 2020; Ramey, 2021). Forensic genetic genealogists also need the cooperation and collaboration of the law enforcement department to facilitate effective use of all possible information available that may help solve the case (Addison, 2021). Another commonly stated need of forensic genetic genealogists is better understanding of their work by the public and criminal justice professionals (Norton & Veltstra, 2021; Ramey, 2021).

Criminal Justice Professionals

Continuing education is a requirement of law enforcement professionals, and online training has proven effective for standardizing training across departments (Kingshott et al., 2015). The rapid growth of technology is considered essential in the professional development of detectives (Westera et al., 2016) and this aspect of continuing education needs to be prioritized to facilitate training opportunities. No determination has been made as to whether forensic genetic genealogy is a forensic tool, a policing tool, or a hybrid of both (Scudder et al., 2019). Detectives who are aware of the issues within close-knit communities of a resistance to filing witness statements need to understand why and how forensic genetic genealogy can circumvent this issue (Banyard et al., 2019).

Consumers of Genealogical DNA Testing Products

Consumers of genetic genealogy products and family tree building websites need to know that their concerns about accidental exposure of health information will be handled appropriately

as advances in mapping autosomal SNP to inheritable traits continues to become more accurate (Wickenheiser, 2019). Public consumers also need further education on the actuality of privacy laws and an understanding of the potential result of putting any identifiable information on the internet (Rumbold & Wilson, 2019). Four of the most prominent providers of direct-to-consumer (DTC) genetic genealogical testing state in their privacy policies that they do not sell or transfer a consumer's genetic information without express permission from the individual consumer (23andMe, 2020; *Privacy Policy*, 2020; *Privacy Statement*, 2019; *Privacy Statement*, 2020). Federal laws such as the Genetic Information Nondiscrimination act (*Genetic Information Discrimination*, 2021) and 2013 amendments to the Health Insurance Portability and Accountability Act (HIPAA) (National human genome research institute, 2020) prevent employers and health insurers, respectively, from discriminating against individuals based on their genetic information. These facts are also not well known to consumers, according to a 2018 poll (Associated Press, 2018) in which 50% of adults stated that they were extremely concerned about their information being sold by for-profit companies to medical researchers or doctors.

Families of Missing Persons, Victims, and Perpetrators of Violent Crimes.

Perpetrators and their families have a right to privacy of non-case-related information, including their health information, regardless of whether the perpetrator has yet to be identified (Roberts, 2017). These family members will need to know that their privacy is respected as the public can become very invasive, as was the case with Golden State Killer Joseph DeAngelo's former wife (Tron, 2020). The arrest of Joseph DeAngelo was the first publicized arrest brought on by forensic genetic genealogy and brought an initial awareness about the field to the public (Wickenheiser, 2019).

Families of previously unidentified victims have also experienced harassment. For example, the family of the former Jane Doe popularly referred to as “Buckskin Girl,” experienced harassment from public citizens accusing them of having never reported their family member missing (Websleuths, 2021). This is a common occurrence for the families of missing and formerly unidentified people, and is usually through no fault of their own, as there are no standardized methods of reporting a missing person, following up on a missing persons report, or procedurally handling a missing persons case (Zaczek, 2019). When the family of a missing person reports their family member missing to the local police office, they usually believe that this is all they have to do (Katz, 2012). This is because the other avenues by which a missing person can be reported, such as the National Missing and Unidentified Persons System (NamUs) and the National Center for Missing and Exploited Children (NCMEC) are not well known to the public or are not considered by the families as another point of contact other than the local police.

The National Missing and Unidentified Persons System (NamUs) is the central database for all such cases throughout the United States. However, not every state is individually required to enter missing persons or unidentified decedents into the system (*Identifying Missing Persons Through Legislation*, 2016). A family member of a missing person can willingly create a profile for a missing person and have it approved by NamUs directly and can also submit family members’ DNA to the CODIS database for comparison to unidentified decedents. Without nationwide requirements to enter cases into the database, however, there will always continue to be gaps in the data (Case Ravel, 2019). The public assumes, with good reason and good faith, that if a family member has contacted the police about a missing loved one, that report has been

taken seriously and is under investigation (Zaczek, 2019). However, if a person is a legal adult and there is no reason to assume they have come to harm, these reports have historically not been taken seriously as there is little precedent to assume harm would have befallen them (Zaczek, 2019). The report is often not put into active investigation for this reason, and the family members of a missing person may be none the wiser to this issue (Zaczek, 2019). Better education is needed for the public as well as families, so a better understanding is had overall of all available avenues.

Concerns

As their goals and values differ, so too do the concerns of forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes. Generally, forensic genetic genealogists and criminal justice professionals are primarily concerned with the resolution of cases. Consumers of genealogical DNA testing products have widely varying concerns about the use of forensic genetic genealogy ranging from concerns for their own privacy to the accuracy of the methodology. The families of missing persons, victims, and perpetrators of violent crimes also have concerns about their own privacy and safety, as some family members of individuals related to prominent cases have experienced harassment from the public as well as the media. Families of missing persons, victims, and perpetrators of violent crimes also have concerns about the thoroughness of the investigations pertaining to their family member's case. The researcher believes that the key to alleviating these concerns is an open dialogue amongst the stakeholder subgroups.

Forensic Genetic Genealogists

The primary concern of forensic genetic genealogists is ensuring the continuation of the field. As they are actively working forensic cases, they experience policy and law changes and discussions of policy concerns in real time as they occur (O'Neil, 2021). Forensic genetic genealogists' primary goal is human identification, followed by the assurance that the field will continue and be able to grow (Addison, 2021). They are concerned with information security, the integrity of their investigation, and compassionate consideration of the needs of the other three stakeholder groups (Ivany et al., 2020). A growing concern for forensic genetic genealogists is state-by-state legislation restricting the use of the methodology, as there is in Maryland (Prudente, 2021) and Montana (Wetsman, 2021), both following the resolution of prominent cases in their respective states (Associated Press, 2021; Prudente, 2021).

Criminal Justice Professionals

Law enforcement professionals aware of previous shortcomings of the use of both forensic genetic genealogy and its predecessor, familial searching via partial CODIS matches (Kaye, 2013) may be concerned about the potential for misidentification and the ensuing backlash of this error in instances where the information conveyed from the forensic genetic genealogist to the department was unclear or insufficient such as in the investigation into the homicide of Angie Dodge (Scudder et al., 2019). Some of these misunderstandings come from the prevalence of media misrepresentation of forensic science that has tainted not only public media consumers' understanding of investigations, but that of investigators themselves (Trainum, 2019). Criminal justice professionals have also voiced concerns about the recent restrictions placed on the use of forensic genetic genealogy in Maryland and Montana, stating

that these restrictions will ultimately make already difficult cases even harder to resolve (Hughes, 2021).

Consumers of Genealogical DNA Testing Products

Products accessed by public consumers have already been negatively impacted by insufficient policies and education on the use of forensic genetic genealogy. For example, the misidentification of Michael Usry, Jr., in the murder of Angie Dodge was a violation of a major genealogical DNA database's privacy policies and permanently altered access and functionality to certain features of the site, such as Y DNA comparison (Scudder et al., 2019). The database in question no longer sells Y DNA tests to consumers, and users who previously purchased Y DNA tests can now only access that information in the form of a raw data download to be uploaded elsewhere (Scudder et al., 2019).

An experiment conducted in 2013 by Yaniv Erlach, the CEO of one of the major genealogical DNA databases, showed that DNA test consumers who intentionally anonymized their information could still be identified using their DNA matches and internet use information (Bohannon, 2013). After the announcement of the apprehension of the Golden State Killer, the genealogical DNA service of which Erlach was the CEO updated their site's terms of use to explicitly disallow the use of their services for law enforcement investigations. On sites which permit the use of searching by law enforcement, DNA testers may agree to the terms of service, but their family members who have not tested have not given that same consent (Moran, 2018). The Golden State Killer case also brought to light the legality surrounding collection of discarded DNA, which is legally in the public domain and therefore permissible for collection by law enforcement. Comparisons to DNA collection and cataloging have been regarded with

fearful association with eugenics and “genetic surveillance” (Kaye, 2013). Better transparency of methods and usage of databases is needed for all sides to facilitate a reciprocal conversation on the issues.

Families of Missing Persons, Victims, and Perpetrators of Violent Crime

Families of missing persons, victims, and perpetrators enter the public spotlight along with those directly involved in a case as they are questioned and investigated for further details. For example, the families of Angie Dodge and Michael Usry, Jr. have been negatively and irrevocably impacted by the misidentification of Dodge’s killer due to an error in the use of Y DNA surname searching (Scudder et al., 2019). Uploads of DNA data can unintentionally lead to the identification of family members of testers without their consent (Moran, 2018) which may be considered by some to be a breach of privacy. Victims and their families are re-traumatized every time they tell their stories, and steps can be taken to minimize this (Meyers, 2018). One of these steps can be forensic genetic genealogy, as the DNA results tell their own narrative and eliminate the need for much interviewing and re-examination of narratives.

Families of missing persons face uncertain and unclear policies in regard to the filing of their reports (Zaczek, 2019) and the process by which DNA reference samples are collected in the event of locating a potential match for DNA comparison (Katsanis et al., 2018). The most likely people to be reported missing are those from disadvantaged populations, such as racial minorities, people in low income areas, undomiciled people, sex workers, runaways, and mentally ill people (Kiepal et al., 2012). These are the same groupings of people who report insufficient service from law enforcement when needed (Banyard et al., 2019; Petersen, 2017).

Misunderstandings

There are many misunderstandings and outdated beliefs pertaining to the use of forensic genetic genealogy. For example, it is believed by some that forensic genetic genealogy may result in misidentification of a victim or perpetrator (Wickenheiser, 2019). This is no longer as much of a risk as it had been in the case of Angie Dodge, as the Department of Justice (DOJ) interim policy requires conventional confirmatory testing such as CODIS comparison, dental or fingerprint records (United States Department of Justice, 2019).

Another misconception is that searching consumer-recreational genetic genealogical databases for forensic purposes without honoring the same privacy policies as private databases such as CODIS equates to a violation of privacy (Murphy, 2018). This is false because of the terms of use agreement on every genetic genealogy database website that either specifically disallows the use of the database for law enforcement (*Terms and Conditions*, 2020), or permits it, sometimes in the form of a clause that expresses the information on the site may be used for purposes other than what is originally intended. This statement is included on almost every consumer website as a way to protect the controlling company from liability if the users' information is harvested for spam solicitation, but also allows the use of the database for law enforcement searching as a purpose other than what is originally intended (Phillips, 2015).

There is a concern for the potential of misidentification due to secondary contributors of DNA at a crime scene that may result in the identification of a person who had simply come in physical contact with some evidence at some point. It is also believed that forensic genetic genealogy is new as of the last few years, when the use of genealogy to identify perpetrators using their DNA matches has been used via partial CODIS matches for decades (Kaye, 2013).

This method, known as “familial searching,” is often misattributed to current forensic genetic genealogy by its misleading name, which some use interchangeably when the method is quite different, and known to have a much higher margin of error (*Combined DNA Index System (CODIS)*, 2021). The use of the term “identification” in adjudication is often misinterpreted by the public as meaning “to the exclusion of all others” (Swofford & Cino, 2018). This fact alone causes some anxiety in terms of what a genealogical identification entails (Associated Press, 2018).

Conclusion

Much has been said about forensic genetic genealogy, but different invested parties have different needs and concerns regarding its use. While there is no law requiring any website to maintain a terms of service for their users, it is the responsibility of the consumer to understand the privacy policies for any website to which they upload their DNA data (*What Are Terms of Service*, 2021). This includes an understanding of whether their health information or private identifying data will be exposed. Law enforcement requires a clear understanding of what is and is not permissible in research methods. Families of missing persons, victims, and perpetrators need to know that their privacy will be respected as case information is publicized and require some counseling on how to handle media requests.

Forensic genetic genealogy has the potential to be an equalizer in the racial imbalance in both forensic databases and genealogical databases (E. Murphy & Tong, 2020; Sachs, 2019). However, marginalized groups have fears of the potential harm that can come to them through the use of DNA for identification, grounded in racial essentialism (Soylu Yalcinkaya et al., 2017), gender essentialism (Boskey, 2020), genetic essentialism (Dar-Nimrod & Heine, 2011)

and the use of these concepts to justify racism, sexism, transphobia, and eugenics (Boskey, 2020; Dar-Nimrod & Heine, 2011; Krueger, 1997; National Public Radio, 2012; Soylu Yalcinkaya et al., 2017; Sparrow, 2014). An understanding of what can and cannot legally be done with genetic information may result in more support of the use of forensic genetic genealogy by marginalized populations (*Genetic Information Discrimination*, 2021; National human genome research institute, 2020; Phillips, 2015).

Proper education of all invested parties is required to facilitate a functional discussion. Research is needed into gaps in understanding, so that each group can be served according to its needs. Once a foundational understanding is achieved across all parties, an informed dialogue can be opened across all parties so that a consensus can be reached on policy and education. All groups can be served and benefit from the use of forensic genetic genealogy if transparency and compassion are emphasized overall.

CHAPTER 3: METHODOLOGY

Forensic genetic genealogy is a new field, having only publicly shown its efficacy in April of 2018 with the apprehension of Joseph James DeAngelo, later convicted of multiple assaults and homicides attributed to the Golden State Killer (Wickenheiser, 2019). As the methodology evolves, and notable case resolutions gain media publicity, use of forensic genetic genealogy becomes an even more divisive topic amongst consumers of genealogical DNA tests who are given impetus to choose their stance either for against its use, with only limited and sometimes misleading information on how it affects them (Syndercombe Court, 2018). It is for that reason that a narrative survey approach was used to collect data on the experiences of stakeholders and their needs in order to improve future case outcomes. Narrative researchers collect and tells stories about people's lives and writes narratives of individual experiences (Creswell & Creswell, 2018). This is to capture data on beliefs, opinions, misconceptions, and the possible motivations behind them. For the purpose of this research study, survey questions were crafted to elicit an emotional response from participants. By applying concepts from dual-process theory, which suggests that an individual has two systems of thought leading them to a personal conclusion on a subject (Stephens et al., 2018) and terror management theory, which suggests that all choices made by an individual's worldview is primarily influenced by their avoidance of acceptance of their own mortality (Rubin, 2018), participants were given opportunities throughout the survey to change their answer depending on situational factors that caused them to consider their own fears, beliefs, and values. According to dual-process theory, many participants may present more than one viewpoint on the same topic when given slightly different prompts due to the likelihood that many respondents have internalized or subconscious

biases based on their own experiences and worldviews. This was accounted for in the data analysis, allowing for the coding of the responses to be representative of more than one stance per individual respondent.

Purpose of the Study

The purpose of this qualitative narrative study was to identify strategies by which forensic genetic genealogy can be applied to cases of unidentified decedents who are from marginalized populations that have been historically deprioritized or difficult to resolve. This study was designed to determine the needs of marginalized individuals affected by the use of forensic genetic genealogy. What was examined was not only the needs of the individuals and groups, but the ways in which their stance changed when confronted with a theoretical case of a marginalized victim as opposed to one of a heterosexual, cisgender white individual of European descent.

Forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes within marginalized populations were surveyed to determine needs and concerns regarding the use of forensic genetic genealogy, and the origins of those needs and concerns. A study shows that fear and gaps in understanding influence decisions relating to personal privacy or safety (K. Martin, 2016), but little research exists that targets connected populations with conflicting viewpoints to find the common ground between them. The proposed study was comprised of 36 self-identified respondents within the United States, composed of 13 forensic genetic genealogists, 12 criminal justice professionals, 20 consumers of genealogical DNA testing products, and nine families of missing persons, victims, and perpetrators of violent crimes

It was theorized that there would be many differences across the target populations, but some common themes would emerge that can help facilitate the resolution of cases of violence toward marginalized victims.

Research Questions

This qualitative, narrative study sought to answer the following questions:

1. What is each affected group (forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes) most concerned about regarding the use of forensic genetic genealogy to identify marginalized unidentified decedents or perpetrators of violent crime against marginalized group members?
2. How have the past experiences of individuals in the affected groups contributed to their stance on the use of forensic genetic genealogy?
3. How do stakeholders' opinions on the use of forensic genetic genealogy change when applied to cases involving marginalized victims of violent crime versus white, heterosexual, cisgender European-descended victims?

These questions were selected based on the existing literature on the topic of forensic genetic genealogy and its predecessor, familial searching (Kaye, 2013), which show that there are rifts of opinion between advocates of its use and those who have ethical or privacy concerns on the topic. The primary goal of forensic genetic genealogy is human identification to bring about closure of law enforcement cases in order to make the world a safer place (Thomson et al., 2019). Forensic genetic genealogy can be applied to cases of marginalized decedents in a way

that counterbalances the systemic issues that prevent the resolution of said cases, as the researcher has been exploring since 2018 (Poli, 2021). By working together to find commonality between those affected by its use, the methodology can be made more inclusive of marginalized victims.

Site Information

This narrative study took place on a customized website hosted and controlled by the researcher and created for the sole purpose of collecting narrative survey data for this study. The site used Nextcloud, a content collaboration platform, to securely manage and analyze participant data (Nextcloud, 2021). Nextcloud is an open-source cloud file storage and collaboration platform that is self-hosted, self-administered and utilizes multiple encryption methods for data security (Nextcloud, 2021). Several plugins and modifications such as end to end encryption, hiding the site user list and automatic deletion of data after a set time were added to the installation to ensure security and privacy for participants. Participants were required to log in to the site to access the narrative survey, but the ability to see the list of other users on the site was removed to protect anonymity of the participants from each other. Only the researcher was able to see the full list of users. A forms plugin that allows the assignment of specific forms to individual participants within the system was installed (Sattizahn, 2021) as well as an analytics plugin that parsed coding data to visualize themes (Scherello, 2021). Additionally, a terms of service plugin that required participants to accept the online consent form before making an account ensured that users have been informed about the nature of the study before progressing to the survey (Schilling, 2021).

By utilizing this customized NextCloud system, participants in this study were ensured that their information will be kept confidential, but the identity of respondents were known to the researcher. Fully anonymized survey-taking online can lead to careless or faulty data entry (Meade & Craig, 2012), therefore identifiers were taken during the survey but were removed before publication. Using several social media platforms such as Facebook, Twitter, and Reddit as the setting for this research broadened the available test population, as the forensic genetic genealogy community is small and spread out globally. In addition to the geographical spread of the potential participants, forensic genetic genealogical research is primarily conducted via the internet and using the same or similar platform to what is used professionally, or by family members who advocate for their loved ones, may result in more accurate responses from participants.

Populations

The four subgroups that were asked to participate in this study, forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA tests, and families of missing persons, victims, and perpetrators were treated as separate populations in this study. Each population has a unique stake in the use of forensic genetic genealogy. There are known trends amongst these populations on their general stances on the use of forensic genetic genealogy. Some populations are known to be divided on the issue and some are clearly for or against its use. Given that the survey will be time-consuming, the researcher employed multiple social media platforms such as Facebook, Twitter, and Reddit to gain interest from potential participants in order to receive sufficient data.

Forensic Genetic Genealogists

Forensic genetic genealogists represent the population most likely to be in support of the use of forensic genetic genealogy since they are the active practitioners of the process.

Practicing forensic genetic genealogists are a small population but are a somewhat close-knit community. The forensic genetic genealogy community is prevalent on Facebook, and the researcher procured permission to share the survey link in a number of relevant groups. A total of 13 participants in this subgroup responded to the narrative survey.

Criminal Justice Professionals

Criminal Justice professionals, such as police detectives, district attorneys, forensic scientists, medical examiners, and lawyers, are prone to mixed feelings about forensic genetic genealogy. This is assumed to be because of the limited public knowledge on the method and a general unawareness of the efficacy of its use (Callaghan, 2019). There are some in this target group who have learned and practice the methodology themselves, and others who are staunchly against its use. A total of 12 participants in this subgroup responded to the narrative survey.

Commercial DNA Test Consumers

Consumers of commercial DNA tests, from casual users to adoptees to professional genealogists, have their own experiences in witnessing the power of genetic genealogy in solving long-standing mysteries. The most obvious difference between this target population and Forensic Genetic Genealogists is that people within this population are more likely to have been directly involved in the experience of a living person who has seen the results of finding solutions via genealogical DNA. This comes with its own set of concerns, most likely stemming

from fears related to personal privacy and the emotional impact of their experiences. A total of 20 participants in this subgroup participated in the narrative survey.

Families of Missing Persons, Victims, and Perpetrators of Violent Crimes

This target population represents the living people most closely related to those who a forensic genetic genealogical sample may originate from. Whether a family member's case was solved by forensic genetic genealogy or other traditional means, there were concerns to be explored here, such as privacy concerns related to media exposure, personal family struggles when hard truths are faced, and the confusing feelings associated with case closure, which stem from relief to anger to frustration that the process seemed to have taken far too much time. Families of missing persons, victims, and perpetrators were found via word of mouth on advocacy Facebook groups, Reddit, LinkedIn, or Twitter. A total of nine participants in this subgroup responded to the narrative survey.

Sampling Method

This study utilized snowball sampling as the primary sampling method. Snowball sampling, which utilizes respondents' social networks for further recruitment, has been proven useful in studies where the population being studied is hidden due to low numbers, or sensitivity of the topic being studied (Browne, 2005). Voluntary responses from each population group were occasionally examined by the researcher by verifying the provided information on the survey site and interventions to acquire more voluntary responses were made via targeted social media advertisement placement or other relevant interventions for that underrepresented population.

Instrumentation

The proposed study was carried out via text-based survey prompts delivered via the researcher's survey site. The survey instrument contained complimentary but individualized prompts based on the respondent's subgroup. For example, the survey for criminal justice professionals included a prompt for a narrative describing what the respondent considers to be the most important case they have ever solved, the forensic genetic genealogist survey asked for a narrative of a case the genealogist helped to solve, the family member survey asked the respondent for a narrative of the experience of their loved one's case, and the DNA test consumer survey asked for a narrative of the consumer's experience of learning something new or solving a personal mystery (Appendix C). All surveys ended with a set of hypothetical scenarios that are the same for each respondent (Appendix C).

Data Collection

The researcher posted a participant letter on Facebook, Twitter, Reddit, and LinkedIn to encourage potential participants to visit the secure survey site and complete the survey or to email the researcher with questions (Appendix A). The recruitment process lasted for a period of four weeks. Potential participants created an account on the secure site and accepted the participant consent form, which was required by the system for the participant to continue (appendix B). The participant then completed an initial survey to gather their name and contact data and determine if they fit the desired demographic for the survey, such as immigrant or child of immigrant(s), sexual orientation other than heterosexual, race or ethnicity other than white, or gender identity other than cisgender. The researcher then contacted the potential participants via their self-reported preferred means of communication as provided in the survey (phone or email)

and assigned each respondent the narrative survey corresponding to their self-identified stakeholder subgroup through the secure site. The participants completed the survey questions in any order. The survey cumulatively took the respondents 45 minutes to two hours to complete but was able to be completed at the respondents' own pace according to their schedule and comfort level. A quick exit link was provided as part of the survey so that respondents could quickly leave the survey site if they felt unbearable stress from recounting their experience or if they were interrupted by others in the course of their writing and felt unsafe to continue (Technology Safety, 2021). Respondents who had difficulty with writing the narrative were given the option to have a recorded Zoom call with the researcher to be transcribed later and could contact the researcher via email to make arrangements, but no such arrangements were necessary. Respondents who provided incomplete submissions were contacted via their self-reported preferred method of communication and asked if they wished to complete the survey, submit the partial information to the study, or have their entry discarded. Only one participant made a partial entry and chose to have their partial entry included. Member checking took the form of allowing respondents to review their own responses and email the researcher with revisions if necessary and permitting the researcher to contact the respondents for clarification and validation of proper interpretation of the responses. At the end of the survey, the respondents could state if they wish to receive a copy of the study. The data collection process lasted for four weeks. The researcher was automatically notified of the respondents' completion by the system via email. The narrative survey data was stored for four weeks within the secure survey site, which was only accessible by the researcher. The data was downloaded by the

researcher to a dedicated, encrypted flash drive in a locked safe in the researcher's office. The researcher anonymized the data and will store the survey results for two years before deletion.

Data Analysis

An inductive coding approach was used to analyze the narrative data. The inductive coding process began with no preconceived codes for the data, so that the data itself informed the codes that were needed. The researcher developed codes based on the narrative as the dataset was reviewed, to eliminate the potential for cognitive bias on the part of the researcher. Special attention was given to instances where the participant was describing their own actions, the actions of others, their feelings, or their perception of the feelings of others. Each complimentary survey response was coded in a manner that allowed for cross-comparison of answers to look for similarities and differences in order to find the intersections between the subgroups' needs. A new code set was used for each subgroup, with a master code set determined at the end of analysis comprised of similar codes that appeared across each subgroup.

The researcher began the initial coding process with a preliminary read-through of the narrative responses to become familiar with the responses and to look for general codes within them and will follow with a more granular coding with a deeper attention to detail. The researcher attempted to code everything that is represented in the narrative, as the participants came from varied backgrounds and their experience colored their narratives in unanticipated or seemingly unrelated ways. This process was repeated for each subgroup individually before moving on to the next; the subgroup was coded entirely before the researcher started on the next subgroup. A master code set based on these common themes was used to look for correlates within the text that bore similarities or differences across the subgroups. From these correlates,

the researcher determined intersectional commonalities amongst the subgroups as well as differences of opinion, expectations and fears that can be resolved by the development of inclusive standards of practice.

Limitations of the Research Design

A major limitation to the study was the limited population of stakeholder subgroup members that are also members of marginalized populations. There were fewer still within this population who are willing to recount their experiences. The interdisciplinary nature of forensic genetic genealogy allowed for some amount of transferability of the results to other similar areas of study such as victim advocacy, but it is possible that the uniqueness of the field may be a limitation to the study's transferability. Potential bias of the researcher and the potential for bias to form for the participants existed due to the emotional nature of the work and the emotional responses that the affected subgroups have to the use of forensic genetic genealogy. Member checking procedures such as allowing the respondent to review their responses and permitting the researcher to contact for clarification and validity of interpretation of the response were taken to ensure that these limitations caused minimal negative impact to the study.

Validity and Credibility

The validity of this study was dependent on two main factors: accurate and truthful reporting of the study participants, and elimination of bias on the part of the researcher. Study participants were expected to be truthful and forthcoming in their responses with the understanding that their information would remain confidential and be anonymized before publication. However, since a great deal of this study revolved around participants' emotional responses to prompts, what was assumed about the feelings and actions of others was taken as

seriously as the participants' truth. The researcher made efforts to confirm with the participants that the researcher had accurately interpreted their narratives in order to limit observational bias on the part of the researcher.

Member Checking Procedures

Participants were able to review their narrative survey responses and were given four days after submission to submit any alterations to their responses. Notice of the opportunity to submit revisions was provided through the secure survey site. The researcher was also able to contact the participants via their self-reported preferred method of communication for clarification during reviewing the responses for coding.

Transferability

The study has the potential for transferability to other areas of criminal justice as it pertains to inclusivity for marginalized groups in criminal investigations. Some aspects of the study may be transferable to research on the role of DNA in investigations or the ethics of using DNA or personal data for investigations of marginalized groups. There is potential for transferability to studies related to social justice due to the researcher focusing on the personal narratives of marginalized individuals from multiple perspectives of criminal investigations.

Dependability

The dependability and trustworthiness of the data relies on the competency of the researcher (Roberts & Hyatt, 2019). The researcher was aware of a personal bias in relation to the issue. A text-based narrative survey allowed for the participants to take time to record their experiences and eliminate some of the potential bias on the part of the researcher by giving the

researcher time to review and check the responses and to ask the respondent if the researcher's interpretation of the responses is representative of the beliefs of the respondent.

Confirmability

The confirmability of the study was dependent on the honest responses of the participants. Since this study dealt with feelings and misconceptions, it was entirely up to the accuracy of the responses of the participants based on their feelings, experiences, and perceptions in order to ensure confirmability of the study, but inductive coding and co-word analysis were for confirmability (Chung et al., 2020). Efforts were made to encourage the honesty of participants by being clear and transparent that the purpose of the study is to lead to standards of practice that serve the needs of marginalized individuals involved in criminal investigations using the latest in advanced methodology that should be made accessible to all currently unsolved cases where it applies.

Ethical Issues in the Study

The ethical concerns in this study were minimal. The primary focus of the study was in regard to privacy and safety concerns of those affected by the use of forensic genetic genealogy. The text-based narrative format of the research allowed participants to converse freely about their concerns in a deliberate and self-paced manner and to let their voice be heard in a way that was confidential but could benefit the greater cause of respect for the privacy and wellbeing of all persons. This also addressed the principle of beneficence, by providing a benefit that outweighs the potential for emotional duress that the participants may have experienced through the interview process (The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). The use of four sub-groups was designed to make

the study fair towards marginalized people affected by the use of forensic genetic genealogy. By addressing the needs of the four distinct populations identified and gathering an equal number of respondents in each category, no one voice was louder than another in the research.

Summary

This narrative survey study was one that is emotionally driven for the researcher and for the participants, and therefore was executed with great amounts of analytical care. Participants were free to express their true feelings on a survey pertaining to their own experiences and were given a safe and secure platform created and hosted by the researcher to do so. The researcher coded and interpreted the provided data in as fair and balanced a manner as possible, coding each subgroup separately before determining a common set of codes that appeared amongst all groups. While the use of four participant subgroups may result in some complicated thematic coding and clustering of responses, every effort was made to find a central point upon which all participants could agree in order to facilitate an effective future conversation on policy making and education for the use of forensic genetic genealogy in investigations of violence toward marginalized victims.

CHAPTER 4: RESULTS

The purpose of this qualitative narrative study was to identify strategies by which forensic genetic genealogy can be applied to cases of unidentified decedents who are from marginalized populations that have been historically deprioritized or difficult to resolve. This study was designed to determine the needs of marginalized individuals affected by the use of forensic genetic genealogy. What was examined was not only the needs of the individuals and groups, but the ways in which their stance changed when confronted with a theoretical case of a marginalized victim as opposed to one of a heterosexual, cisgender white individual of European descent. Unidentified decedents and victims of homicidal violence who belong to one or more marginalized groups experience major barriers to case closure, such as institutional bias causing these cases to be deprioritized over white, heterosexual, cisgender victims (National Public Radio, 2014; Tuerkheimer, 2018; Waldron & Schwencke, 2018). This institutional bias may or may not be known to people who are not members of a marginalized group; therefore, they may be unaware that there are additional layers of difficulty with marginalized cases as opposed to majority cases. This qualitative, narrative study targeted members of four identified stakeholder subgroups: forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products and family members of victims and perpetrators of violent crimes and wrongfully convicted. The four subgroups included respondents who either self-identify as a member of a marginalized group, or as someone who is not an individual from a marginalized group.

The responses were analyzed for overall trends as well as trends specific to stakeholder subgroups and marginalized versus non-marginalized respondents. While no respondents'

opinions or willingness to test changed based on hypothetical scenarios of cases involving marginalized victims, a tendency towards stronger feelings and greater motivation to contribute based on the respondent's ability to relate to the hypothetical victim was noted. Responses were then analyzed for evidence of emotional responses versus logical responses and were coded as system 1 or system 2 responses according to dual process theory. Some clear correlations emerged between the respondents' own marginalization and their usage of both emotion-driven system 1 and logic based system 2 for their decision making, as well as their acceptance of mortality in relation to their willingness to contribute their genetic genealogical information to forensic investigators (Rubin, 2018; Sowden et al., 2015). Non-marginalized respondents revealed a trend towards ambivalence towards helping. While no respondents said they would not help in the investigation of a marginalized victim's identity, there was notable ambivalence across all responses as opposed to a strong reaction in favor of helping marginalized victims.

Research Questions

This qualitative, narrative study targeted members of four identified stakeholder subgroups: forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products and family members of victims and perpetrators of violent crimes and wrongfully convicted. The four subgroups included respondents who either self-identify as a member of a marginalized group, or as someone who is not a member of a marginalized group. The study sought to answer the following questions:

1. How have the past experiences of individuals in the affected groups contributed to their stance on the use of forensic genetic genealogy?

2. How do stakeholders' opinions on the use of forensic genetic genealogy change when applied to cases involving marginalized victims of violent crime versus white, heterosexual, cisgender European-descended victims?

These questions were based on the existing literature on the topic of forensic genetic genealogy and its predecessor, familial searching (Kaye, 2013), which show that there are rifts of opinion between advocates of its use and those who have ethical or privacy concerns on the topic. The primary goal of forensic genetic genealogy is human identification to bring about closure of law enforcement cases in order to make the world a safer place (Thomson et al., 2019). However, there is not a dialogue between forensic genetic genealogists and marginalized individuals to inform genealogists of the needs of marginalized victims. By working together to find commonality between those affected by its use, the methodology can be made more inclusive of marginalized victims.

Data Collection Summary

To address the research questions, the researcher created a set of interconnected narrative surveys, customized for each stakeholder group, along with a preliminary survey that collected the respondents' self-identified stakeholder groups and marginalization status. The data for this study was gathered over the course of 43 days, from December 15, 2021, to January 22, 2022. Participants were invited to the study via the distribution of a "Participant Letter" (Appendix A) which was distributed via a Facebook page established to invite participants to the study. The Participant Letter included a link to a dedicated, self-hosted, encrypted website running Nextcloud, a web-based collaboration platform, where the surveys were accessible. Upon account creation, participants were required to electronically acknowledge the Consent Form

(Appendix B) before continuing to the preliminary survey (Appendix C). The preliminary survey collected participant information including contact information to be used to invite the participant to the narrative survey, and their self-identification as a member of any of four marginalized groups, or none of the above: gender identity other than cisgender; sexual orientation other than heterosexual; racial minority; or immigrant or child of immigrants. The preliminary survey also prompted participants to declare themselves as one or two of the stakeholder subgroups: forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, or family members of victims, perpetrators, or wrongfully convicted individuals.

The researcher was automatically notified via email when participants completed the preliminary survey. Based on the responses, the participants were then invited to complete one or two narrative surveys (Appendix C) depending on how many stakeholder subgroups they selected. Marginalized respondents were asked an additional two questions about their experience as a member of a marginalized group, to collect further data beyond the four broader categories in the preliminary survey. The researcher was automatically notified via email upon completion of the narrative surveys. The responses were then downloaded to an encrypted USB drive which was stored in a locked safe in the researcher's office and deleted from the online platform. During the collection process, no participants requested the removal of their surveys. Only one participant partially completed their survey; this data was retained for the final analysis.

Participant Information

Overall, 36 individuals participated in the narrative survey. Of these, 18 (50%) elected to respond from the viewpoint of two different stakeholder groups. A total of 54 responses were recorded when counting the dual respondents' two survey entries independent of each other. Of the four stakeholder subgroups, 20 (37%) of the responses were from consumers of genealogical DNA testing products; 13 (24%) were from forensic genetic genealogists; 12 (22%) were from criminal justice professionals; and nine (17%) were from family members of missing persons, victims, perpetrators of violent crime, and wrongfully convicted persons. As seen in Figure 1: Number of Respondents per Stakeholder Category, consumers of genealogical DNA testing products are the most represented stakeholder subgroup, while family members of missing persons, victims, perpetrators of violent crime, and wrongfully convicted persons are the least represented.

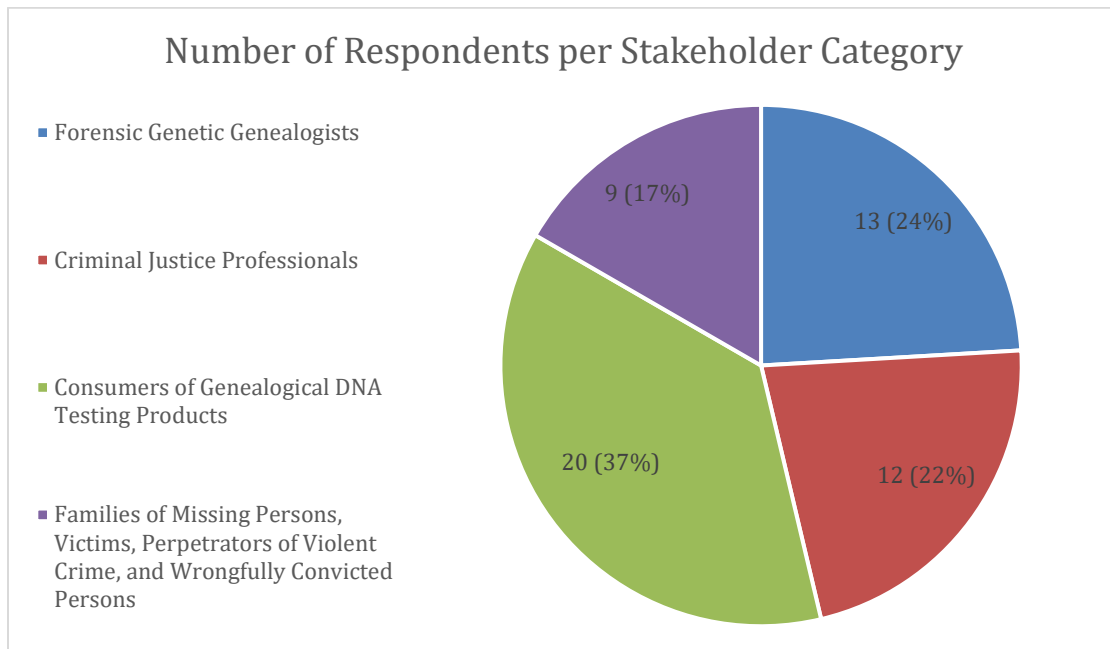


Figure 1: Number of Respondents Per Stakeholder Category

Marginalized Vs. Non-marginalized Respondents

Of the 36 overall respondents, 20 (56%) respondents overall identified themselves as not a member of a marginalized group; 16 (44%) identified themselves as either a member of a racial minority, immigrant or child of immigrants, gender identity other than cisgender or sexual orientation other than heterosexual. As seen in Figure 2: Marginalized Vs. Non-marginalized respondents Across Stakeholder Subgroups, four (31%) of forensic genetic genealogists self-reported marginalized status, while nine (69%) were non-marginalized; six (50%) of criminal justice professionals self-reported marginalized status while six (50%) identified as non-marginalized; eight (40%) of DNA test consumers self-reported marginalized status and 12 (60%) identified as non-marginalized; and four (44%) of family member of victims, perpetrators, or wrongfully convicted persons self-reported marginalized status while five (56%) identified as non-marginalized.

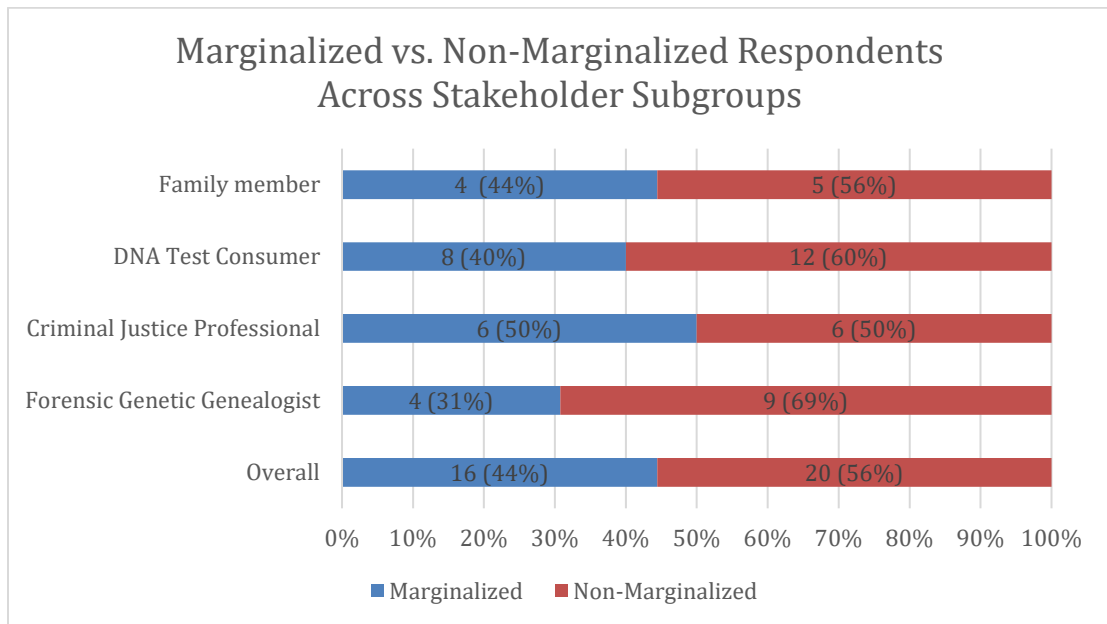


Figure 2: Marginalized vs. Non-marginalized Respondents Across Stakeholder Subgroups

Race, Gender, and Sexuality Diversity of Respondents

Respondents were not categorized by binary gender; rather, individuals self-identifying as not a member of a marginalized group also identified as cisgender, as did the members of marginalized groups who did not self-declare as non-cisgender. As seen in Figure 3: Race, Gender Identity, and Sexuality Diversity of Respondents, 28 (78%) respondents are cisgender, and eight (22%) have a gender-diverse gender identity. Additionally, 23 (64%) of respondents are heterosexual, and 13 (36%) reported a non-heterosexual identity. Of racial identity, 30 (83%) of respondents were white, while six (17%) declared themselves to be of a racial minority.

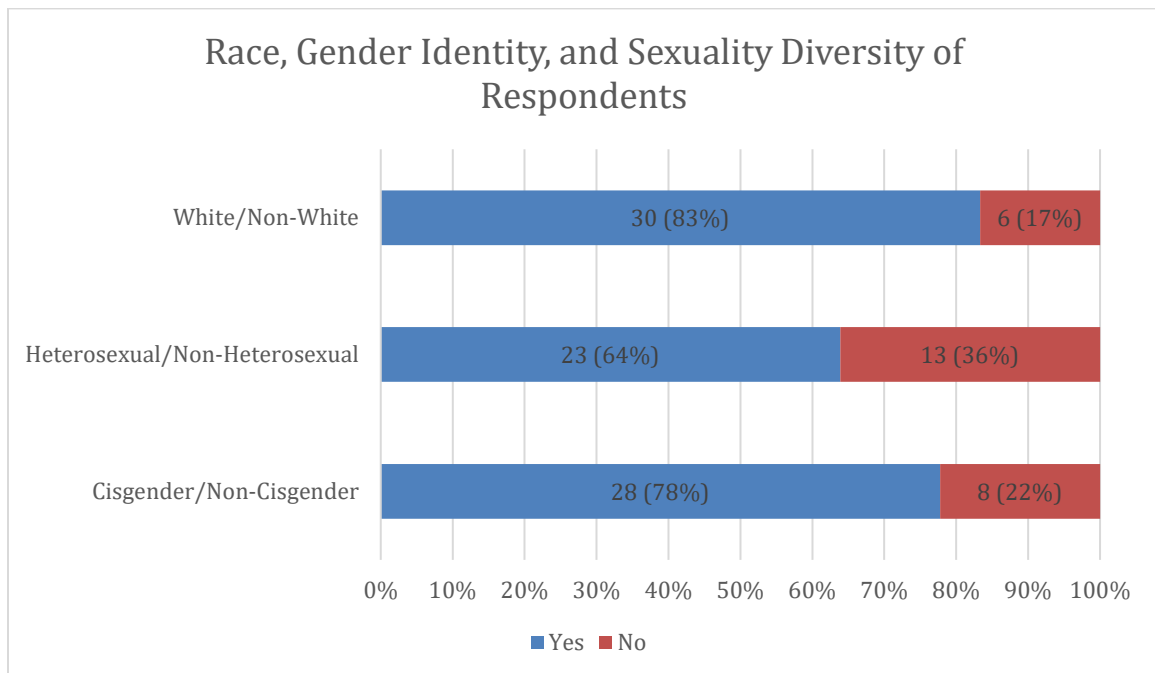


Figure 3: Race, Gender Identity, and Sexuality Diversity of Respondents

Intersectionality of Marginalized Groups

Self-declared marginalized respondents further identified themselves as racial minority, sexual orientation other than heterosexual, gender identity other than cisgender, and immigrant

or child of immigrants. Respondents were allowed to select as many as would apply, and further explain their role as a member of a marginalized group in the beginning questions of the narrative survey. Analysis of these responses showed a trend toward intersectional marginalization, in which an individual belongs to two or more marginalized populations, and often experiences a greater degree of marginalization overall (Robards et al., 2020). Of the 16 marginalized respondents, six (37%) identify as having both a gender identity other than cisgender and a sexuality other than heterosexual; five (31%) belong to only one marginalized subgroup; two (13%) have an alternate sexuality and gender and are a racial minority; two (13%) are non-heterosexual, a racial minority and an immigrant or child of an immigrant; and one (6%) respondent identified as non-cisgender, non-heterosexual, and an immigrant or child of immigrants. No respondents reported belonging to all four categories.

Self-reported Identities of Marginalized Respondents

Marginalized respondents were asked to explain in what ways they identify as members of a marginalized group. This open-ended question prompted a wide array of responses, although some trends were discovered. Of the 16 marginalized respondents, six self-identified as “bisexual,” four self-identified as “queer” and four self-identified as “nonbinary.” None of these terms were mutually exclusive; several respondents identified themselves using multiple key words. While most of the key terms were relative to the pre-defined marginalized classes of non-cisgender, non-heterosexual, non-white, or immigrant, several respondents self-described with words that indicated health concerns or neurodivergence, such as “depression,” “ADD/ADHD,” “autistic,” “disabled,” or “autoimmune condition.”

Analysis Method

After all narrative surveys were collected and anonymized, they were then coded. An inductive coding approach in which the codes used to analyze the interviews are informed by the content, rather than developing a set of codes to look for before beginning analysis, was used for the survey responses (Medelyan, 2019). The four stakeholder subgroups – forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and family members of victims, perpetrators, and wrongfully convicted persons - were analyzed independently of each other and given their own code set. The individual respondents from each subgroup were given codes based on dual-process theory to indicate a System 1/emotion-based response, a System 2/logic-based response, or both (Sowden et al., 2015). The respondents were also individually coded according to terror management theory to indicate either a fear of mortality or personal safety, acceptance of perceived risk, or both (B. Arrowood & R. Cox, 2020).

The resulting code sets from each individual subgroup were examined for similar themes across multiple subgroups. A master code set of themes that are similar across all subgroups was used to determine the collective needs of all groups. Themes that were independent to individual subgroups, or two or three out of four, were used to determine the individual needs of each subgroup. Additionally, the codes of marginalized members of each subgroup were compared to those of white, heterosexual, cisgender individuals of European descent to determine similarities and differences of opinion.

Results

Respondents to this narrative survey were given the opportunity to share specifics about their self-identity, their role as a stakeholder in the use of forensic genetic genealogy, and their reactions to hypothetical scenarios that they may experience because of the use of forensic genetic genealogy. No identifying information about the respondents is included in this presentation of results; While some respondents self-reported a combination of marginalized identities and professional roles that may make them identifiable to those who know them, efforts have been made to prevent presenting responses from individual respondents in such a way that they could be identified.

Research Question 1

The first question that this study sought to answer is “What is each affected group (forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes) most concerned about regarding the use of forensic genetic genealogy to identify marginalized unidentified decedents or perpetrators of violent crime against marginalized group members?” Upon analysis of the data, this question was answered in full. Each stakeholder subgroup revealed a primary concern overall.

Respondents were given the prompt “What is your biggest concern about the use of forensic genetic genealogy?”. This open-ended question left room for a variety of responses. Information gathered from responses to this prompt were analyzed for trends across groups. As seen in Figure 4: Concerns Regarding the Use of Forensic Genetic Genealogy, 30 (81%) of

respondents expressed one or more concerns about the use of forensic genetic genealogy, while seven (19%) stated they had no concerns.

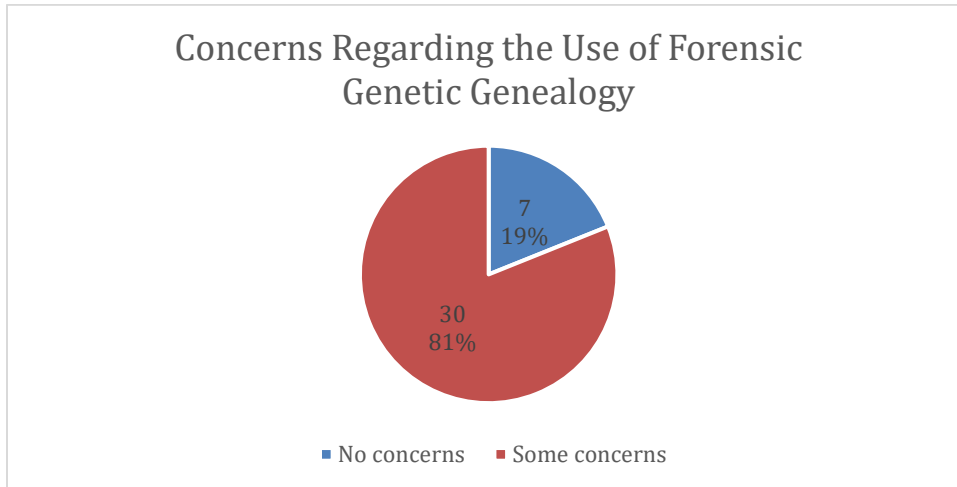


Figure 4: Concerns Regarding the Use of Forensic Genetic Genealogy

Concerns Stated by Marginalized Respondents vs. Non-marginalized Respondents

The number of respondents with no concerns proved to be a substantial percentage of the respondent population. The data was compared between marginalized and non-marginalized respondents. As seen in Figure 5: Concerns Stated by Marginalized Respondents, 15 (94%) of marginalized respondents expressed one or more concerns, while only one (6%) of respondents stated they had no concerns. Most of the respondents with no concerns are amongst non-marginalized respondents.

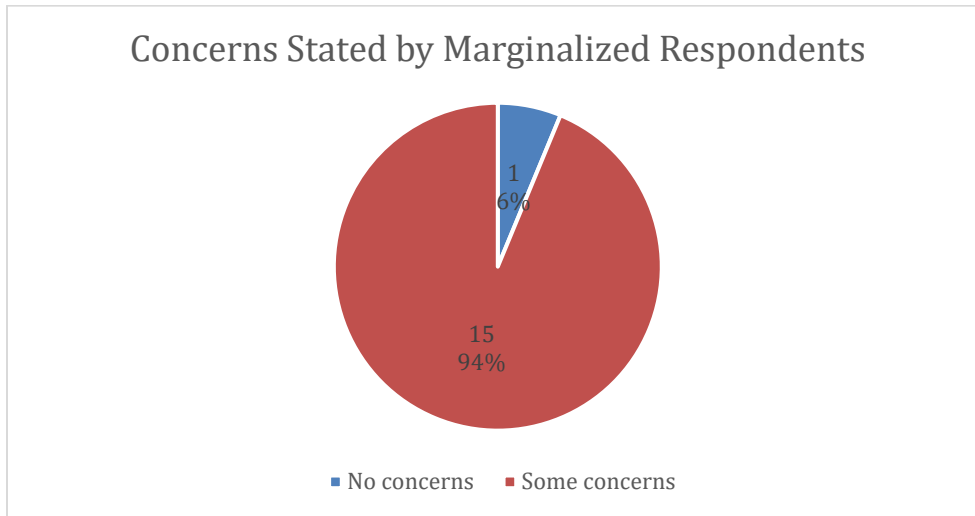


Figure 5: Concerns Stated by Marginalized Respondents

In comparison, as seen in Figure 6: Concerns Stated by Non-marginalized Respondents, 14 (70%) of respondents stated having one or more concerns, while six (30%) of respondents stated they had no concerns. There are notably more respondents who do not self-identify as a member of a marginalized group and who also have no concerns about the use of forensic genetic genealogy.

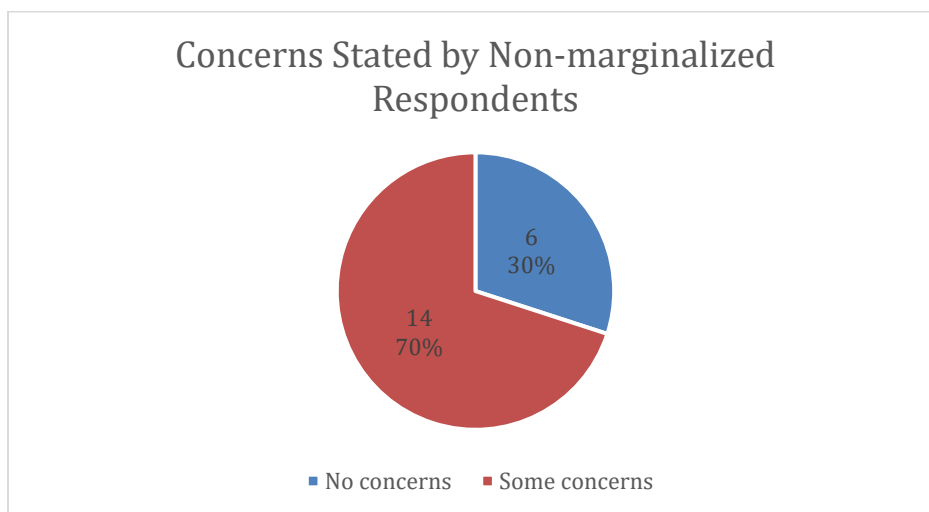


Figure 6: Concerns Stated by Non-marginalized Respondents

Concerns Compared Across Groups

Specific concerns stated by respondents were compared to those across subgroups as well as compared across marginalized versus non-marginalized respondents. Several themes were repeated across all categories, as well as some themes proving to be specific to individual groups, or only appearing in responses from marginalized or non-marginalized respondents. What follows is an analysis of these concerns.

All Groups. Eleven common themes carried across all stakeholder categories. These common themes are Ethics/Misuse excluding genetic discrimination, harmful policymaking, education/training, genetic discrimination, misidentification, potential restriction or regulation, limited resources, privacy, misuse by government or law enforcement entities, the potential for inconclusive results, and the possibility that forensic genetic genealogy may be deemed inadmissible in court. It is of note that only two of these concerns are directly related to the respondents' personal safety or privacy concerns: privacy, which in this instance is notably a vague concept expressed by respondents with no further specifications, and genetic discrimination. Genetic discrimination appeared more frequently among the concerns of the marginalized respondents, stated nine times (41%), and significantly less frequently by non-marginalized respondents, four times (13%).

Three out of Four. Six stated concerns were shared by three out of four stakeholder groups. The concerns shared by all groups except for the family members of victims and perpetrators are used for less serious crimes and lack of public education on FGG. The concern shared by all groups except for DNA test consumers is that privacy concerns may dissuade people from testing or uploading. The concerns shared by all groups except for criminal justice

professionals are a lack of proper training for FGG practitioners, and misleading information from labs or FGG companies. The concern shared by all groups except for forensic genetic genealogists is that insurance companies may use genealogical DNA data to deny coverage.

Two out of Four. Three concerns were shared between two out of four subgroups. Intentional wrongful incrimination was stated as a concern by both forensic genetic genealogists and family members. Forensic genetic genealogists and criminal justice professionals shared the concern about the potential for eugenics or genetic discrimination. The concern shared by both criminal justice professionals and consumers of genealogical DNA tests is that a lack of accurate information may dissuade people from testing or uploading to DNA databases accessible to forensic genetic genealogists. While there were similar concerns across three out of four subgroups, there were no concerns that were shared only between forensic genetic genealogists and DNA test consumers.

Concerns Unique to Individual Stakeholder Groups. DNA test consumers had the most unique concerns, followed by criminal justice professionals. Concerns unique to DNA test consumers are the death of potential testers before sample collection, the potential impact on the families of DNA testers, the concern that genetic information may be sold to corporations. Concerns unique to criminal justice professionals are that FGG may not be taken seriously in the forensics community and that future policies may compromise the rights of DNA testers. There were no concerns unique to family members of missing, murdered, and perpetrators, or to forensic genetic genealogists.

Forensic Genetic Genealogists. The most common concern stated by forensic genetic genealogists was ethics or misuse excluding genetic discrimination, with seven (54%) of forensic

genetic genealogists making this statement. This concern is shared by three (25%) criminal justice professionals, five (25%) DNA test consumers, and two (22%) family members of missing and murdered persons. Additionally, six (46%) were concerned about harmful policymaking, with five (42%) criminal justice professionals, three (15%) DNA test consumers and three (33%) family members sharing the concern. The third most common concern among forensic genetic genealogists is the potential for restriction or regulation, with five (38%) forensic genetic genealogists. Two (17%) criminal justice professionals, two (10%) DNA test consumers and one (11%) family members sharing this concern.

Criminal Justice Professionals. The most common concern stated by criminal justice professionals was harmful policymaking, with five (42%) making this statement. This concern was also the second most common concern stated by forensic genetic genealogists, with six (46%) making this statement, and three (15%) DNA test consumers and three (44%) family members also making this statement. The next most common concern stated by criminal justice professionals was education and training, with four (33%) expressing the concern, along with four (31%) of forensic genetic genealogists, four (20%) of DNA test consumers and two (22%) of family members stating the same. The third most common concern expressed by criminal justice professionals was ethics or misuse excluding genetic discrimination, with three (25%) criminal justice professionals stating this concern. This is also the most frequently stated concern overall and the most frequent concern of forensic genetic genealogists.

Consumers of Genealogical DNA Testing Products. The most frequently stated concern by DNA test consumers was genetic discrimination, with six (30%) of consumers stating this concern, along with three (23%) forensic genetic genealogists, two (17%) criminal justice

professionals and two (22%) family members stating the same. The second most common concern stated by DNA test consumers was ethics or misuse excluding genetic discrimination, with five (25%) of consumers making this statement. This concern is also the most common overall, and the most common concern of forensic genetic genealogists. The third most common concerns of DNA test consumers was misidentification and harmful policymaking, with four (20%) of DNA test consumers stating these concerns. Harmful policymaking is also the second most common concern stated across all respondents.

Families of Missing Persons, Victims, and Perpetrators of Violent Crimes. The concern most frequently stated by family members is harmful policymaking, with three (33%) of family members making this statement. Most other concerns stated by family members were made only once or twice. As this is the smallest subgroup, there may be a lack of data to show clear trends.

Marginalized respondents. The most common concerns stated by marginalized respondents were ethics or misuse excluding genetic discrimination, and education and training, with ten (45%) statements each. The third most common concern stated by marginalized respondents was genetic discrimination, with nine (41%) respondents making this statement.

Non-marginalized respondents. The most common concern stated by non-marginalized respondents was harmful policymaking, which was stated nine times (28%) by non-marginalized respondents. The second and third most common concerns stated by non-marginalized respondents were ethics or misuse excluding genetic discrimination and potential restriction or regulation, stated seven times each (22%).

Top three Concerns Compared Across Categories

The overall top three concerns: Harmful policymaking, ethics or misuse excluding genetic discrimination, and education and training, were compared to the top three concerns across all categories. Ethics or misuse excluding genetic discrimination appeared in the top three concerns of all stakeholder groups as well as marginalized and non-marginalized respondents. Harmful policymaking did not appear in the top three concerns of marginalized respondents, or DNA test consumers. Education and training did not appear in the top three of non-marginalized respondents, forensic genetic genealogists, or family members. Marginalized respondents' top three included genetic discrimination, which also appeared in the top three of DNA test consumers and family members. Potential for restriction or regulation appeared as a top concern for non-marginalized respondents and forensic genetic genealogists.

Respondent Example: Hunter

“Hunter,” a non-heterosexual and non-cisgender respondent who identified themselves as a forensic genetic genealogist and a consumer of DNA testing products, had unique insight into potential concerns related to forensic genetic genealogy. In response to research question 1, Hunter stated:

“My biggest concern is probably that it will be deemed unconstitutional or something and that it won't be able to be used as a tool to help solve crimes. Outside of that, my biggest concern might be that [forensic genetic genealogy] would be used to identify protestors or in small crimes rather than in sex crimes, assaults, and murders. And I guess I have some concern about the potential use of DNA to frame people for crimes they did not do or about circumstantially

present DNA from an innocent person would be used to convict them without the presence of other evidence.”

Respondent Example: Florence

“Florence,” a non-marginalized respondent who also identified themselves as a forensic genetic genealogist and a consumer of DNA testing products, responded to research question 1 in a way that reveals pervasive misinformation and lack of education even among forensic genetic genealogists:

“[A concern] is the lack of privacy. I don't mind the lack of privacy, but some people do. Some people with pre-existing health conditions may get casted by an insurance company. I have heard that this is not a conspiracy. Insurance companies are catching onto this, and it can affect their insurance rates.”

Of note in this response is the false belief that autosomal DNA, the primary DNA data used in forensic genetic genealogy, could be used for discriminatory purposes by health insurance agencies. In 2008, the Genetic Information Non-Discrimination Act (GINA) was passed into law, which protects individuals from having their genetic information used to discriminate against them in health coverage or employment (*Genetic Information Discrimination*, 2021). Additionally, the health Information Portability and Accountability Act (HIPAA) was amended in 2013 to cover genetic information, thus ensuring that DNA data, even autosomal DNA data from direct-to-consumer tests, cannot be transferred to any individuals or organizations without the express permission of the tester, unless that information has been fully anonymized.

Research Question 2

The second question this study sought to answer was “how have the past experiences of individuals in the affected groups contributed to their stance on the use of forensic genetic genealogy?” This question was addressed by comparing themes found in response to the narrative survey questions to the responses to hypothetical scenarios. Comparisons were also made to the experiences of marginalized respondents to their responses to hypothetical scenarios.

Experiences of Marginalized Individuals

Marginalized respondents were prompted to answer the question “What is something you wish others knew about your experience as a member of a minority or marginalized group?”. This open-ended question revealed some trends across the broader spectrum of marginalized respondents as well as within the individual subcategories. As seen in Table 1: Experiences of Marginalized Individuals, seven of 16 marginalized respondents (43.75%) indicated that they have experienced stereotypes or generalizations as a marginalized individual. Over half of all non-heterosexual respondents (53.85%) and immigrant respondents (60%) indicated the same. Also of note is that none of the racial minority and immigrant respondents indicated that they felt unsafe or unequal. However, both categories had the fewest respondents; therefore, the data may be inconclusive.

Experiences of Marginalized Individuals	Overall (Out of 16)	Non-Heterosexual (out of 13)	Non-Cisgender (out of 8)	Racial Minority (out of 6)	Immigrant (out of 5)
Experiences stereotypes or generalizations	7 (43.75%)	7 (53.85%)	3 (37.50%)	3 (50.00%)	3 (60.00%)
Experiences bias or hostility	6 (37.50%)	6 (46.15%)	4 (50.00%)	1 (16.67%)	1 (20.00%)
Experiences institutional or systemic oppression	4 (25.00%)	4 (30.77%)	2 (25.00%)	2 (33.33%)	2 (40.00%)
Feels out of place	4 (25.00%)	4 (30.77%)	2 (25.00%)	2 (33.33%)	2 (40.00%)
Wishes others would ask questions	4 (25.00%)	4 (30.77%)	3 (37.50%)	1 (16.67%)	1 (20.00%)
Wishes others would not make assumptions based on appearance	4 (25.00%)	4 (30.77%)	2 (25.00%)	2 (33.33%)	2 (40.00%)
Experiences family estrangement	3 (18.75%)	2 (15.38%)	1 (12.50%)	1 (16.67%)	1 (20.00%)
Feels unequal	3 (18.75%)	3 (23.08%)	1 (12.50%)		
Feels unsafe	2 (12.50%)	2 (15.38%)	2 (25.00%)		

Table 1: Experiences of Marginalized Individuals

Stakeholder Experiences

Respondents from each stakeholder group were prompted to explain their role within their field as well as what they wished others knew about their role. The stakeholder subgroups were intentionally broad to allow for a wide array of variation; these questions were included in the survey to capture details of this variation. The responses to question 3: describe your role as a member of your stakeholder group; and question 4: what is something that you wish others knew about your role in your stakeholder group; were coded individually according to each group and then compared to each other for commonalities. There were no common codes that

appeared in all four groups. Two terms in question 3, “Identification” and “Unidentified,” appeared in three of four subgroups. One term in question 4, “Hard work,” also appeared in three of four subgroups. The groups with the most terms in common are forensic genetic genealogists and criminal justice professionals, sharing 10 terms in common. Following this, forensic genetic genealogists and consumers of genealogical DNA tests share five terms in common. The groups with the least number of terms in common are DNA test consumers and family members of victims, perpetrators and wrongfully convicted, who only share one term in common: “New details may emerge in time.” Contextually, these terms carry different meanings. For the DNA test consumers, this is in reference to advances in genetic genealogical techniques and data which improves ethnicity estimations and predicted relationships. The family members’ response is in reference to the emergence of new details, evidence or advancement in forensic science that may shed new light on unsolved cases. While these meanings differ in obvious ways, there is a clear commonality between them regarding scientific advances improving the quality of work for either stakeholder group.

Respondent Example: Cameron

“Cameron,” a non-marginalized forensic genetic genealogist, had a notable response to question 4:

“When I first started out as a genetic genealogist, my dream was to ensure that cases of people of color have an equal chance of getting solved as those of Caucasians. Overtime I learned that not every case has an equal chance of getting solved, because some populations are poorly represented in the databases used for [forensic genetic genealogy]. Similarly, people with

nontraditional family structures or misattributed parentage events also have less of a chance of being found in a family tree.”

Cameron was notably the only non-marginalized respondent who indicated an understanding that underrepresentation in genealogical databases creates a barrier to solving non-White cases. Several marginalized respondents noted this distinction.

Respondent Example: Harlow

“Harlow,” a non-cisgender, non-heterosexual criminal justice professional, clearly articulated the imbalance in how the legal system supports the resolution of cases involving marginalized victims. Harlow stated, “No matter how progressive or forward-thinking scientists are, it is often only appreciated in the confines of a larger system that often does not support the victims we analyze.” This awareness of the systemic issues is an important observation from someone working within this system who is also intersectionally marginalized.

Respondent Example: Narcisse

“Narcisse,” a non-heterosexual, non-cisgender immigrant who dually responded as a forensic genetic genealogist and a family member of a formerly missing person, provided insight from both of their narrative surveys. In context of being a forensic genetic genealogist, Narcisse stated that something they wish others knew was “how devalued the work is except for a few rich [cisgender, heterosexual] white people who are considered celebrities and well paid for it, regardless of their actual skill set.” This statement is reflective of known issues within professional fields, particularly within criminal justice professions, in which the opinions and contributions of White, heterosexual cisgender professionals are valued above those of professionals belonging to any marginalized group.

As the family member of a formerly missing person, Narcisse wished for others to know “how little support there is for us, the official barriers we face, the large number of agencies and organizations that we have to interact with and different systems we have to navigate and learn alone. Also, how stressful it is socially to deal with, because people will actually constantly tell you to move on, or give up, or say horrible things about your family member.” This is reflective of case examples mentioned previously, such as Marcia King, whose family was accused of not reporting their loved one as missing (Websleuths, 2021).

Respondents’ Overall Adoption of Genealogical DNA Testing

As seen in Figure 7: Adoption of Genealogical DNA Testing, most respondents in any category have taken a genealogical DNA test. Of all respondents, 26 (70%) have taken a genealogical DNA test; only one respondent stated they do not wish to test. Two respondents stated that they have not tested and have not yet decided if they want to; eight (22%) have not tested but want to in the future. Overall, this puts 34 (92%) respondents personally in favor of taking a genealogical DNA test, 5% undecided and 3% against genealogical DNA testing. It is of note that the one individual who responded that they do not personally want to take a genealogical DNA test indicated that they had bought a test for their sibling but were personally against taking a test themselves.

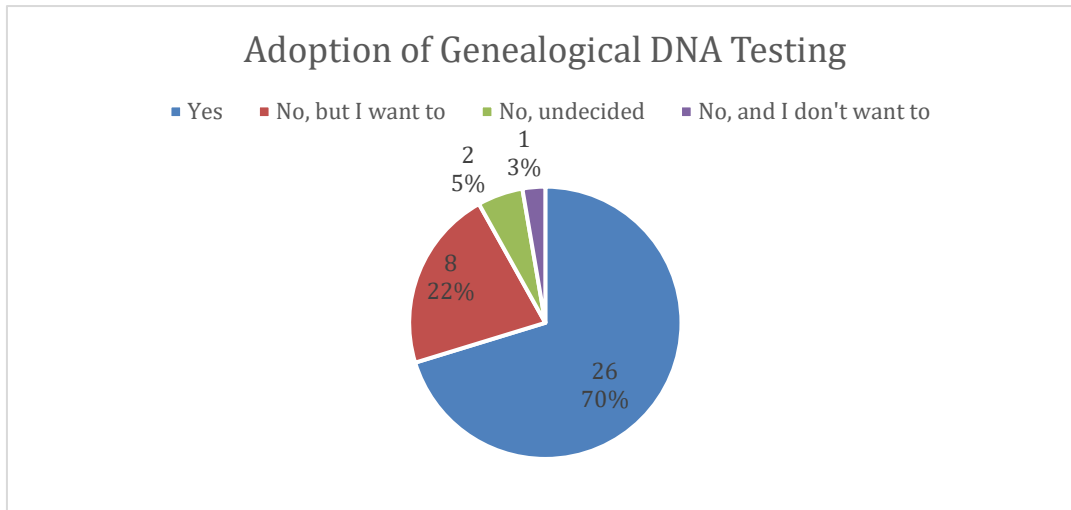


Figure 7: Adoption of Genealogical DNA Testing

Narrative Questions 1 and 2 Across Stakeholder Groups

Respondents were asked two questions pertaining to their role within their stakeholder group. The narrative questions were designed to be complimentary to each other for parallel coding and comparison. Narrative Question 1 and 2 for each stakeholder group were as follows:

- Forensic genetic genealogists
 - Narrative question 1: Please share your experience about a case you helped to solve. Details of what you did to solve the case are welcomed. Describe any challenges or successes with solving the case, reporting your findings, and closing the case. If you have not yet participated in a case closure, please feel free to elaborate on your current experience. From this case, describe any interactions you had with various agencies or media. Any interactions are notable and relevant. Based on this case, please share any emotions you had, from start to finish. Within your comfort, feel free to elaborate on these feelings. Your responses are confidential.

- Narrative question 2: Share an experience of a disagreement you had with someone about forensic genetic genealogy. Details of the experience are welcomed. Describe what the disagreement was, what you said in response, how it was received, and how the situation resolved. If you have not personally had this kind of difficult interaction, describe your experience of hearing of another experience, how it made you feel, and what you would say in response if you were in the situation. Based on this experience, share any emotions you had, from start to finish. Is there anything that you wish others had understood about your experience that, if they knew, you feel they might have acted differently?
- Criminal justice professionals
 - Narrative question 1: Share an experience about what you consider to be the most important case you have ever worked on. Details of what you contributed to the case are welcomed. Describe any challenges or successes with solving the case, reporting your findings, and closing the case. If you have not yet participated in a case closure, please feel free to elaborate on your current experience. From this case, describe any interactions you had with family members or media. Any interactions are notable and relevant. Based on this case, please share any emotions you had, from start to finish. Within your comfort, feel free to elaborate on these feelings. Your responses are confidential.
 - Narrative question 2: Share an experience of an interaction you have had with an uncooperative witness, informant, or family member. Details of the interaction are welcomed. Describe the interaction, what you said in response, how it was

received, and how the situation resolved. If you have not personally had this kind of difficult interaction, describe your experience of hearing of another experience, how it made you feel, and what you would say in response if you were in the situation. Based on this experience, share any emotions you had, from start to finish. Is there anything that you wish others had understood about your experience that, if they knew, you feel they might have acted differently?

- Consumer of genealogical DNA testing products
 - Narrative question 1: Share an experience you have had of learning something new and exciting about yourself or someone else through genealogical DNA. Details of what you learned are welcomed. Describe what you did to learn more, and any challenges you faced. If you feel that you have not yet had a significant discovery through genealogical DNA, explain what made you choose to submit a DNA test and what you hope to learn. From this experience, describe any interactions you had with family members or media. Any interactions are notable and relevant. Based on this experience, please share any emotions you had, from start to finish. Within your comfort, feel free to elaborate on these feelings. Your responses are confidential.
 - Narrative question 2: Share an experience of a struggle you have had collaborating or sharing research, genealogical and/or genetic information with others. Details of the struggle are welcomed. Describe the struggle, what happened, what you did, and what you did to resolve it. If you have not personally had this kind of difficult interaction, describe your experience of

hearing of another experience, how it made you feel, and what you would say in response if you were in the situation. Based on this experience, share any emotions you had, from start to finish. Is there anything that you wish others had understood about your experience that, if they knew, you feel they might have acted differently?

- Family member of a missing person, victim, or perpetrator of a violent crime
 - Narrative question 1: Share your experience of your loved one's case. Details of the case are welcomed. Describe any challenges or successes you personally experienced, receiving the news of the case closure, and how it was resolved. If your loved one's case is not yet solved, please feel free to elaborate on your current experience. From this case, describe any interactions you had with investigators or media. Any interactions are notable and relevant. Based on this case, please share any emotions you had, from start to finish. Within your comfort, feel free to elaborate on these feelings. Your responses are confidential.
 - Narrative question 2: Share an experience you had in which someone said or did something upsetting in regard to your loved one's case. Details of the interaction are welcomed. Describe the struggle, what happened, what you did, and what you did to resolve it. If you have not personally had this kind of difficult interaction, describe your experience of hearing of another experience, how it made you feel, and what you would say in response if you were in the situation. Based on this experience, share any emotions you had, from start to finish. Is there anything

that you wish others had understood about your experience that, if they knew, you feel they might have acted differently?

The answers to narrative questions 1 and 2 were coded separately by stakeholder group. The resulting code sets were then compared to each other to look for commonalities. Themes unique to individual stakeholder groups were also isolated. Similarities and differences between marginalized and non-marginalized respondents were also analyzed.

Common Narrative Themes Across Stakeholder Groups

The code sets from narrative questions 1 and 2 revealed 25 narrative themes (17 from question 1 and eight from question 2) that were common across all stakeholder groups. These are themes that appeared at least once in the narratives of each stakeholder subgroup. Themes that appear more than once in each subgroup's responses to narrative question 1 include "responsibility," "difficult case," "family mystery," "poor communication," "difficult emotions," "need for compassion," and "findings." Themes that appear more than once in each subgroup's responses to narrative question 2 include "distrust of organization, workers or professionals," "unprofessional behavior," "bias or oppression," "unfriendly or indifferent birth family," "difficult communication," and "disagreement."

Narrative Themes Shared by Three of Four Subgroups

Of the responses to narrative questions 1 and 2, 19 themes (13 for question 1, six for questions 2) appeared in the responses of three out of four subgroups. Consumers of genealogical DNA testing products most frequently do not share themes in common with the other three subgroups. Themes shared in response to narrative question 1 among all subgroups except for the consumer subgroup are "empathy," "recovery of remains," "unidentified remains,"

“homicide,” “unrecovered remains,” “unsolved case,” “child,” “media coverage,” “professionalism,” and “need for accuracy.” Themes shared in response to narrative question 2 among all subgroups except for the consumer subgroup are “empathy” and “misdirected anger.” It is notable that most of these themes that are not shared by DNA test consumers relate to criminal case investigation, which is an area of work the DNA test consumers are least likely to share with the other three subgroups.

Narrative Themes Shared by Two out of Four Subgroups

Of the responses to narrative questions 1 and 2, 14 themes (11 for question 1, three for question 2) appeared in the responses of two out of four subgroups. The subgroups with the most themes in common are criminal justice professionals and family members, with six themes in common. Criminal justice professionals and family members shared the themes “DNA evidence,” “analysis of remains,” “suicide,” “cause of death,” “substance abuse,” and “silent complicity.” Criminal justice professionals and family members of missing, victims, perpetrators and wrongfully convicted are the two subgroups most likely to interact with each other; therefore, the correlation between the themes of the two subgroups may be due to this interaction.

Themes Unique to Individual Stakeholder Groups

Of the responses to narrative questions 1 and 2, 17 themes (14 for question 1, three for question 2) were unique to only one subgroup. DNA test consumers have the most unique themes of any subgroup, having six unique themes to the subgroup. This is similar to the narrative themes shared by three out of four subgroups, in which the DNA test consumer group has the least number of themes in common with others. Themes unique to the DNA test

consumer group are “regret,” “genealogical testing health information,” “immigrant ancestor,” “ethnicity results,” “blood test,” and “NPE or adoptee.” The subgroup with the least unique themes is the forensic genetic genealogist subgroup, with only two unique themes: “lack of proper credit for work” and “repeat offender.”

Narrative Questions 1 and 2 According to Marginalized Status

The themes found in response to narrative questions 1 and 2 were analyzed across marginalized vs. non-marginalized respondents. Eight themes had a greater than 25% difference in responses. “Disagreement,” “recovery of remains,” “systemic bias,” “distrust of organization, workers, or professionals,” “threats” and “misdirected anger” were more frequently found in the responses of marginalized respondents. “Family mystery” was more frequent in the responses of non-marginalized respondents. These differences seem to follow a pattern; the statement made more frequently by marginalized respondents seem to be centered in concerns outside of oneself, primarily in the form of concerns of systemic non-support. The more common theme of “family mystery” from non-marginalized respondents is a personal one, centered solely on the respondent and their family.

Respondent Example: Ashton

“Ashton,” a non-heterosexual criminal justice professional, gave examples related to informing next of kin in death investigations. Ashton explained that often, when a family disagrees with the determined manner of death, or questions the findings, their feelings of anger can often be directed at the investigators. Ashton presented an example of a time when the family of a deceased person who did not accept the findings threatened litigation against the investigation team. Ashton expressed a need for patience and understanding for the family and

encouraged others in the field to rely on the experiences of their peers to work through difficult communications with families.

Respondent Example: Narcisse

Narcisse, the non-heterosexual, non-cisgender immigrant forensic genetic genealogist and family member of a formerly missing person, had insights to share via both subgroups. As a forensic genetic genealogist, Narcisse narrated the experience of working on an unidentified decedent case in which one of the team leads demonstrated poor communication with the agency in charge of the case and with the team, which put the case in jeopardy and caused hurt feelings among the team. Narcisse's role in this case was to provide guidance to less experienced team members, and this poor example of team leadership made their job difficult and created issues that needed to be cleaned up, taking Narcisse's attention away from the work they were assigned and put it towards fixing things that were not done properly initially. When the case was resolved, Narcisse had trouble processing their emotions afterwards, as the relief of closing the case was complicated by the communication issues from within the team.

When prompted to describe a disagreement that emerged in regard to forensic genetic genealogy, Narcisse stated that they had faced people who thought the methodology should not be used at all, but the arguments used against forensic genetic genealogy, such as privacy concerns and genetic surveillance, are things that are already happening to marginalized individuals. Narcisse has had the experience of both seeing minds change after addressing the issues, and arguments ending with no resolution.

Narcisse also shared a narrative of their experience as the relative of a formerly missing person. Narcisse's great uncle was unable to be located when Narcisse's great grandmother was

ill. Narcisse took on the role of attempting to locate him via records searching and contacting agencies in areas where he may have lived. After nine and a half years of searching, Narcisse discovered that their great uncle had been deceased and unclaimed the entire time, and no effort was made to contact his family. This experience, and the experience of being told that the search did not matter and seeing that their great uncle's life mattered because he experienced drug use and housing instability, inspired Narcisse to continue to work on missing persons cases that were not given the appropriate attention due to intersectional marginalization. The arguments Narcisse faced as a family member of a missing person were more intensely described than their experience as a forensic genetic genealogist; Narcisse stated that "I would have to explain that actually [my great uncle] wasn't worthless and was missed and loved and it was very messed up an inappropriate to tell someone their family member was worthless garbage. The resolution was usually actually me not letting them leave or stop the interaction until they were extremely uncomfortable or until they apologized."

Respondent Example: Darcy

"Darcy," a non-White criminal justice professional and family member of a survivor of sexual assault, shared their story from the perspective of both of their subgroups. Darcy's niece was sexually assaulted by her older brother at a young age and disclosed the assault to a teacher when she was a young teenager. Her brother, Darcy's nephew, was arrested and faced charges for the assault. However, most of Darcy's family put pressure onto their niece to drop the charges and leave the incident in the past. Darcy and their spouse were the only members of the family to stand up for their niece and were asked by the judge to allow the niece to stay with them to avoid the rest of the family putting pressure on her. Darcy no longer speaks to this part

of their family. A contributing factor was that Darcy's brother-in-law, the father of both Darcy's niece and the nephew who assaulted her, expected Darcy to assist in getting the perpetrator out of jail as opposed to supporting their niece in what they needed.

Darcy's experience as a criminal justice professional is unique from others. An informant and witness to a homicide did not wish to cooperate with the detective involved in the case and only felt comfortable speaking with Darcy, even though they were not in a position to speak to a witness. The informant became incredibly distressed over time, until one day he entered the office and pulled a firearm on Darcy to demand their assistance. Darcy handled the situation calmly and spoke to him until he lowered his firearm. Darcy expressed that they feel the reasons why they were not permitted to work with the witness were not fully explained to him in a way that he understood, and that if time was taken to explain this to him, the situation may not have escalated.

Respondent Example: Trinidad

"Trinidad" is a non-White, non-heterosexual immigrant respondent who is a DNA test consumer and a family member of a formerly missing person. Trinidad's relative was missing for several months before being found deceased. Her cause of death was deemed unknown, and no further investigation was pursued; however, Trinidad believes that their relative's cause of death should have been investigated more thoroughly and thinks that the relative's spouse may have had involvement in their relative's death. Much like Narcisse's narrative about their missing great uncle, Trinidad's relative participated in occasional drug use, and Trinidad believes that the investigation into her death was deemed less important for this reason. This experience prompted Trinidad to pursue citizen journalism and focused cases involving victims whose

investigations may have been hampered by systemic bias. Trinidad's experience with systemic bias continued in this endeavor as they became faced with remarks that dehumanized and downplayed the importance of these cases.

Research Question 3

The third question this study sought to answer was "how do stakeholders' opinions on the use of forensic genetic genealogy change when applied to cases involving marginalized victims of violent crime versus white, heterosexual, cisgender European-descended victims?" This question was addressed by examining how respondents' answers to hypothetical questions differed according to stakeholder subgroup or marginalized status. Respondents were asked a series of 11 questions related to their reactions to being asked to contribute their genetic genealogical information to assist in hypothetical case research. The questions asked were:

1. Imagine that you have received an email asking for you to submit a genealogical DNA test for comparison to an unidentified decedent. What questions would you have in response?
2. Would the answers to these questions have any bearing on your decision to test and upload your DNA? How and why?
3. The email you have received includes details that the individual in question is non-White. How do you feel about this? How would you respond?
4. The email you have received indicates that the individual in question may have been a recent immigrant to the United States. How do you feel about this? How would you respond?

5. The email you have received includes details that the individual in question may have been homosexual. How do you feel about this? How would you respond?
6. The email you have received includes details that the individual in question may have been transgender. How do you feel about this? How would you respond?
7. Would any of the above scenarios change your response? How and why?
8. Would your answer change if the person being identified was a perpetrator of a violent crime? How and why?
9. Would your answer change if the person being identified was associated with a sexual assault kit sample taken from a survivor? How and why?
10. Would your answer change if the person being identified was either confirmed or assumed to be a sex worker? How and why?
11. Is there anything else you want to say that was not asked?

Responses to these questions were analyzed for trends across subgroups and/or marginalized identity. Respondents who completed two surveys were counted as individual responses for both of their entries. A total of 54 entries were recorded. Of these, 13 were forensic genetic genealogists, 12 were criminal justice professionals, 20 were consumers of genetic genealogical test products, and nine were family members of victims, perpetrators, missing persons, and wrongfully convicted individuals. Overall, 22 respondents identified as a member of a marginalized group, and 32 did not.

Scenario Questions 1 and 2

Hypothetical scenario question 1, “1. Imagine that you have received an email asking for you to submit a genealogical DNA test for comparison to an unidentified decedent. What

questions would you have in response?” was analyzed for the types of questions most asked by respondents. As seen in Table 2: Hypothetical Scenario 1 Responses, of 54 respondents, 20 (37%) had questions related to the details of the associated case; 18 (33%) wished to know what agency or organization was making the request; 11 (20%) wished to know how they were determined to be a target tester. Other less frequently posed questions pertained to information privacy, control of data, confirmation that the data would be deleted after being used, the credentials of the organization making the request, among others.

Trends Among Scenario Question 1 Responses Across Stakeholder Categories. The questions raised by respondents in response to question 1 were compared across stakeholder categories. As seen in Table 2: Hypothetical Scenario Question 1 Responses, nine questions were shared across all stakeholder categories. These were the absence of any questions, questions related to the collection process, questions related to trust or credibility, how was the respondent determined to be a target tester, questions related to databases and/or sample storage, questions related to privacy of information, the origin of the request, case details, and if the respondent will be informed of the results. Only one question was unique to one stakeholder group; two respondents in the family member subgroup wanted to know if the unidentified decedent might be their missing family member. Forensic genetic genealogists and DNA test consumers wanted to ask if money would be made off their DNA contribution, and criminal justice professionals and DNA test consumers wanted to know if they would be expected to pay for the DNA test.

Code Name	All		Forensic genetic genealogists		Criminal justice professionals		DNA test consumers		Family members	
Case details	20	37%	6	46%	5	42%	7	35%	2	22%
Where is the request coming from	18	33%	5	38%	5	42%	6	30%	2	22%
How was I determined to be a target tester	11	20%	2	15%	3	25%	5	25%	1	11%
Who will have access to my information	10	19%	4	31%	3	25%	3	15%		0%
No questions	8	15%	3	23%	1	8%	2	10%	2	22%
Questions related to collection process	8	15%	1	8%	3	25%	3	15%	1	11%
Questions related to databases and/or sample storage	8	15%	1	8%	1	8%	4	20%	2	22%
Question related to trust or credibility	7	13%	2	15%	1	8%	3	15%	1	11%
Questions related to privacy of information	7	13%	3	23%	2	17%	1	5%	1	11%
Will I be informed of the results	7	13%	1	8%	2	17%	2	10%	2	22%
Will my data be deleted afterwards	5	9%	2	15%	1	8%	2	10%		0%
Will I have control of my own data	5	9%	1	8%	2	17%	2	10%		0%
What is my predicted relationship	3	6%	1	8%	1	8%	1	5%		0%
Questions related to cost	2	4%		0%	1	8%	1	5%		0%
Is money being made off my data	2	4%	1	8%		0%	1	5%		0%
Is the unidentified my missing family member	2	4%		0%		0%		0%	2	22%

Table 2: Hypothetical Scenario 1 Responses.

Trends Among Scenario Question 1 Responses, Marginalized vs. Non-marginalized.

The themed questions were compared according to marginalized vs non-marginalized status. As

seen in Table 3: Hypothetical Scenario Question 1 Responses, Marginalized vs. Non-marginalized, most questions were asked evenly by both categories within less than a 20% margin. A notable difference was seen in the frequency at which respondents had no questions whatsoever; eight (25%) of non-marginalized respondents had no questions, while zero marginalized respondents had no questions. This is a 20% difference in responses. Following this difference, 10 (45%) of marginalized respondents wish to know the origin of the request, while eight (25%) of non-marginalized respondents wished to know the same. This is a 20% difference in this response rate.

Code Name	All		Marginalized		Non-marginalized		Difference	
Case details	20	37%	9	41%	11	34%	-2	7%
Where is the request coming from	18	33%	10	45%	8	25%	2	20%
How was I determined to be a target tester	11	20%	7	32%	4	13%	3	19%
Who will have access to my information	10	19%	4	18%	6	19%	-2	-1%
No questions	8	15%		0%	8	25%	-8	-25%
Questions related to collection process	8	15%	4	18%	4	13%	0	5%
Questions related to databases and/or sample storage	8	15%	2	9%	6	19%	-4	-10%
Question related to trust or credibility	7	13%	5	23%	2	6%	3	17%
Questions related to privacy of information	7	13%	3	14%	4	13%	-1	1%
Will I be informed of the results	7	13%	5	23%	2	6%	3	17%
Will my data be deleted afterwards	5	9%	3	14%	2	6%	1	8%
Will I have control of my own data	5	9%	3	14%	2	6%	1	8%
What is my predicted relationship	3	6%	3	14%		0%	3	14%
Questions related to cost	2	4%	2	9%		0%	2	9%
Is money being made off my data	2	4%	2	9%		0%	2	9%
Is the unidentified my missing family member	2	4%	1	5%	1	3%	0	2%

Table 3: Hypothetical Scenario Question 1 Responses, Marginalized vs. Non-marginalized

Bearing of Answers to Questions on Willingness to Provide DNA Data. Hypothetical scenario question 2 asked respondents to state whether the answers to their questions would have any bearing on their willingness to provide DNA. As seen in Table 4: Bearing of Answers to Questions on Willingness to Provide DNA Data, overall, most respondents stated that the answers to their questions would have some effect on their willingness to cooperate; 28 (52%) of respondents stated that their willingness to provide DNA data would likely be contingent on the answers to their questions. Nearly half of respondents, 26 (48%) stated that their willingness to provide DNA data would not change regardless of the answers to their questions. Of the respondents who indicated that the answers to their questions may have bearing on their decision, 5 (9%) indicated that they were certain that their decision would be affected by the answers to their questions. Ten (19%) indicated that their decision would possibly be affected.

Code Name	All		Forensic genetic genealogists		Criminal justice professionals		DNA test consumers		Family members	
No change	26	48%	5	38%	6	50%	8	40%	7	78%
probably not	15	28%		0%	2	17%	2	10%	1	11%
Possibly	10	19%	2	15%	2	17%	5	25%	1	11%
Yes	5	9%	6	46%	3	25%	5	25%	1	11%
<i>Contingent on legitimacy of requesting agency</i>	10	19%	3	23%	4	33%	2	10%	1	11%
<i>Contingent upon which database is used</i>	7	13%	3	23%	1	8%	3	15%		0%
<i>Contingent upon retaining control of data</i>	6	11%	2	15%	1	8%	3	15%		0%
<i>Contingent upon response to privacy issues</i>	3	6%	1	8%		0%	1	5%	1	11%
<i>Contingent on personal safety concerns</i>	3	6%	1	8%		0%	2	10%		0%
<i>Contingent on why the request is being made</i>	3	6%	1	8%	1	8%	1	5%		0%
<i>contingent on predicted relation to the unidentified</i>	2	4%		0%	1	8%	1	5%		0%
<i>contingent on associated cost</i>	2	4%		0%	1	8%	1	5%		0%

Table 4: Bearing of Answers to Questions on Willingness to Provide DNA Data

Responses to scenario question 2 analyzed according to marginalized vs. non-Marginalized status showed clear differences in responses. As seen in Table 5: Bearing of Answers to Questions on Willingness to Provide DNA Data, Marginalized vs. Non-marginalized Respondents, marginalized respondents were more likely to change their responses based on the legitimacy of the requesting agency; 10 (19%) of marginalized respondents indicated this, while

only 2 (6%) of non-marginalized respondents indicated the same, showing a 30% difference in response. Marginalized respondents did not voice that their decision would be contingent on their privacy and safety concerns being address or why the request was being made, while non-marginalized respondents did consider these answers important. Marginalized respondents did, however, feel their predicted relationship to the unidentified and potential associated cost were of importance to consider, while non-marginalized respondents did not mention these.

Code Name	All		Marginalized		Non-marginalized		Difference	
No change	26	48%	10	45%	16	50%	-6	-5%
probably not	15	28%	3	14%	2	6%	1	8%
Possibly	10	19%	4	18%	6	19%	-2	-1%
Yes	5	9%	6	27%	9	28%	-3	-1%
Contingent on legitimacy of requesting agency	10	19%	8	36%	2	6%	6	30%
Contingent upon which database is used	7	13%	2	9%	5	16%	-3	-7%
Contingent upon retaining control of data	6	11%	2	9%	4	13%	-2	-4%
Contingent upon response to privacy issues	3	6%		0%	3	9%	-3	-9%
Contingent on personal safety concerns	3	6%		0%	3	9%	-3	-9%
Contingent on why the request is being made	3	6%		0%	3	9%	-3	-9%
contingent on predicted relation to the unidentified	2	4%	2	9%		0%	2	9%
contingent on associated cost	2	4%	2	9%		0%	2	9%

Table 5: Bearing of Answers to Questions on Willingness to Provide DNA Data, Marginalized vs. Non-marginalized Respondents

Questions 3 to 7: Changes in Response According to Victim Marginalization

Questions 3 through 7 of the hypothetical scenario questions prompted the respondents to consider if their responses would change if the victim in question belonged to a marginalized population. No respondents stated that they would refuse to assist based on the marginalization of the victim. Trends in responses revealed more about the motivations behind the responses or

the level of understanding of the respondent of complicating issues that affect cases involving marginalized victims. There was a trend toward non-marginalized respondents having less detailed responses than marginalized respondents. Non-marginalized respondents also were more likely to cooperate without question, and more likely to view the marginalized status of the hypothetical victim as unimportant or irrelevant to the case overall.

Question 3: Non-White. Respondents prompted with a hypothetical scenario involving a non-White victim primarily stated no change in their response. Across all respondents, 23 (43%) indicated no impact in response. Additionally, 13 (24%) of respondents stated they would be unsurprised by this inquiry, with several citing that they know of non-White relatives, have non-White admixture present in their genealogical DNA results, are aware of ancestors who were slave holders, or are themselves non-White. Eight (15%) stated that they would be surprised or confused by the request as they know of no non-White relatives in their family. Six (11%) of respondents indicated that they would become more curious about their own genealogy if they were asked this question.

Analysis of the responses to question 3 compared across marginalized and non-marginalized responses revealed key differences. As seen in Table 6: Changes in Response, Non-White Victim, Marginalized vs. Non-marginalized, five (23%) of marginalized respondents stated that the race of the victim had no impact on their response, while 17 (53%) of non-marginalized respondents stated the same, making an 11% difference in response rate. Additionally, three (14%) of marginalized respondents stated that they would be more curious about their personal genealogy were they asked the question, while no non-marginalized respondents stated this. Two (4%) of marginalized respondents also stated they would want to

assist with the research while non-marginalized respondents did not state this. Additionally, four (18%) of marginalized respondents stated both a concern about the difficulty of the related case and an increased desire to contribute to help, while no non-marginalized respondents made these statements.

Code Name	All		Marginalized		Non-marginalized		Difference	
No impact on response	23	43%	5	23%	17	53%	-12	-30%
not surprised	13	24%	4	18%	9	28%	-5	-10%
Surprised or confused	8	15%	5	23%	3	9%	2	14%
Aware of non-White genetic admixture	6	11%	3	14%	3	9%	0	5%
Increased curiosity about personal genealogy	6	11%	3	14%	0	0%	3	14%
Has non-White relatives	5	9%	2	9%	3	9%	-1	0%
Concern about the difficulty of the related case	4	7%	4	18%	0	0%	4	18%
more motivated to contribute	4	7%	4	18%	0	0%	4	18%
Would want to assist in research	2	4%	2	9%	0	0%	2	9%
Unsure if data would be helpful	2	4%	0	0%	2	6%	-2	-6%
Aware of slaveholder ancestors	2	4%	0	0%	2	6%	-2	-6%

Table 6: Changes in Response, Non-White Victim, Marginalized vs. Non-marginalized

Question 4: Recent Immigrant. Respondents were prompted with a hypothetical scenario in which the victim in question was a recent immigrant to the United States. Out of all responses, 18 (33%) indicated this would not have any impact on their response. Ten respondents (19%) indicated that this scenario would cause them to have increased curiosity about their personal genealogy. Nine respondents (17%) felt a personal connection to the hypothetical unidentified, with seven (13%) reporting that they are descendants of immigrants, and two (4%) stating that they themselves are immigrants.

When examined across marginalized vs. non-marginalized respondents, a 26% difference in respondents who felt this scenario would have no impact on their response was noted. As seen

in Table 7: Changes in Response, Recent Immigrant, Marginalized vs. Non-marginalized, of marginalized respondents, 18 (33%) indicated that this would not affect their response while 14 (44%) of non-marginalized respondents indicated the same. Also of note is that five (23%) of marginalized respondents felt a personal connection to the unidentified while four (13%) of non-marginalized respondents said the same, making a 10% difference in response. Additionally, three (5%) of marginalized respondents stated that they were concerned about the difficulty of the related case and felt an obligation to assist, while no non-marginalized respondents indicated this.

Code Name	All		Marginalized		Non-marginalized		Difference	
No impact on response	18	33%	4	18%	14	44%	-10	-26%
Increased curiosity about personal genealogy	10	19%	5	23%	5	16%	0	7%
personal connection to hypothetical unidentified	9	17%	5	23%	4	13%	1	10%
<i>Descendant of immigrant</i>	7	13%	3	14%	4	13%	-1	1%
<i>Respondent is an immigrant</i>	2	4%	2	9%		0%	2	9%
More curious about outcome	8	15%	4	18%	4	13%	0	6%
Unsure if data would be helpful	7	13%	4	18%	3	9%	1	9%
Surprised or confused	7	13%	3	14%	4	13%	-1	1%
Sense of obligation to assist	3	6%	3	14%		0%	3	14%
Would want to assist in research	3	6%	1	5%	2	6%	-1	-2%
Concern about the difficulty of the related case	3	6%	3	14%		0%	3	14%
not surprised	2	4%	1	5%	1	3%	0	1%

Table 7: Changes in Response, Recent Immigrant, Marginalized vs. Non-marginalized.

Question 5: Homosexual. Scenario question 5 prompted respondents to explain if and how their answer might change if they were told the victim in question may have been homosexual. Across all responses, 30 (56%) respondents stated that this would have no impact on their response. Twelve (22%) of respondents indicated a personal connection to the

hypothetical unidentified, with nine (17%) respondents stating that they are a member of the LGBTQ+ community and five (9%) of respondents indicating that they have an LGBTQ+ relative. Respondents who indicated that they have an LGBTQ+ relative did not volunteer much more context beyond “this wouldn’t phase me,” “this doesn’t bother me,” or “I would feel fine about it.” Respondents who indicated that they are also members of the LGBTQ+ community also stated that they felt concerned about the responses of others in such a case, and also felt an obligation to assist in the investigation.

When responses to question 5 were divided across marginalized vs. non-marginalized respondents, a 55% difference in respondents stating this scenario would have no impact emerged. As seen in Table 8: Changes in Response, Homosexual, Marginalized vs. Non-marginalized Respondents, Of marginalized respondents, five (23%) stated that the scenario would have no impact, while 25 (78%) non-marginalized respondents said the same. Marginalized respondents showed that the change in their responses was in the direction of wanting to be more involved in the case; three (6%) of marginalized respondents indicated that they felt an obligation to assist and would want to help with case research, while no non-marginalized respondents indicated the same. Marginalized respondents also stated that they had concerns about the difficulty of the related case, concerns about the response of others to the case details, and a feeling of sadness regarding receiving the inquiry. No non-marginalized respondents replied in this way.

Code Name	All		Marginalized		Non-marginalized		Difference	
No impact on response	30	56%	5	23%	25	78%	-20	-55%
personal connection to hypothetical unidentified	12	22%	8	36%	4	13%	4	23%
<i>Respondent is LGBTQ+</i>	9	17%	9	41%		0%	9	41%
<i>Relative of LGBTQ+ individual</i>	5	9%	1	5%	4	13%	-3	-8%
Concern about motives of requesting agency	3	6%	2	9%	1	3%	1	6%
Sense of obligation to assist	3	6%	3	14%		0%	3	14%
Would want to assist in research	3	6%	3	14%		0%	3	14%
Surprised or confused	2	4%	1	5%	1	3%	0	2%
Concern about the difficulty of the related case	2	4%	2	9%		0%	2	9%
Concern about the response of others to the case details	2	4%	2	9%		0%	2	9%
sad, upset	2	4%	2	9%		0%	2	9%

Table 8: Changes in Response, Homosexual, Marginalized vs. Non-marginalized Respondents.

Question 6: Transgender. Scenario question 6 prompted respondents to explain if and how their response might change if they were told that the victim in question was Transgender. Across all responses, 31 (57%) respondents indicated that this information would have no impact on their response. Additionally, 14 (26%) of respondents felt a personal connection to the hypothetical unidentified, with ten (19%) respondents identifying as LGBTQ+ and four (7%) indicating that they have an LGBTQ+ relative. Of all responses, eight (15%) implied that the respondent had some understanding about potential difficulties when dealing with a case of an unidentified transgender decedent. Of the respondents that stated they have an LGBTQ+ family member, three out of the four simply stated “this wouldn’t bother me” or “I would feel fine about it” while one respondent indicated an emotional response and demonstrated a knowledge of the potential complications to such a case. Of the ten respondents who indicated that they are a

member of the LGBTQ community, four indicated that they would want to assist in the case research, two expressed concerns about the difficulty of the case, and one expressed concern about the motivations of the investigating agency.

When examined across marginalized vs. non-marginalized respondents, differences in response emerged. As seen in Table 9: Changes in Response, Transgender, Marginalized vs. Non-marginalized, six (27%) of marginalized respondents indicated there would be no impact on their response, while 25 (78%) of non-marginalized respondents indicated the same, showing a 51% difference in response. Marginalized respondents indicated that they would want to assist in research, felt an obligation to assist, felt concerned about the difficulty of the related case and the response of others to the case details, and felt sad or upset by the possibility, and felt overall more motivated to contribute, where non-marginalized respondents stated none of these. Respondents who felt a personal connection to the hypothetical unidentified were 11 (50%) marginalized and three (9%) non-marginalized, with a 41% difference in response. Responses showing literacy about potential case complications appeared in the answers of five (23%) of marginalized respondents and three (9%) of non-marginalized respondents, revealing a 14% difference.

Code Name	All		Marginalized		Non-marginalized		Difference	
No impact on response	31	57%	6	27%	25	78%	-19	-51%
personal connection to hypothetical unidentified	14	26%	11	50%	3	9%	8	41%
<i>Respondent is LGBTQ+</i>	10	19%	10	45%		0%	10	45%
<i>Relative of LGBTQ+ individual</i>	4	7%	1	5%	3	9%	-2	-4%
Literate about potential case complications	8	15%	5	23%	3	9%	2	14%
Would want to assist in research	4	7%	4	18%		0%	4	18%
Sense of obligation to assist	4	7%	4	18%		0%	4	18%
Concern about the difficulty of the related case	3	6%	3	14%		0%	3	14%
Concern about the response of others to the case details	2	4%	2	9%		0%	2	9%
sad, upset	2	4%	2	9%		0%	2	9%
more motivated to contribute	2	4%	2	9%		0%	2	9%

Table 9: Changes in Response, Transgender, Marginalized vs. Non-marginalized.

Question 7: Midpoint Temperature Check. Scenario question 7 served as a midpoint check for respondents to state if any of the previous scenarios may have changed their opinion. This was an open-ended question left to the respondents’ interpretations. Across all responses, 48 (89%) respondents indicated no change in their responses. Three respondents indicated that they may question the motivations of the requesting agency; These three respondents further explained that their concerns were regarding their own information and not about the unidentified individual or associated case.

Questions 8 to 10: Hypothetical Scenario Questions Related to Case Details

Scenario questions 8 through 10 were focused on the hypothetical scenario that the DNA profile being identified may belong to a perpetrator or be linked to creating leads to a suspect in a homicide. Respondents were asked to state whether their opinion changed based on the DNA

sample belonging to a perpetrator of a homicide, a sample from a sexual assault kit linked to a surviving victim, or the DNA of an unidentified decedent who may have been a sex worker. Overall, most respondents indicated that they felt the victim or family of the victim deserved closure, or that they felt every victim deserves a fair chance at identification. Respondents were, however, less curious about the outcome of the case. Only one of all respondents indicated any curiosity about the outcome; this same respondent had suspicions that a family member of theirs may have been a perpetrator of a violent crime.

Question 8: Perpetrator of Violent Crime. Scenario question 8 prompted respondents to consider how their answers might change if they were contacted to assist in the identification of a perpetrator of a violent crime. Across all responses, 32 (59%) respondents stated there would be no impact on their response. Five (9%) of respondents stated they felt a personal connection to the hypothetical unidentified, with three (6%) stating that they are a family member of a perpetrator, one is a survivor, one is a family member of a victim, and one respondent suspects a family member of being a perpetrator. Of all respondents, four (7%) stated that they had personal safety concerns that would need to be addressed before agreeing to submit their genealogical DNA information. Two respondents (4%) stated that they did not agree with the use of forensic genetic genealogy to apprehend criminals.

When responses to question 8 were analyzed across marginalized vs. non-marginalized respondents, there was not a significant difference in rate of response. As seen in Table 10: Changes in Response, Perpetrator of Violent Crime, Marginalized vs. Non-marginalized, 15 (68%) of marginalized respondents stated there would be no change in their response, while 17 (53%) of non-marginalized respondents stated the same, making a 15% difference in response.

All other responses deviated by less than a 10% difference. Notable differences, however, are that marginalized respondents were more concerned about the legitimacy and motivation of the requesting agency, while non-marginalized respondents did not share this concern.

Code Name	All		Marginalized		Non-marginalized		Difference	
No impact on response	32	59%	15	68%	17	53%	-2	15%
personal connection to hypothetical unidentified	5	9%	2	9%	3	9%	-1	0%
<i>respondent is family member of perpetrator</i>	3	6%	1	5%	2	6%	-1	-1%
<i>Respondent is survivor</i>	1	2%		0%	1	3%	-1	-3%
<i>respondent is family member of victim</i>	1	2%	1	5%		0%	1	5%
<i>respondent suspects family member of being a perpetrator</i>	1	2%	1	5%		0%	1	5%
Contingent on personal safety concerns	4	7%	1	5%	3	9%	-2	-4%
Disappointed	3	6%	1	5%	2	6%	-1	-1%
Does not support FGG for apprehension of criminals	2	4%		0%	1	3%	-1	-3%
Contingent on legitimacy of requesting agency	2	4%	2	9%		0%	2	9%
Concern about motives of requesting agency	2	4%	2	9%		0%	2	9%
more motivated to contribute	2	4%		0%	2	6%	-2	-6%

Table 10: Changes in Response, Perpetrator of Violent Crime, Marginalized vs. Non-marginalized.

Question 9: Sexual Assault Kit Sample Taken from Survivor. Question 9 prompted respondents to explain how their answer might change if they knew the case they were being asked to provide DNA information to assist with was that of perpetrator DNA collected from a survivor of sexual assault. Across all responses, 31 (57%) respondents stated that there would be no impact on their response. Six (11%) of respondents stated they felt a personal connection to the hypothetical case, with two (4%) stating that they are a family member of a survivor, and two (4%) stating that they are a survivor of sexual assault. Six respondents (11%) stated that this scenario would make them more motivated to contribute, while four (7%) stated that their

willingness would be contingent on answers to their privacy concerns and four (7%) stated that their willingness would be contingent on answers to their questions about personal safety concerns.

Answers to question 9 were analyzed across marginalized and non-marginalized respondents. As seen in Table 11: Changes in Response, Sexual Assault Kit, Marginalized vs. Non-marginalized, the most notable difference in response is that of the personal connection to the hypothetical case; no marginalized respondents indicated that they felt a personal connection, and six (19%) indicated that they did. It is possible that the marginalized respondents did not volunteer this information, leaving a question of why the non-marginalized respondents felt comfortable volunteering this information while the marginalized respondents did not. Non-marginalized respondents indicated that they were more motivated to contribute DNA based on this scenario than marginalized respondents; five (16%) non-marginalized respondents indicated a higher motivation while one (5%) marginalized respondent indicated the same.

Code Name	All		Marginalized		Non-marginalized		Difference	
No impact on response	31	57%	14	64%	17	53%	-3	11%
personal connection to hypothetical unidentified	6	11%		0%	6	19%	-6	-19%
<i>Respondent is survivor</i>	2	4%		0%	2	6%	-2	-6%
<i>Respondent is family member of survivor</i>	2	4%		0%	2	6%	-2	-6%
<i>respondent is family member of perpetrator</i>	2	4%		0%	2	6%	-2	-6%
more motivated to contribute	6	11%	1	5%	5	16%	-4	-11%
Contingent upon response to privacy issues	4	7%	2	9%	2	6%	0	3%
Contingent on personal safety concerns	4	7%	1	5%	3	9%	-2	-4%

Table 11: Changes in Response, Sexual Assault Kit, Marginalized vs. Non-marginalized.

Question 10: Sex Worker. Question 10 prompted respondents to explain how their answer might change if the hypothetical unidentified deceased individual was assumed or known to be a sex worker. Across all responses, 40 (74%) respondents indicated that there would be no impact on their response. Notably absent in response to question 10 is any respondents feeling a personal connection to the deceased. Three (6%) of respondents revealed illiteracy on issues surrounding sex work, and three (6%) revealed a personal bias against sex work. It is of note that neither the criminal justice professionals nor family members subgroups showed these biases.

The sex worker question proved to be one of the more divisive questions in the survey, and one of the most revealing. In response to the general perpetrator question, eight respondents stated that they felt the family of the deceased deserved closure; in response to the victim being a sex worker, only two respondents made this statement. Additionally, in response to the victim being a potential sex worker, five respondents made statements to the effect of “I am not biased.” Of these five respondents, four were non-marginalized, and two, who were also both non-marginalized respondents, proceeded to demonstrate bias against sex workers in their response.

When analyzed across marginalized vs. non-marginalized respondents, there is not a notable difference in rate of response aside from the appearance of bias against sex work. As seen in Table 12: Changes in Response, Sex Worker, Marginalized vs. Non-marginalized, no marginalized respondents showed a bias against sex work, while three (9%) of non-marginalized respondents did.

Code Name	All		Marginalized		Non-marginalized		Difference	
No impact on response	40	74%	16	73%	24	75%	-8	-2%
Literate about potential case complications	5	9%	3	14%	2	6%	1	8%
illiterate on sex work issues	3	6%	1	5%	2	6%	-1	-1%
Biased against sex work	3	6%		0%	3	9%	-3	-9%

Table 12: Changes in Response, Sex Worker, Marginalized vs. Non-marginalized

Thematic Responses Across All Scenario Prompts

Several similar phrases were repeated across multiple hypothetical scenario responses. These phrases were "this would not affect my answer," "I would be happy to help any way I can," "everyone deserves a fair chance," "this doesn't/shouldn't matter," "I would feel fine about it," "victims/family deserve closure," "not relevant," "I am not biased," "I have a {marginalized identity} family member/friend," and "I wouldn't care." These phrases were examined for correlations across subgroups, marginalized vs. non-marginalized status, evidence of literacy or illiteracy pertaining to marginalized group issues, and other themes present in the responses. An extended matrix of these correlations can be seen in Appendix D: Thematic Response and Marginalization Literacy Matrix.

Determining Literacy vs. Illiteracy

Individual responses were analyzed for evidence of marginalization literacy or illiteracy on topics pertaining to the marginalized populations being discussed. Literacy or illiteracy was determined based on individual responses to prompts. Some responses were deemed unclear and were considered neutral responses for purposes of data analysis. As seen in Table 13: Examples of Marginalization Literacy or Illiteracy from Respondents, some

respondents made statements that implied whether they were aware of issues faced by a marginalized group or if they held assumptions based on false or stereotypical ideas.

Respondents who made statements that could be construed as evidence of literacy or illiteracy were marked as such for correlation to thematic statements.

Marginalized identity	Literacy example	Illiteracy example
Non-White	"Any of my White relatives may have married a non-White person"	"I would be surprised because my family is 100% European"
	"I would not be surprised because I have ancestors who were slaveholders"	"I would be surprised because my family is very racist"
Immigrant	"Recent immigrants to the US have very limited DNA testing rates"	"I don't know of any family members living overseas"
	"I would want to make sure the investigators were working with a genealogist or organization from the decedent's country of origin because many records would be difficult to find"	"I don't see how this would affect anything because we were all immigrants at some point"
LGBTQ	"I would be worried that their family of origin wouldn't claim them"	"I don't know why this is important to bring up. Have they found that homosexuality is genetic?"
	"I would be more motivated to help because as an LGBTQ+ person I know that could easily be me"	"People's choices in life wouldn't affect my willingness to help"
Transgender	"I know that people get miscategorized in NamUS all the time"	"How would they be able to tell?"
	"It is possible that the soft tissue examination and DNA testing led to different sex estimations"	"I don't know how you would be able to get that kind of information from the examination of a body"
Sex worker	"Sex workers can still be sexually assaulted"	"Sex workers are usually people dealing with a drug or gambling addiction"
	"Repeat offenders are more likely to prey on sex workers"	"I don't think any sex worker ever planned to be in the profession they are in"

Table 13: Examples of Marginalization Literacy or Illiteracy from Respondents.

"This Would Not Affect My Answer"

A response to the effect of “this would not affect my answer” appeared a total of 103 times in response to all scenario prompts. Statements grouped under this theme include “this would not affect my answer,” “my answer would not change,” “I would not have any change of heart,” “I would not feel any sort of way,” among others. This statement was made 42 times by

marginalized respondents and 61 times by non-marginalized respondents. It was most frequently used in response to Question 4, regarding a recent immigrant decedent. In response to this question, it was said 19 times overall, eight times by marginalized respondents and 11 times by non-marginalized respondents. The second most frequent appearance of this statement was in response to the decedent potentially being a sex worker; it was said 17 times overall, six times by marginalized respondents and eight times by non-marginalized respondents.

“This would not affect my answer” correlated most frequently to another thematic response, “I would be happy to help any way that I can.” The two themes appeared in the same statement 14 times: six times in responses by marginalized respondents and eight times by non-marginalized respondents. “I would be happy to help any way that I can” was the thematic response most often made in conjunction with “this would not affect my answer” by marginalized respondents. The thematic response most made in conjunction with “this would not affect my answer” by non-marginalized respondents was “this doesn’t/shouldn’t matter,” a total of 11 times.

“I Would be Happy to Help Any Way That I Can”

A response to the effect of “I would be happy to help any way that I can” was recorded a total of 51 times in response to all scenario prompts. This was stated 25 times by marginalized respondents and 26 times by non-marginalized respondents. This statement was made 15 times in response to a homosexual decedent and 15 times in response to a transgender decedent, seven times in response to a recent immigrant, six times in response to a non-white decedent, and four times in response to a sexual assault kit sample taken from a surviving victim. The least frequent

use of this statement was regarding a perpetrator of a violent crime, or a sex worker decedent, with two responses each.

“I would be happy to help any way that I can” correlated most frequently to the thematic response “This would not affect my answer” as explained previously. Additionally, the statement correlated most frequently for marginalized respondents with the respondent stating that they felt a personal connection to the hypothetical unidentified; this occurred 16 times. The same only occurred once among non-marginalized respondents. Marginalized respondents making this statement also stated in conjunction that they would want to assist in case research seven times. No non-marginalized respondents made this correlation.

“Everyone Deserves a Fair Chance”

The thematic statement “everyone deserves a fair chance” appeared a total of 42 times in response to the hypothetical scenario questions. This was stated 22 times by marginalized respondents and 20 times by non-marginalized respondents. This statement was most frequently made in response to the unidentified possibly being a sex worker; this was stated 17 times in response to this prompt, eight times by marginalized respondents and nine times by non-marginalized respondents.

This thematic response appeared the most often in conjunction with the response “this would not affect my answer,” a total of nine times; twice by marginalized respondents and seven times by non-marginalized respondents. Non-marginalized respondents who made this statement also demonstrated illiteracy about LGBTQ+ and Transgender issues 11 times each in conjunction.

“This Doesn’t/Shouldn’t Matter”

A statement to the effect of “this doesn’t or shouldn’t matter” was made a total of 39 times in response to the hypothetical scenario questions. Across marginalized vs. non-marginalized respondents, 33 non-marginalized respondents made this statement while six marginalized respondents made the statement. This statement was most frequently made in response to the hypothetical victim being Transgender. The statement was made 12 times; ten times by non-marginalized respondents and twice by marginalized respondents. The statement was made 11 times regarding a homosexual decedent (eight non-marginalized, three marginalized), ten times in response to a non-white decedent (nine non-marginalized, one marginalized), and six times regarding a recent immigrant decedent by only non-marginalized respondents.

Marginalized respondents who made this statement did not exhibit any clear illiteracies to issues surrounding the examined marginalized communities. However, non-marginalized respondents who made this statement exhibited illiteracy about sex work four times, illiteracy about transgender individuals six times, illiteracy about LGBTQ+ individuals six times, immigrant illiteracy five times and race illiteracy once.

“I Would Feel Fine About It”

A statement to the effect of “I would feel fine about it” appeared a total of 21 times in response to the hypothetical scenario questions. Across marginalized vs. non-marginalized respondents, the statement was made eight times by marginalized respondents and 13 times by non-marginalized respondents. This statement was made the most frequently in response to the

hypothetical Transgender victim, appearing seven times; twice from marginalized respondents and five times from non-marginalized respondents.

The statement appears most frequently in conjunction with the respondent expressing that they feel a personal connection to the hypothetical unidentified, either due to having a friend or family member from within the mentioned marginalized group, or that the respondent themselves identifies as such. This conjunction occurred four times

“Victims/Family Deserve Closure”

A statement to the effect of “victims/family deserve closure” occurred a total of 15 times across all respondents. This was stated by marginalized respondents five times and non-marginalized respondents 10 times. This statement was made the most frequently in response to the hypothetical scenario of the sample being identified belonging to a perpetrator. The statement was made eight times: three times by marginalized respondents and five times by non-marginalized respondents. It was not made in response to any of the questions prompting respondents to consider the changes in their response if the decedent belonged to a marginalized group.

“Victims/family deserve closure” was stated very infrequently in conjunction with other statements; it was said three times in conjunction with “everyone deserves a fair chance” and twice with “I would be happy to help anyway that I can.”

“This Is Not Relevant”

A common statement across all scenario prompts was for the respondent to state something to the effect of “this is not relevant to DNA” or “this is irrelevant to the case.” An analysis of the subgroups and marginalized status of the respondents who made this statement

reveals that no marginalized respondent made this statement, nor did any member of the criminal justice professionals' subgroup. The "not relevant" statement was made a total of 12 times in the hypothetical scenario prompts. Of these, all 12 were stated by non-marginalized respondents. "Not relevant" was most frequently stated in response to the hypothetical unidentified being homosexual. This occurred five times. The only other thematic response the statement appeared with was "everyone deserves a fair chance", one time, in response to the victim having been homosexual.

"I Am Not Biased"

A statement to the effect of "I am not biased" appeared a total of eight times across all responses: one time by a marginalized respondent and seven times from non-marginalized respondents. The statement only appeared in conjunction with "everyone deserves a fair chance," appearing twice: once from a marginalized respondent and once from a non-marginalized respondent. Marginalization illiteracies appeared very infrequently in conjunction with this statement with the exception of sex worker illiteracy, which appeared seven times: once by a marginalized respondent and six times by a non-marginalized respondent.

"I Have a (Marginalized Identity) Family Member/Friend"

A statement indicating that the respondent has a friend or family member from a marginalized community was made eight times by non-marginalized respondents only. This statement was made four times each in response to the decedent being homosexual or transgender. The only thematic statement it appeared in conjunction with was "I would feel fine about it," two times. No other thematic responses appeared in correlation.

“I Wouldn’t Care”

A statement to the effect of “I wouldn’t care” occurred a total of six times: once by a marginalized respondent and five times from non-marginalized respondents. It only appeared in conjunction with “not relevant” a total of four times. No other thematic responses appeared in correlation. “I wouldn’t care” appeared twice in response to the hypothetical victim being homosexual and twice in response to the hypothetical victim being Transgender. The theme was also repeated in response to a potential sec worker victim once, and an immigrant once.

Absence of Correlations

The thematic response and marginalization literacy matrix was examined for thematic responses with the fewest correlations. Out of all thematic responses, “I wouldn’t care” exhibited 18 instances in which there was no correlation to the other themes. This was followed by “I am not biased” which had 16 non-correlations. Tied for third were “I have a (marginalized identity) family member/friend” and “not relevant” with 15 non-correlations each. These standalone responses raise important questions about the nature of the thematic response. For example, “I wouldn’t care” appears to indicate an apathetic response, as there is very little said in conjunction with the statement. “I am not biased” seems to indicate a truly unbiased response, with respondents making this statement giving little context to show a strengthening or weakening of their motivation to contribute. The “I have a {marginalized identity} family member/friend” response having few correlatives is of note due to the frequency at which this single statement is used by non-marginalized individuals to attest that they are allies while offering little other evidence to prove allyship, often using their alleged marginalized friend or

family member as leverage to insist they hold a moral high ground over marginalized groups with whom they engage in discussion (Effron, 2014; Parry, 2018).

Motivations to Participate vs. Thematic Responses

Three additional themes were compared to the thematic responses to determine if the thematic responses had any correlation to the respondents' motivation to assist in the investigation. These themes are increased curiosity about the respondents' personal genealogy, a sense of obligation to assist, and concern about the increased difficulty of the related case.

Increased Curiosity About Personal Genealogy. A statement indicating that the respondent felt more curious about their own genealogy upon being prompted with a hypothetical scenario happened a total of 16 times, evenly split between eight marginalized respondents and eight non-marginalized respondents. This statement was only made in conjunction with the thematic statements "this would not affect my answer" and "this doesn't/shouldn't matter," three times each. The respondents who made this statement did so in response to the hypothetical victim being a recent immigrant ten times and non-White six times. Marginalized respondents who made this statement. Of the respondents' self-identification, 15 instances of this response came from White respondents and only one from a non-White respondent.

Sense of Obligation to Assist. Respondents indicated feeling a sense of obligation to assist a total of ten times. All these instances were within the responses of marginalized respondents. This sense of obligation was expressed four times in response to the victim being Transgender, three times in response to the victim being homosexual and three times in response to the victim being an immigrant. All four instances in response to the victim being Transgender

were made by non-cisgender respondents. Also of note is that all ten respondents identified as non-heterosexual.

Concern About the Difficulty of the Related Case. A concern about the increased difficulty of the related case was stated 13 times. All 13 instances were in the responses of marginalized respondents, and again, all 13 identified as non-heterosexual. This concern was voiced relatively evenly across all hypothetical marginalized victims: four times in relation to the victim being non-White, three times for an immigrant victim, twice for a homosexual victim and three times for a Transgender victim. This concern was also voiced once in response to the DNA being identified originating from a sexual assault kit sample taken from a survivor. This concern was stated five times in correlation with a sense of obligation to assist and six times in correlation to the respondent expressing a feeling of connection to the hypothetical victim.

Marginalized Identity Literacy of Respondents

Respondents' overall answers were evaluated for literacy or illiteracy in relation to issues faced by marginalized groups. An attempt was made to infer whether respondents were aware of key issues faced by marginalized groups, and were sorted into categories of Literate, Illiterate or Unclear for each marginalization explored by the study: racial minority, immigrant, LGBTQ+, Transgender and sex worker. Evidence of literacy or illiteracy was then compared to thematic responses and motivations to contribute to identify the presence of any correlations.

Race Literacy and Illiteracy. Of 54 respondents, a total of 21 respondents exhibited race literacy, eight respondents exhibited race illiteracy and 25 respondents' literacy or illiteracy was unclear. Ten marginalized respondents and 11 non-marginalized exhibited literacy, and four marginalized and four non-marginalized respondents exhibited illiteracy. Respondents who

exhibited race literacy made the thematic statement “I would be happy to help any way that I can” a total of 28 times. Respondents who exhibited race illiteracy made this statement nine times. Race literate respondents expressed a sense of obligation to assist ten times while race illiterate respondents did not express this. Additionally, race literate respondents voiced a concern for the increased difficulty of the related case thirteen times, and race illiterate respondents made no such statements.

Immigrant Literacy and Illiteracy. Of 54 respondents, a total of 16 respondents exhibited immigrant literacy, seven exhibited immigrant illiteracy, and 31 were unclear. Ten marginalized respondents and six non-marginalized respondents were immigrant literate. Three marginalized respondents and four non-marginalized respondents were immigrant illiterate. Immigrant literate respondents stated 27 instances of “I would be happy to help any way that I can” while immigrant illiterate respondents said this three times. Immigrant literate respondents, like race literate respondents, expressed a concern about the increased difficulty of the related case thirteen times and a sense of obligation to assist ten times, while immigrant illiterate respondents made neither of these statements.

LGBTQ+ Literacy and Illiteracy. Of 54 respondents, ten exhibited LGBTQ+ literacy, six demonstrated illiteracy and 38 were unclear. All ten literate respondents were also members of marginalized groups, and all six illiterate respondents were from non-marginalized groups. Additionally, all ten literate respondents identified as non-heterosexual. LGBTQ+ literate respondents expressed instances of “I would be happy to help any way that I can” 20 times while illiterate respondents made this statement three times.

Transgender Literacy and Illiteracy. Of 54 respondents, thirteen expressed literacy about Transgender issues, five expressed illiteracies and 36 were unclear. Two non-marginalized respondents and 11 marginalized respondents comprised the Transgender literate respondents, while four non-marginalized and one marginalized respondent made up the illiterate respondents. Transgender literate respondents expressed instances of “I would be happy to help any way that I can” a total of 23 times, while Transgender illiterate respondents made no such statement.

Sex Worker Literacy and Illiteracy. Of 54 respondents, 16 indicated literacy of issues related to sex work, nine expressed illiteracies, and 29 were unclear. Of the sex worker literate respondents, eight were marginalized and eight were non-marginalized respondents. Of the illiterate respondents, three were marginalized and 6 were non-marginalized. A total of 27 iterations of “I would be happy to help any way that I can” were stated by sex work literate respondents, while eight iterations of the same were stated by illiterate respondents.

Ambivalence or Action in Response according to Marginalized Identity Literacy or Illiteracy

Four thematic responses were identified as being ambivalent in nature due to having few correlations to other themes which indicated an increased desire to assist. The thematic responses deemed to be ambivalent are "I would feel fine about it," "not relevant," "I have a {marginalized identity} family member/friend," and "I wouldn't care." These four thematic responses were compared to the respondent's general literacy or illiteracy overall. Additionally, two themes that frequently correlated with an indication of desire or motivation to act were also compared to literacy or illiteracy. These themes are “I would be happy to help any way that I can” and a sense of obligation to assist in the investigation.

Correlations to Ambivalence. Respondents who made the thematic statements correlated to ambivalence or action were assessed for the presence or absence of self-identified marginalization and evidence to suggest marginalization literacy or illiteracy. Individual respondents who made thematic statements determined to be ambivalent were ordered from most to least ambivalent statements and cross referenced for correlations to their ambivalence. As seen in Table 14: Correlations to Ambivalence, the three respondents with the most ambivalent responses were all white cisgender and heterosexual these non-marginalized respondents made ambivalent statements nine times, eight times and four times. These three respondents also made no statements correlation to action. The top two respondents also exhibited one literacy statement each, and the third stated no literacies.

Number of marginalizations	Ambivalent themes				Active themes				Literacy							
	"I would feel fine about it"	"Not relevant"	"I have a {marginalized identity} family member/friend"	"I wouldn't care"	Total ambivalent themes	"I would be happy to help any way I can"	Sense of obligation to assist	Total active themes	Difference ambivalence/action	Race	Immigrant	LGBTQ	Trans	Sex Work	illiteracies	Literacies
0	0	5	0	4	9	0	0	0	-9	Y	?	?	?	?	0	1
0	6	0	2	0	8	0	0	0	-8	?	Y	?	?	Y	0	1
0	4	0	0	0	4	0	0	0	-4	?	?	?	?	?	0	0
1	3	0	0	0	3	0	0	0	-3	?	Y	?	?	?	0	1
0	0	3	0	0	3	0	0	0	-3	Y	?	?	?	?	0	1

Table 14: Correlations to Ambivalence

Correlations to Action. Individual respondents who made thematic statements deemed to correlate to action were ordered from most to least active statements and cross referenced for correlations. As seen in Table 15: Correlations to Action, the top three respondents who expressed active statements exhibited two marginalizations each. These respondents stated active statements ten, nine, and eight times. None of these top three expressed ambivalent statements. The three top active respondents expressed no marginalization illiteracies, and four marginalization literacies each.

Ambivalent themes					Active themes				Literacy							
Number of marginalizations	"I would feel fine about it"	"not relevant"	"I have a {marginalized identity} family member/friend"	"I wouldn't care"	Total ambivalent themes	"I would be happy to help any way I can"	Sense of obligation to assist	Total active themes	Difference ambivalence/action	Race	Immigrant	LGBTQ	Trans	Sex Work	illiteracies	Literacies
2	0	0	0	0	0	7	3	10	10	Y	Y	Y	Y	Y	0	4
2	0	0	0	0	0	5	4	9	9	Y	Y	Y	Y	Y	0	4
2	0	0	0	0	0	5	3	8	8	Y	Y	Y	Y	Y	0	4
0	0	0	0	0	0	6	0	6	6	Y	Y	?	?	?	0	2
0	0	0	0	0	0	5	0	5	5	?	?	?	?	N	0	0

Table 15: : Correlations to Action

Increased Motivation to Assist According to Relatability to Hypothetical Victim

The respondents who made statements indicating a sense of obligation to assist were evaluated for their sense of relatability to the hypothetical victim. The respondents most likely to feel compelled to assist in an investigation involving a victim from the same community as themselves are non-cisgender respondents; of 11 non-cisgender respondents, ten expressed an increased desire to help in a hypothetical case of a Transgender victim. Two out of three immigrant respondents (66.7%) felt compelled to assist in an investigation of an immigrant victim. Of 18 non-heterosexual respondents, 11 (61.1%) felt compelled to assist in the

investigation of a homosexual victim. Of seven descendants of immigrants, four (57.1%) had active responses to aiding in a case of an immigrant victim. Of eight non-white respondents, one (14.3%) had active responses to a racial minority victim. One relative of an LGBTQ+ individual out of nine (11.1%) had an active reaction to a homosexual victim. Respondents who did not express an active response to a correlative hypothetical victim are assault survivors to assault kit samples, relatives of LGBTQ+ individuals to transgender victims, a respondent who suspects a family member of being a perpetrator to a perpetrator case, family member of victim to perpetrator case, and family member of survivor to sexual assault kit sample.

Synthesis of Data

Theoretical Framework

Following thorough analysis of the data, the resulting information was examined through the lens of the theoretical framework of dual process theory and terror management theory. Based on the respondents' use of logic or emotion to justify their responses, respondents were determined to be employing a system 1 response, a system 2 response or both. Additionally, responses were analyzed for evidence of fear-based decision making or evidence of acceptance of reality based on to determine their terror management response.

Dual Process

Respondents were evaluated for exhibiting a system 1 response, which is a quickly developed emotion-based decision, or a system 2 response, which is a more slowly developed decision grounded in logic. As seen in Table 16: Dual Process Usage Across Respondents, 27 respondents, or 50% overall, showed usage of both system 1 and system 2 processes to form their opinions. Across all individual subgroups and marginalized vs. non-marginalized

respondents, 50% or more of all groups exhibited use of both system 1 and system 2 processes with the exception of DNA test consumers. Of this subgroup, 12 (60%) exhibited only a system 1 response, and seven (35%) showed use of both system 1 and system 2 processes.

	Overall		Marginalized		Non-marginalized		Forensic genetic genealogists		Criminal Justice professionals		DNA test consumers		Family members	
System 1	22	41%	8	36%	11	34%	3	23%	3	25%	12	60%	4	44%
System 1 & 2	27	50%	11	50%	16	50%	9	69%	6	50%	7	35%	5	56%
System 2	5	9%	3	14%	2	6%	1	8%	3	25%	1	5%	0	0%

Table 16: Dual Process Usage Across Respondents

Terror Management

Respondents were evaluated for exhibiting a fear of mortality or acceptance according to Terror Management Theory. As seen in Table 17: Terror Management Responses Across Respondents, most respondents overall exhibited an acceptance of mortality; 34 (63%) of all respondents indicated as such. No group predominantly displayed a fear of mortality, but the DNA test consumer subgroup was the most evenly divided group, with nine (45%) displaying fear and 11 (55%) displaying acceptance.

	Overall	Marginalized	Non-marginalized	Forensic genetic genealogists	Criminal justice professionals	DNA test consumers	Family members
Fear	20 37%	9 41%	11 34%	4 31%	4 33%	9 45%	3 33%
Acceptance	34 63%	13 59%	21 66%	9 69%	8 67%	11 55%	6 67%

Table 17: Terror Management Responses Across Respondents

Dual Process Systems to Terror Management of Respondents

Respondents’ use of dual processes to arrive at a conclusion was compared to their terror management response to look for correlations. As seen in Table 18: Overall Dual Process System Usage vs. Acceptance or Fear of Mortality, most respondents utilized both systems 1 and 2 and demonstrated an acceptance of mortality. This consists of 18 (33%) of respondents. Respondents who utilized system 1 only and exhibited acceptance of mortality numbered 12 (22%) overall. Only one respondent appeared to utilize only system 2 and demonstrated a sense of fear.

	System 1	Both	System 2
Acceptance	12 22%	18 33%	4 7%
Fear	10 19%	9 17%	1 2%

Table 18: Overall Dual Process System Usage vs. Acceptance or Fear of Mortality

The correlation of dual process system usage and acceptance or fear of mortality was examined across subgroups and across marginalized and non-marginalized respondents. As seen in Table 19: Dual Process System Usage vs. Acceptance or Fear of Mortality Across Groups, the group most represented in these correlations is the family members group, with four (44%) of

respondents in this group utilizing both system 1 and system 2 and exhibiting an acceptance of mortality. All subgroups had most respondents using both dual processes and exhibiting acceptance of mortality except for the DNA test consumer group. Of this group, four (20%) exhibited the use of both dual process systems and an acceptance of mortality; six (30%) of respondents each exhibited only system 1 usage and acceptance of mortality, or only system 2 usage and fear of mortality.

	System 1/Acceptance		System 1&2/Acceptance		System 2/Acceptance		System 1/Fear		System 1&2/Fear		System 2/Fear	
Forensic genetic genealogists	3	23%	5	38%	1	8%	0	0%	4	31%	0	0%
Criminal justice professionals	1	8%	5	42%	2	17%	2	17%	1	8%	1	8%
DNA test consumers	6	30%	4	20%	1	5%	6	30%	3	15%	0	0%
Family members	2	22%	4	44%	0	0%	1	11%	1	11%	0	0%
Marginalized	3	14%	8	36%	2	9%	5	23%	3	14%	1	5%
Non-marginalized	9	28%	10	31%	2	6%	4	13%	6	19%	0	0%

Table 19: Dual Process System Usage vs. Acceptance or Fear of Mortality Across Groups

Summary

A qualitative narrative survey study was designed to determine the needs of marginalized individuals affected by the use of forensic genetic genealogy. The narratives considered included not only the individual stance of those with a stake in the use of forensic genetic genealogy, but also the group mentality of each affected party. What was examined was not only the needs of the individuals and groups, but the ways in which their stance changed when confronted with a theoretical case of a marginalized victim as opposed to one of a heterosexual, cisgender white individual of European descent.

Interpreting the data from the narrative surveys to answer the research questions required a multi-layered analysis and synthesis of findings. Respondents were evenly distributed across stakeholder subgroups and marginalized vs. non-marginalized individuals, with the fewest respondents belonging to the family member subgroup. An inductive coding approach was used to develop the code set for each subgroup, after which the code sets were compared to each other for similarities and to develop an overall code set for the analysis. These overall codes, and the codes which only appeared in one, two, or three subgroups, were used to answer the research questions put forth for the study.

In response to research question 1, the most frequent concern stated by all respondents was misuse excluding genetic discrimination. This was the most frequent concern stated by marginalized respondents, forensic genetic genealogists, and DNA test consumers. The most frequent concern stated by non-marginalized respondents was harmful policymaking. This was also the most common concern voiced by criminal justice professionals and family members of missing and murdered persons. Some respondents chose to report that they had no concerns. When analyzed across marginalized vs. non-marginalized respondents, it was found that non-marginalized respondents were more likely to state they had no concerns as opposed to marginalized respondents.

In response to research question 2, marginalized respondents tended to have more questions about the hypothetical scenarios presented, and non-marginalized respondents were more likely to proceed with no questions asked. It is possible that this is the case because of the trend towards marginalized respondents having negative experiences interacting with criminal justice professionals or organizations, and the awareness that these respondents had overall that

the systems developed to investigate and resolve cases of fatal violence often allow marginalized victims to fall through the cracks. Non-marginalized respondents tended to express loosely formed concerns about privacy and health care discrimination, while marginalized respondents cited specific issues of genetic surveillance and discrimination experience by marginalized individuals that cause distrust of the organizations that enact these methods.

In response to research question 3, it was found that respondents were more likely to feel more motivated to assist if they personally related themselves to the unidentified deceased person or victim. Non-marginalized respondents presented more ambivalent responses overall, while marginalized respondents were more likely to state that they felt an obligation to assist. The ambivalent responses from non-marginalized respondents correlated with evidence of illiteracy about marginalized group issues, and these ambivalent responses also correlated to statements indicative of self-interest, such as the hypothetical case scenarios prompting the respondent to become more curious about their own genealogy as opposed to greater concern about the hypothetical case itself.

The researcher believes that the results of this study will be useful toward developing policies that will be beneficial to resolving cases of fatal violence towards marginalized individuals using forensic genetic genealogy and set the methodology up for success where other advances in forensic identification have fallen short. There are many questions raised by the study that can be answered later with further research and inquiry, and this study lays a positive foundation for future work.

CHAPTER 5: CONCLUSION

The purpose of this qualitative narrative study was to identify strategies by which forensic genetic genealogy can be applied to cases of unidentified decedents who are from marginalized populations that have been historically deprioritized or difficult to resolve. This study was designed to determine the needs of marginalized individuals affected using forensic genetic genealogy. What was examined was not only the needs of the individuals and groups, but the ways in which their stance changes when confronted with a theoretical case of a marginalized victim as opposed to one of a heterosexual, cisgender white individual of European descent.

This narrative study took place on a customized website hosted and controlled by the researcher and created for the sole purpose of collecting narrative survey data for this study. The site used Nextcloud, a content collaboration platform, to securely manage and analyze participant data (Nextcloud, 2021). Nextcloud is an open-source cloud file storage and collaboration platform that is self-hosted, self-administered and utilizes multiple encryption methods for data security (Nextcloud, 2021). Several plugins and modifications such as end to end encryption, hiding the site user list and automatic deletion of data after a set time were added to the installation to ensure security and privacy for participants. Participants were required to log in to the site to access the narrative survey, but the ability to see the list of other users on the site was removed to protect anonymity of the participants from each other. Only the researcher was able to see the full list of users. A forms plugin that allows the assignment of specific forms to individual participants within the system was installed (Sattizahn, 2021) as well as an analytics plugin that parsed coding data to visualize themes (Scherello, 2021). Additionally, a terms of

service plugin that required participants to accept the online consent form before making an account ensured that users have been informed about the nature of the study before progressing to the survey (Schilling, 2021).

Interpretation of Findings

An inductive coding process was utilized for this study to allow the data to inform the code set and reduce confirmation bias (Stephens et al., 2018). The coding process revealed trends separating marginalized respondents from non-marginalized respondents more than across subgroups. The research questions were phrased in a manner that focused on the differences between subgroups, but enough evidence suggested the importance of the differences between marginalized versus non-marginalized respondents. The following section details these thematic differences in three parts modeled after the three research questions explored by the study.

Research Question 1

The first question that this study sought to answer is “What is each affected group (forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes) most concerned about regarding the use of forensic genetic genealogy to identify marginalized unidentified decedents or perpetrators of violent crime against marginalized group members?” Upon analysis of the data, this question was answered in full. Each stakeholder subgroup revealed a primary concern overall.

Three concerns were the most frequently stated overall: 17 respondents were concerned about harmful policymaking, 17 were also concerned about ethics or misuse excluding genetic discrimination, and 14 respondents were concerned about education and training. The top three

concerns of each subgroup contain some notable differences. Harmful policymaking was the primary concern of the criminal justice professionals and family members groups. This appears to be logically sound, as these groups have a personal investment in giving unresolved cases every chance of being resolved. Harmful policymaking was the second most common concern among forensic genetic genealogists, with ethics or misuse excluding genetic discrimination being the leading concern for this subgroup. DNA test consumers ranked harmful policymaking as significantly lower on their concerns, with genetic discrimination being the top concern for this subgroup. This is in keeping with concerns held by marginalized people about the use of genetic essentialism to argue in favor of eugenics or selective abortions of pregnancies deemed genetically inferior (Dar-Nimrod & Heine, 2011).

The DNA test consumer subgroup that showed the greatest concern for the potential for genetic discrimination is notable in that genetic discrimination using autosomal DNA is prohibited by law in the United States by the Genetic Information Nondiscrimination Act (GINA) and the Health Information Portability and Accountability Act (HIPAA) (*Genetic Information Discrimination*, 2021). This reveals a harmful misconception held by members of this group which could prevent them from participating in forensic genetic genealogy by uploading their autosomal DNA data to databases accessible for forensic genetic genealogical research. While it is true that discarded DNA is considered to be within the public domain and can be collected for processing, this presently only applies to STR testing, and not autosomal sequencing (Katsanis et al., 2018).

Beyond the initial question's focus on stakeholder subgroups, a division between marginalized and non-marginalized respondents was noted. Of marginalized respondents, 94%

stated at least one concern about the use of forensic genetic genealogy, and 6% had no concerns. Of non-marginalized respondents, however, 70% stated at least one concern about the use of forensic genetic genealogy, and 30% stated they had no concerns. Marginalized individuals do have a strained relationship with the police largely because of the insufficient effort given to cases involving marginalized victims (Petersen, 2017).

Research Question 2

The second question this study sought to answer was “how have the past experiences of individuals in the affected groups contributed to their stance on the use of forensic genetic genealogy?” This question was addressed by comparing themes found in response to the narrative survey questions to the responses to hypothetical scenarios. When marginalized respondents were asked what they wish others knew about their experiences, the most common statement made was regarding being subject to stereotypes and generalizations, followed by bias or hostility, and then institutional or systemic oppression. When this is compared to marginalized respondents’ most stated concerns about the use of forensic genetic genealogy, which were ethics or misuse excluding genetic discrimination, education and training, and genetic discrimination, these issues seem to mirror each other. Two out of three of marginalized respondents’ concerns have to do with ethical concerns that may result in harm, exploitation or ignorance of the issues faced by marginalized victims, which is in correlation to marginalized respondents’ statement of being subject to bias, hostility, and systemic oppression. The third, education and training, pertains to correcting incorrect beliefs – this is in correlation with the concern about stereotypes and generalizations. The findings of this study show that the respondents’ concerns are consistent with previous writings on known issues present in the

investigation of violent crimes against marginalized people, such as deprioritization, poor communication between communities and the police, and systemic bias (Banyard et al., 2019; Michael et al., 2021; Nakhaeizadeh et al., 2014; Quesada et al., 2011; Verman, 2018).

When marginalized and non-marginalized respondents' answers to hypothetical scenario questions 1 and 2 were compared, a difference between the two groups became apparent. Marginalized respondents, whose experiences frequently included systemic oppression by organizations meant to help resolve cases (Michael et al., 2021; Quesada et al., 2011; Verman, 2018), were more likely to report that the answers to their questions about the hypothetical scenario would have bearing on their willingness to contribute genetic genealogical information for forensic investigation purposes. Marginalized respondents primarily wanted to know what the requesting agency was, details of the associated case, and how they were determined to be a target tester. Non-marginalized respondents wished to know the details of the case, where the request was coming from, or had no questions at all. In comparison, hypothetical scenario question 2 asked respondents if the answers to their questions had any bearing on their willingness to participate. Most non-marginalized respondents indicated that no, they would still submit their DNA data. Most marginalized respondents indicated that the answers to their questions would matter to some degree, with the most important answers relating to the legitimacy of the responding agency.

Research Question 3

The third question this study sought to answer was “how do stakeholders’ opinions on the use of forensic genetic genealogy change when applied to cases involving marginalized victims of violent crime versus white, heterosexual, cisgender European-descended victims?” This

question was addressed by examining how respondents' answers to hypothetical questions differed according to stakeholder subgroup or marginalized status. Respondents were asked a series of 11 questions related to their reactions to being asked to contribute their genetic genealogical information to assist in hypothetical case research. A notable trend toward non-marginalized respondents indicating an increased curiosity about their own genealogy carried across all questions. Marginalized respondents were more likely to offer additional assistance to the investigators, especially in instances where they felt a personal connection to the hypothetical victim, for example, if the respondent and the hypothetical victim belonged to the same marginalized community. In instances where non-marginalized respondents indicated a personal connection to the hypothetical victim, such as to say, "I have a gay cousin" or "I have many Black friends," no further indication of increased or decreased desire to assist was apparent. Most respondents who stated that they had a friend or family member belonging to the same marginalized group as the hypothetical victim qualified their explanation with "I would feel fine about it" or "it doesn't bother me." This is notable in the context of previous research on the "Black friend" phenomenon, which indicates that such statements are more in self-defense than allyship (Parry, 2018). Most marginalized respondents indicated a greater sense of empathy by speaking of the hypothetical victim instead of themselves.

Implications

The results from this qualitative narrative study indicate a great lack of communication and understanding more between marginalized and non-marginalized respondents. There is also a lack of communication amongst different marginalized groups despite the frequency of intersectionality amongst marginalized individuals. For example, sex workers are the least

understood of any of the hypothetical victims, even amongst marginalized respondents. Sex workers who go missing or who are murdered are the most likely category of people to have their cases deprioritized due to living a “high risk lifestyle,” and are also the most likely category of people to be preyed upon by repeat offenders, for this very reason, as they know a missing or murdered sex worker will not be investigated as thoroughly as a housing-secure, middle-class, White cisgender heterosexual person meeting the same fate (Prior et al., 2013). Additionally, Transgender and gender-variant people represent a forensically significant population (Blackless et al., 2000; Michael et al., 2021) who are far more likely to become victims of violent crime than the national average (Talusán, 2016) but insufficient efforts are put towards resolving cases of homicidal violence targeting transgender people (Momen & Dilks, 2021). The researcher believes that this study can be used to bridge the gap between communities and help professionals and public alike to have a better dialog about needs and misunderstandings relative to cold cases involving marginalized victims. This will build trust between marginalized individuals, forensic genetic genealogists and criminal justice professionals and therefore reduce barriers to marginalized individuals contributing genetic genealogical information for forensic use. This will then create a larger pool of data to draw upon, and increase the efficacy of forensic genetic genealogy in identifying unidentified deceased individuals from marginalized communities.

Giving Marginalized People a Voice

The results of the study indicate that marginalized people need a larger voice in discussions centered around resolving cases of homicidal violence against marginalized people. Non-marginalized people overall mean well, at least within the confines of this study, but are

unaware of the issues which complicated investigations with a marginalized victim.

Marginalized people are, in general, aware of the risks they face on a day-to-day basis and how much more likely it is for them to become victims than non-marginalized individuals (James et al., 2016). Marginalized people are also aware of the likelihood that, if anything should befall them, the investigation into the incident is less likely to be taken seriously, or at the very least, not likely to involve the specialized attention the investigation would require (Verman, 2018).

The researcher has presented at several professional conferences to encourage Transgender and gender-variant professionals and students to consider ways in which they can contribute to harm reduction for transgender decedents, and has also implored non-marginalized professionals to make room for their marginalized colleagues to come forward and lead these conversations (Michael et al., 2021; Redgrave & Redgrave, 2021; Trans Doe Task Force, 2021).

Results from this study could be applied to support professionals from within marginalized communities in leadership positions in investigations involving marginalized victims. Investigations involving marginalized victims may include input from marginalized professionals, but systemic bias often prohibits marginalized professionals from attaining leadership positions, and therefore their voice is deemed less valuable than those who systematically outrank them for no reason other than internal bias.

Professional Education

The results of this study indicate a need for professional education for all stakeholder groups, including forensic genetic genealogists, on issues faced by marginalized individuals and laws surrounding what can and can't be done with autosomal DNA data according to the Genetic Information Non-discrimination Act and the Health Information Portability and Accountability

Act (*Genetic Information Discrimination*, 2021). Issues that necessitate the development of professional education on the topic of forensic genetic genealogy include lack of awareness of issues faced by marginalized individuals, and their reasons for apprehension when asked to provide genetic information to assist in investigations. Forensic genetic genealogists can then play a part in the education of potential target testers whose fears may dissuade them from contributing their genetic genealogical information. Criminal justice professionals, some of whom lack understanding of how gender identity and sexual orientation may be inferred in cases of an unidentified decedent, should be educated on cultural ephemera that may lead to this hypothesis and assist in confirming an identity as well as a motive in an individual's death. This education is essential to curb the tendency of non-marginalized people towards saviourship as opposed to allyship (Healthline, 2021). Criminal justice professionals also need to be educated on the basics of how forensic genetic genealogy works for them to be able to determine when the methodology would be best employed in a case.

Public Education

The results of this study also indicate a need for public education for DNA test consumers as well as family members of victims of violent crime. Marginalized respondents expressed a concern about existing practices that negatively impact them using their DNA information, and non-marginalized respondents tend to be unaware of the actual law surrounding what can and can't be done with their DNA information. These issues often become conflated, as there are some methods of DNA collection that are legal, and some that require authorization from law enforcement such as a warrant issued based on probable cause (Katsanis et al., 2018). There is a concern, also, about DNA being surreptitiously planted at a crime scene to implicate

an otherwise innocent individual. Public education on the DNA collection and analysis process would help to dissuade these fears, as well as produce accountability in the event that such a thing was to happen, and an understanding of what such an event would look like on a DNA analysis level as opposed to true crime scene evidence.

Formal Policymaking

The primary reason the researcher chose to undertake this study is its applications to formal policymaking for future forensic genetic genealogical research. In a professional field still in its nascence, an intervention must be made to prevent this investigative tool from developing the same issues as other advancements which have left marginalized victims' cases unsolved and forgotten. Autosomal DNA should be an equalizing force in human identification, as every human being is comprised of DNA, and segments of that DNA are shared with millions of other people, living or dead (Ball et al., 2020). With enough perseverance and training, any unidentified deceased person and any unknown perpetrator's case should be solvable if sufficient DNA evidence is available. Policymaking that addresses the gaps in communication across groups and includes contingencies for cautious target testers and underrepresented populations could assist in creating a future where an unidentified person's race, identity or orientation is not a bar to their identification.

Recommendations for Action

The findings from this study provided recommendations for actions to support the identification of unidentified marginalized deceased individuals by removing barriers to forensic genetic genealogical research. The necessary approach to achieve this is multifaceted but will ultimately support a more positive future for the field. The recommended actions are public and

professional education to correct misinformation, the formation of an inclusive and holistic forensic genetic genealogy policy board, development of forensic genetic genealogy education that is accessible for marginalized professionals, and establishment of a diverse forensic genetic genealogy certifying body. Completion of these actions will create credibility and accountability for future practitioners of forensic genetic genealogy.

Public And Professional Education to Correct Misinformation

The researcher recommends that, based on the study findings, educational material should be developed to address misinformation and false beliefs held by all stakeholder groups, such as lack of awareness of the Genetic Information Non-Discrimination Act and amendments to the Health Information Portability and Accountability Act which prevents genetic information from unauthorized exposure and prevents employers and health providers from discriminating based on genetic information (*Genetic Information Discrimination*, 2021). Professional education on forensic genetic genealogy as well as public education of the same issues as they relate to DNA test consumers should be provided freely as a public service, and shareable by professional forensic genetic genealogists in the event of interacting with a misinformed potential target tester. An accessible course of education on these issues will establish the groundwork for further recommended actions. This accessible education is important because of the tendency of potential target testers to believe in hearsay about the potential dangers of providing their DNA for law enforcement use without conducting their own research. With an easily accessible and free course of public education, potential target testers and the general public could be easily educated on the real issues surrounding forensic genetic genealogy and

make a more informed decision using their system 2 thought process rather than solely their emotion-driven system 1 process as per dual process theory (Sowden et al., 2015).

Inclusive and Holistic Forensic Genetic Genealogy Policy Board

To develop standards of practice and accepted policies that serve to resolve cases involving marginalized victims, a policymaking board comprised primarily of professionals from marginalized groups is necessary to ensure fairness. Attempts have been made to develop policies that affect marginalized individuals but are not headed by people from within the marginalized community, and these have met with distrust and suspicion, as is the case with the World Professional Association for Transgender Health (WPATH), whose standards of care ultimately affect all transgender individuals seeking gender affirming care but are particularly controversial in the case of care for transgender adolescents, purporting that “social pressure” may cause adolescents to come out as transgender and suggests against seeking gender affirming hormone therapy in the form of antiandrogens, thus forcing transgender youth to experience the incorrect puberty and cause irreparable unwanted changes to their bodies (Yucaba, 2022). In response to WPATH’s standards of care, and their gatekeeping of valuable information from transgender professionals by way of high membership fees, the Transgender Professional Association for Transgender Health (TPATH) was formed, comprised only of transgender and gender-diverse professionals (TPATH, 2022). Likewise, a policy board that puts marginalized professionals forward and favors their voice in decisions that affect marginalized victims would sway the balance of future policies away from saviourship and toward allyship and literacy on relevant issues (Healthline, 2021).

Accessible Forensic Genetic Genealogy Education Development

Development of formalized education on forensic genetic genealogy should be developed based on the findings of this study. There is an existing graduate certificate available on the topic of forensic genetic genealogy, but this was developed without input from marginalized professionals or public consumers (University of New Haven, 2022). A more inclusive educational program should be developed in a way that is accessible via the internet for mixed ability learners, affordable, and verifiable upon completion by both employers and DNA test consumers who wish to know the credentials of a forensic genetic genealogist by whom they may be approached. The importance of accessibility and affordability is to create an environment that removes barriers to marginalized individuals becoming credentialed in a skilled profession and therefore giving marginalized individuals credentialed authority as well as experiential authority to handle unresolved cases. Academic gatekeeping is an issue faced by marginalized individuals who would otherwise become professionals in skilled fields, or participatory in forensic associations, but exorbitant tuition and membership fees have historically been a barrier to including marginalized individuals in professional spaces (Janssen et al., 2022). Therefore, the best way to ensure inclusion as well as putting marginalized professionals forward is to ensure that education is affordable for marginalized individuals who are often also financially burdened.

Establishment of Diverse Forensic Genetic Genealogy Certifying Body

In conjunction with a formal education, a certifying body that specifically addresses the needs of marginalized victims should be established. Genealogical certifying bodies have historically been staffed by White, heterosexual cisgender individuals, and this has negatively

impacted genealogy by again gatekeeping valuable resources and leaving little room for diversity (Board for Certification of Genealogists, 2022). In response, Black genealogy certification was established to credentialize and certify Black genealogists, but these are not as well known or well recognized as their primarily White counterparts (AAHGS, 2022). A strong and prominent certifying body to address cases involving marginalized victims must be established to ensure no further gatekeeping occurs in the field. This action will prioritize the development of marginalized forensic genetic genealogy professionals in tandem with the development of an inclusive policy board and create balance and forethought to addressing issues affecting marginalized victims.

Recommendations for Further Study

Further study on the gaps in understanding between marginalized and non-marginalized individuals who are affected by the use of forensic genetic genealogy is needed to more effectively correct problems that arise in the process of resolution of cases involving marginalized victims. The present study was intentionally broad as to avoid confirmation bias. The researcher recommends that a more in-depth study be developed that explores more deeply the differences in understanding between marginalized and non-marginalized individuals.

Additional Studies

The present study was aimed at four subgroups affected by forensic genetic genealogy. The subgroup with the smallest number of respondents was the family members of victims and perpetrators of violent crime. As such, the data for this group was more limited than that of the others, and a clear unifying theme could not be determined. An additional study is recommended that specifically targets family members of victims, perpetrators, and wrongfully

convicted individuals to gain more insight into issues this group faces and what concerns they have about the use of forensic genetic genealogy. Additionally, a major imbalance between the number of marginalized and non-marginalized forensic genetic genealogists was apparent. An additional study seeking out marginalized forensic genetic genealogists would prove useful in clarifying the perspective of this group as opposed to non-marginalized forensic genetic genealogists.

Conclusion

The problem addressed by this study was the gaps in understanding that inhibit the resolution of unsolved homicide and unidentified decedent cases involving marginalized victims using forensic genetic genealogy. The purpose of this qualitative narrative study was to identify strategies by which forensic genetic genealogy can be applied to cases of unidentified decedents who are from marginalized populations that have been historically deprioritized or difficult to resolve. What was examined was not only the needs of the individuals and groups, but the ways in which their stance changes when confronted with a theoretical case of a marginalized victim as opposed to one of a heterosexual, cisgender white individual of European descent. This qualitative, narrative study asked the following questions:

4. What is each affected group (forensic genetic genealogists, criminal justice professionals, consumers of genealogical DNA testing products, and families of missing persons, victims, and perpetrators of violent crimes) most concerned about regarding the use of forensic genetic genealogy to identify marginalized unidentified decedents or perpetrators of violent crime against marginalized group members?

5. How have the past experiences of individuals in the affected groups contributed to their stance on the use of forensic genetic genealogy?
6. How do stakeholders' opinions on the use of forensic genetic genealogy change when applied to cases involving marginalized victims of violent crime versus white, heterosexual, cisgender European-descended victims?

Homicide clearance rates have declined from 92 percent in 1960 to 61 percent in 2006, with significantly higher clearance rates of cases involving White victims than Black or Hispanic (Riedel, 2008). Based on known statistics, it is over 7.3 times more likely for a Black transgender woman to be murdered in the United States than the average homicide rate (Talusán, 2016). According to a 2016 study, approximately .6% of people in the United States identify as Transgender (Flores et al., 2016). According to a 2000 study, as many as 2% of live human births may be sexually indeterminate (intersex) based on current standards of sexual dimorphism (Blackless et al., 2000). The possibility of accurately determining the binary sex (male or female) of a complete skeleton is about 94%; the likelihood is significantly less if the skeleton is incomplete (Spradley & Jantz, 2011). Lack of postmortem indicators of an individual's gender identity in life can contribute to difficulties in categorizing the individual in law enforcement databases and hinder identification efforts through current standardized means (A. Michael et al., 2021a). Based on these factors and steadily growing rates of fatal violence toward gender-variant individuals, Transgender, intersex, and gender-variant individuals represent a forensically significant population (A. Michael et al., 2021a).

Federal laws such as the Genetic Information Nondiscrimination act (*Genetic Information Discrimination*, 2021) and 2013 amendments to the Health Insurance Portability and

Accountability Act (HIPAA) (National human genome research institute, 2020) prevent employers and health insurers, respectively, from discriminating against individuals based on their genetic information. These facts are also not well known to consumers, according to a 2018 poll (Associated Press, 2018) in which 50% of adults stated that they were extremely concerned about their information being sold by for-profit companies to medical researchers or doctors. Comparisons to DNA collection and cataloging have been regarded with fearful association with eugenics and “genetic surveillance” (Kaye, 2013). The use of the term “identification” in adjudication is often misinterpreted by the public as meaning “to the exclusion of all others” (Swofford & Cino, 2018). This fact alone causes some anxiety in terms of what a genealogical identification entails (Associated Press, 2018).

The most likely people to be reported missing are those from disadvantaged populations, such as racial minorities, people in low income areas, undomiciled people, sex workers, runaways, and mentally ill people (Kiepal et al., 2012). These are the same groupings of people who report insufficient service from law enforcement when needed (Banyard et al., 2019; Petersen, 2017). Cases involving marginalized victims are often deprioritized by law enforcement and as such are distrustful of law enforcement, and criminal justice professionals at large have a limited grasp on how much more complicated these cases are and that they require and deserve special care (Banyard et al., 2019; Michael et al., 2021; Momen & Dilks, 2021; Petersen, 2017; Quesada et al., 2011; Verman, 2018). Forensic genetic genealogy has the potential to be an equalizer in the racial imbalance in both forensic databases and genealogical databases (E. Murphy & Tong, 2020; Sachs, 2019). However, marginalized groups have fears of the potential harm that can come to them through the use of DNA for identification, grounded in

racial essentialism (Soylu Yalcinkaya et al., 2017), gender essentialism (Boskey, 2020), genetic essentialism (Dar-Nimrod & Heine, 2011) and the use of these concepts to justify racism, sexism, transphobia, and eugenics (Boskey, 2020; Dar-Nimrod & Heine, 2011; Krueger, 1997; National Public Radio, 2012; Soylu Yalcinkaya et al., 2017; Sparrow, 2014). An understanding of what can and cannot legally be done with genetic information may result in more support of the use of forensic genetic genealogy by marginalized populations (*Genetic Information Discrimination*, 2021; National human genome research institute, 2020; Phillips, 2015).

The findings from this qualitative, narrative survey study showed that there is a divide between marginalized and non-marginalized individuals regarding the use of forensic genetic genealogy in the form of misinformation, fear, and differing priorities. Marginalized respondents overall had more questions in response to hypothetical scenarios in which they were asked to contribute genetic genealogical information to aid in the resolution of a cold case and were more likely to have an empathic response to a hypothetical victim from their own marginalized communities. Non-marginalized respondents showed a tendency toward curiosity about their own genealogy in response to being asked to assist in the identification of a marginalized individual. When non-marginalized respondents felt a personal connection to the hypothetical victim in the manner of having a friend or family member who belonged to the same marginalized group, none of these non-marginalized respondents volunteered any further indication of how this affected their response except to make statements in akin to “I would feel fine about it.” An overall lack of understanding about what can and can’t be done legally with an individual’s autosomal DNA was apparent across all respondents. Non-marginalized respondents were more likely to cite “privacy” as a concern about the use of forensic genetic

genealogy, with little else to qualify the specific manner of privacy about which they were concerned. Non-marginalized respondents also had a tendency towards stating that a victim's marginalized status was somehow inconsequential to the investigation into their identity, while marginalized respondents showed a more thorough thought process about how an individual's marginalization may create barriers to their identification.

From the findings, the researcher recommends that public and professional educational content be developed which addresses the misinformation revealed by respondents. The researcher also recommends the formation of an inclusive and holistic forensic genetic genealogy policy board with puts marginalized professionals in a top tier decision making position in regard to how cases involving marginalized victims are addressed. Additionally, the researcher recommends the creation of accessible forensic genetic genealogy education that addresses the needs of marginalized victims and is affordable to reduce the academic gatekeeping that affects learners from marginalized communities. Finally, the researcher recommends the establishment of a diverse forensic genetic genealogy certifying body that prioritizes the needs of cases involving marginalized victims.

Overall, findings from the study answered the research questions. Respondents revealed their motivations, fears, values, and misconceptions in a personal and thoughtful way. The researcher was able to find common themes among the responses. The gaps in understanding across respondent groups can be addressed with well-developed and thoughtful educational foundations and policy making that will set forensic genetic genealogy on a path to inclusive and compassionate human identification and cold case resolution.

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Appendix A: Participant Letter

Dear invitee:

My name is Anthony Redgrave, and I am a doctoral student of Educational Leadership at the University of New England. I am making an open call for participation in my doctoral research study entitled “**Needs-Based Standards of Practice for the Use of Forensic Genetic Genealogy in Minority-Involved Investigations.**” The purpose of this study is to determine the needs and concerns of minority and marginalized individuals regarding the use of forensic genetic genealogy.

Participants in this study will be asked to provide the following:

- Two short (2-3 paragraph each) written narratives describing their experiences as members of a minority or marginalized population that pertain to genealogical research and criminal investigations
- A description of their concerns about the (mis)use of forensic genetic genealogy from the perspective of a member of a minority or marginalized group
- A synopsis of their understanding of how forensic genetic genealogy is conducted

Findings from this study will be used in my doctoral dissertation and successive presentations and scholarly journal articles. Additionally, these data may be used as the basis for the development of policy and educational standards in forensic genetic genealogy. No direct quotes from the narratives will be used in the study to ensure the anonymity of all participants in the final publication.

A potential undue consequence of recounting experiences with forensic genetic genealogy and criminal investigations is emotional upset or harm. While participants are asked to

describe events that may be upsetting or traumatizing, **my intention with this study is to generate important data for more ethical treatment of minority and marginalized groups in this field.** A safe exit link is available within the survey site if you feel traumatized or unsafe at any time during writing your narrative and need to leave the site quickly. Participation is completely voluntary, and you may withdraw from the study at any time. You do not need to provide a justification for withdrawal. Your name, email and phone number will be collected during the survey, and this information will only be accessible to me. I may need to contact you if there is a need for follow-up questions regarding your responses, but you can choose to not be contacted if you wish.

The data collected in this survey will be fully anonymized before publication and your identity will not be revealed to anyone but me. These narrative surveys will be conducted and stored on a self-contained website dedicated solely to this study. If you have difficulty in writing your narrative responses, please contact me via email at aregrave@une.edu to arrange for a recorded Zoom interview to be transcribed later. Responses will be stored for no longer than four weeks on the site before being automatically deleted.

To participate in this study, please go to <https://study.genealogicalhumanidentification.com> and make a user account. You will be asked to read the letter of informed consent before you are able to complete the preliminary demographic survey. After completing the preliminary demographic survey, I will contact you via your self-reported preferred method of communication to provide the narrative survey through the study site.

Your participation in this research, and the data you provide, will help create inclusive standards of practice, improved educational policy, and resolution for cases involving marginalized and minority populations.

Thank you for your time and participation!

Sincerely,

Anthony Redgrave, M.S., Doctoral Student, University of New England

Appendix B: Participant Consent Form

Consent to be given digitally via the terms of service plugin (Schilling, 2021).

Consent Form

University of New England, Department of Education

Title of the Study: Needs-Based Standards of Practice for the Use of Forensic Genetic Genealogy in Minority-Involved Investigations

Researcher Name: Anthony Redgrave (aredgrave@une.edu)

Study Background

The general purpose of this research is to determine the needs and concerns of minority and marginalized individuals regarding the use of forensic genetic genealogy for minority-involved investigation. Participants in this study will be asked to describe their opinion on the use of forensic genetic genealogy, their concerns about its use from the perspective of a member of a minority or marginalized group and give a synopsis of how they believe forensic genetic genealogy research is carried out. Findings from this study will be used in the researcher's doctoral dissertation and presentation and may be used in the future for a scholarly journal article and development of policy and educational standards.

Possible Risks and Benefits of Taking Part in this Study

A potential undue consequence of recounting experiences with forensic genetic genealogy and criminal investigations is emotional upset or harm. While participants are asked to describe events that may be upsetting or traumatizing, the researcher's intention with this study is to generate important data for more ethical treatment of minority and marginalized groups in

this field. A safe exit link is available within the survey site if you feel traumatized or unsafe at any time during writing your narrative and need to leave the site quickly, and a list of crisis resources is provided in the event that participation in the survey causes mental or emotional discomfort that requires intervention.

Your Rights as a Study Participant

I understand that:

- My participation in this study will take approximately 45 minutes to two hours. I may complete the survey at my own pace and take time between completing the prompts according to my schedule and comfort.
- I will not be compensated for this study.
- My participation is voluntary, and I may discontinue participation in the study at any time by closing the survey. My refusal to participate will not result in any penalty.
- My responses will be kept confidential, to the extent permitted by law. The data will be stored in a secure location on a secure self-hosted and password-protected cloud storage platform, will be available to Anthony Redgrave, for a period of no longer than four weeks, after which time the data will be stored locally on an encrypted drive for no longer than two years before being permanently destroyed. Research reports will only present findings on a group basis, without any personally identifying information.

If you choose to participate in this research study and believe you may have suffered a research related injury, please contact aredgrave@une.edu.

If you have any questions or concerns about your rights as a research subject, you may call Mary Bachman DeSilva, Sc.D., Chair of the UNE Institutional Review Board at (207) 221-4567 or irb@une.edu.

Please save or print this agreement for your own records.

By accepting these terms, you verify that you are 18 years of age or older, you have read and understand your rights, and that you consent to participate in this online research study.

Appendix C: Survey Questions

Part 1: Preliminary survey

To be collected via the Forms plugin (Sattizahn, 2021).

Please answer all questions to the best of your ability. If you are selected for the study, you will be contacted via your preferred method of contact with further instructions.

First and last name: _____

Email address: _____

Phone number: _____

By entering "I Agree" below, you confirm that you have read the participant consent form and agree to the terms outlined (review the terms here:

<https://study.genealogicalhumanidentification.com/index.php/apps/files/?dir=/&fileid=6>)

How would you like to be contacted?

- Email
- Phone

Select from the list below as many of the descriptions that apply to you.

- Racial minority (anyone not White of European descent)
- Immigrant or child of immigrant(s)
- Sexual orientation other than heterosexual
- Gender identity other than cisgender

Select the forensic genetic genealogy stakeholder subgroup best applies to you.

- Forensic genetic genealogist

- Criminal justice professional (police, attorney, forensic scientist, anthropologist, or any other profession with the potential for interaction with a forensic investigation)
- Consumer of genealogical DNA testing products
- Family member of a missing person, victim, or perpetrator of a violent crime

If more than one stakeholder subgroup applies to you, please select a secondary subgroup.

(optional)

- Forensic genetic genealogist
- Criminal justice professional (police, attorney, forensic scientist, anthropologist, or any other profession with the potential for interaction with a forensic investigation)
- Consumer of genealogical DNA testing products
- Family member of a missing person, victim, or perpetrator of a violent crime

Part 2: Narrative Survey

Please provide a narrative of your experiences based on the prompts. Include as much detail as you can about the events that transpired, your interactions with others involved, and how you felt. Your responses will be kept confidential. No direct quotes will be used in the study and any identifying information will be anonymized before publication of the results. If at any time during this survey you feel traumatized or unsafe, please use the quick exit button to leave this page. Take as much time as you need but be aware that this survey will be closed after four weeks of collection. If you have technical problems with the site or have difficulty writing your narrative, please contact aredgrave@une.edu for alternate arrangements.

- In what ways do you self-identify as a member of a minority or marginalized group?

- What is something you wish others knew about your experience as a member of a minority or marginalized group?
- Describe your role as a (stakeholder subgroup).
- What is something you wish others knew about your experience as (stakeholder subgroup)?
- Do you consider yourself for or against the use of forensic genetic genealogy?
 - Yes
 - No
 - Undecided
 - Depends on the circumstances
- Have you taken a genealogical DNA test?
 - Yes
 - No, but I want to in the future
 - No, and I do not want to
 - No, but I haven't decided if I want to or not
- What is your biggest concern about the use of forensic genetic genealogy?
- Narrative question 1
 - (Forensic genetic genealogist) Please share your experience about a case you helped to solve. Details of what you did to solve the case are welcomed.
 - Describe any challenges or successes with solving the case, reporting your findings, and closing the case.

*If you have not yet participated in a case closure, please feel free to elaborate on your current experience.

- From this case, describe any interactions you had with various agencies or media.

*Any interactions are notable and relevant.

- Based on this case, please share any emotions you had, from start to finish. Within your comfort, feel free to elaborate on these feelings. Your responses are confidential.

- (Criminal justice professional) Share an experience about what you consider to be the most important case you have ever worked on. Details of what you contributed to the case are welcomed.

- Describe any challenges or successes with solving the case, reporting your findings, and closing the case.

*If you have not yet participated in a case closure, please feel free to elaborate on your current experience.

- From this case, describe any interactions you had with family members or media.

*Any interactions are notable and relevant.

- Based on this case, please share any emotions you had, from start to finish. Within your comfort, feel free to elaborate on these feelings. Your responses are confidential.

- (Consumer of genealogical DNA testing products) Share an experience you have had of learning something new and exciting about yourself or someone else through genealogical DNA. Details of what you learned are welcomed.
 - Describe what you did to learn more, and any challenges you faced.
*If you feel that you have not yet had a significant discovery through genealogical DNA, explain what made you choose to submit a DNA test and what you hope to learn.
 - From this experience, describe any interactions you had with family members or media.
*Any interactions are notable and relevant.
 - Based on this experience, please share any emotions you had, from start to finish. Within your comfort, feel free to elaborate on these feelings. Your responses are confidential.
- (Family member of a missing person, victim, or perpetrator of a violent crime) Share your experience of your loved one's case. Details of the case are welcomed.
 - Describe any challenges or successes you personally experienced, receiving the news of the case closure, and how it was resolved.
*If your loved one's case is not yet solved, please feel free to elaborate on your current experience.

- From this case, describe any interactions you had with investigators or media.
*Any interactions are notable and relevant.
 - Based on this case, please share any emotions you had, from start to finish. Within your comfort, feel free to elaborate on these feelings. Your responses are confidential.
- Narrative question 2
 - (Forensic genetic genealogist) Share an experience of a disagreement you had with someone about forensic genetic genealogy. Details of the experience are welcomed.
 - Describe what the disagreement was, what you said in response, how it was received, and how the situation resolved.
* If you have not personally had this kind of difficult interaction, describe your experience of hearing of another experience, how it made you feel, and what you would say in response if you were in the situation.
 - Based on this experience, share any emotions you had, from start to finish.
 - Is there anything that you wish others had understood about your experience that, if they knew, you feel they might have acted differently?
 - (Criminal justice professional) Share an experience of an interaction you have had with an uncooperative witness, informant, or family member. Details of the interaction are welcomed.

- Describe the interaction, what you said in response, how it was received, and how the situation resolved.
 - * If you have not personally had this kind of difficult interaction, describe your experience of hearing of another experience, how it made you feel, and what you would say in response if you were in the situation.
 - Based on this experience, share any emotions you had, from start to finish.
 - Is there anything that you wish others had understood about your experience that, if they knew, you feel they might have acted differently?
- (Consumer of genealogical DNA testing products) Share an experience of a struggle you have had collaborating or sharing research, genealogical and/or genetic information with others. Details of the struggle are welcomed.
- Describe the struggle, what happened, what you did, and what you did to resolve it.
 - * If you have not personally had this kind of difficult interaction, describe your experience of hearing of another experience, how it made you feel, and what you would say in response if you were in the situation.
 - Based on this experience, share any emotions you had, from start to finish.
 - Is there anything that you wish others had understood about your experience that, if they knew, you feel they might have acted differently?
- (Family member of a missing person, victim, or perpetrator of a violent crime) Share an experience you had in which someone said or did something upsetting in regard to your loved one's case. Details of the interaction are welcomed.

- Describe the struggle, what happened, what you did, and what you did to resolve it.
 - * If you have not personally had this kind of difficult interaction, describe your experience of hearing of another experience, how it made you feel, and what you would say in response if you were in the situation.
 - Based on this experience, share any emotions you had, from start to finish.
 - Is there anything that you wish others had understood about your experience that, if they knew, you feel they might have acted differently?
- Imagine that you have received an email asking for you to submit a genealogical DNA test for comparison to an unidentified decedent. What questions would you have in response?
 - Would the answers to these questions have any bearing on your decision to test and upload your DNA? How and why?
 - The email you have received includes details that the individual in question is non-White. How do you feel about this? How would you respond?
 - The email you have received indicates that the individual in question may have been a recent immigrant to the United States. How do you feel about this? How would you respond?
 - The email you have received includes details that the individual in question may have been homosexual. How do you feel about this? How would you respond?
 - The email you have received includes details that the individual in question may have been transgender. How do you feel about this? How would you respond?

- Would any of the above scenarios change your response? How and why?
- Would your answer change if the person being identified was a perpetrator of a violent crime? How and why?
- Would your answer change if the person being identified was associated with a sexual assault kit sample taken from a survivor? How and why?
- Would your answer change if the person being identified was either confirmed or assumed to be a sex worker? How and why?
- Is there anything else you want to say that was not asked?

Appendix D: Thematic Response and Marginalization Literacy Matrix

Table D1: Marginalization Literacy Matrix, Top Left

		"This would not affect my answer"	"I would be happy to help any way I can"	"Everyone deserves a fair chance"	"This doesn't/shouldn't matter"	"I would feel fine about it"	"victims/family deserve closure"	"Not relevant"	"I am not biased"	"I have a {marginalized identity} family member/friend"	"I wouldn't care"	Race literacy: literate	Race literacy: illiterate
	All	103	14	9	11	2	0	0	2	0	0	23	12
	Marginalized	42	6	2	0	2	0	0	0	0	0	17	2
	Non-marginalized	61	8	7	11	0	0	0	2	0	0	6	10
"This would not affect my answer"		14	51	5	6	0	2	0	0	0	0	28	3
	Marginalized	6	25	3	2	0	0	0	0	0	0	19	3
	Non-marginalized	8	26	2	4	0	2	0	0	0	0	9	0
"I would be happy to help any way I can"		9	5	42	2	2	3	1	2	0	0	27	5
	Marginalized	2	3	22	0	2	2	0	1	0	0	15	3
	Non-marginalized	7	2	20	2	0	1	1	1	0	0	12	2
"Everyone deserves a fair chance"		11	6	2	39	0	0	0	0	0	0	8	1
	Marginalized	0	2	0	6	0	0	0	0	0	0	0	0
	Non-marginalized	11	4	2	33	0	0	0	0	0	0	8	1
"This doesn't/shouldn't matter"		2	0	2	0	21	0	0	0	2	0	0	4
	Marginalized	2	0	2	0	8	0	0	0	0	0	0	3
	Non-marginalized	0	0	0	0	13	0	0	0	2	0	0	1
"I would feel fine about it"		0	2	3	0	0	15	0	0	0	0	9	0
	Marginalized	0	0	2	0	0	5	0	0	0	0	5	0
	Non-marginalized	0	2	1	0	0	10	0	0	0	0	4	0
"victims/family deserve closure"		0	0	1	0	0	0	12	0	0	4	11	1
	Marginalized	0	0	0	0	0	0	0	0	0	0	0	0
	Non-marginalized	0	0	1	0	0	0	2	0	0	4	11	1
"Not relevant"		2	0	2	0	0	0	0	8	0	0	4	0
	Marginalized	0	0	1	0	0	0	0	1	0	0	0	0
	Non-marginalized	2	0	1	0	0	0	0	7	0	0	4	0
"I am not biased"		0	0	0	0	2	0	0	0	8	0	2	2
	Marginalized	0	0	0	0	0	0	0	0	0	0	0	0
	Non-marginalized	0	0	0	0	2	0	0	0	8	0	2	2
"I have a {marginalized identity} family member/friend"		0	0	0	0	0	0	4	0	0	6	5	1
	Marginalized	0	0	0	0	0	0	0	0	0	1	1	0
	Non-marginalized	0	0	0	0	0	0	4	0	0	5	4	1
"I wouldn't care"		23	28	27	8	0	9	11	4	2	5	169	0
	Marginalized	17	19	15	0	0	5	0	0	0	1	81	0
	Non-marginalized	6	9	12	8	0	4	11	4	2	4	88	0
Race literacy: literate		12	3	5	1	4	0	1	0	2	1	0	56
	Marginalized	2	3	3	0	3	0	0	0	0	0	0	21
	Non-marginalized	10	0	2	1	1	0	1	0	2	1	0	35

Table D2: Marginalization Literacy Matrix, Top Right

	Immigrant literacy: literate	Immigrant literacy: illiterate	LGBTQ+ literacy: literate	LGBTQ+ literacy: illiterate	Trans literacy: literate	Trans literacy: illiterate	Sex work literacy: literate	Sex work literacy: illiterate	Personal connection to hypothetical unidentified	Increased curiosity about personal genealogy	Sense of obligation to assist	Concern about increased difficulty of the case
All Marginalized												
Non-marginalized												
"This would not affect my answer"	20	9	15	13	25	14	30	22	9	3	2	3
	17	2	15	3	19	4	14	0	7	0	2	3
	3	7	0	10	6	10	16	22	2	3	0	0
"I would be happy to help any way I can"	27	3	20	3	23	0	27	8	17	0	8	5
	17	3	20	3	20	0	20	4	16	0	8	5
	10	0	0	0	3	0	7	4	1	0	0	0
"Everyone deserves a fair chance"	18	6	12	11	18	11	27	5	1	0	1	0
	14	2	12	0	15	0	15	2	1	0	1	0
	2	4	0	11	3	11	12	3	0	0	0	0
"This doesn't/shouldn't matter"	2	5	0	8	3	6	8	6	4	3	0	0
	2	0	0	2	0	0	0	2	4	0	0	0
	0	5	0	6	3	6	8	4	0	3	0	0
"I would feel fine about it"	6	3	1	1	1	1	4	1	4	0	0	0
	1	3	1	0	1	0	0	1	0	0	0	0
	5	0	0	1	0	1	4	0	4	0	0	0
"victims/family deserve closure"	4	3	2	2	3	0	7	0	1	0	0	0
	2	0	2	0	2	0	2	0	0	0	0	0
	2	3	0	2	1	0	5	0	1	0	0	0
"Not relevant"	0	1	0	2	0	2	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	2	0	2	0	1	0	0	0	0
"I am not biased"	1	0	0	0	1	0	1	7	0	0	0	0
	1	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	1	0	1	6	0	0	0	0
"I have a {marginalized identity} family member/friend"	4	2	0	2	0	0	4	0	8	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	4	2	0	2	0	0	4	0	8	0	0	0
"I wouldn't care"	1	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	1	0	0	0	0	0
Race literacy: literate	77	14	49	21	70	14	56	14	20	7	10	13
	56	0	49	0	56	0	49	0	17	3	10	13
	21	14	0	21	14	14	7	14	3	4	0	0
Race literacy: illiterate	17	42	21	35	21	7	21	7	12	4	0	0
	7	14	21	0	21	0	7	0	7	2	0	0
	7	28	0	35	0	7	14	7	5	2	0	0

