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Reducing Homonegative Prejudice towards Gay and Bisexual Men by Targeting Diverse Sexual Orientation Beliefs: A Replication and Extension Study

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Reducing Homonegative Prejudice towards Gay and Bisexual Men by Targeting Diverse Sexual Orientation Beliefs: A Replication and Extension Study

A Dissertation Presented for the
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DEDICATION

This dissertation is dedicated to all of the LGBTQ youth I have ever had the privilege of working with at Kaleidoscope Youth Center in Columbus, Ohio. Always remember that you are strong, you are loved, and you are perfect just the way you are.

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ABSTRACT

This study aimed to replicate and extend the first true experiment to investigate the impact of diverse sexual orientation (SO) beliefs on homonegativity (Fry et al., 2020). We performed an experiment to determine if targeting multiple types of SO beliefs could be more effective in reducing homonegative prejudice towards gay men, binegativity towards bisexual men, and infrahumanization towards gay and bisexual men than just focusing on beliefs about biogenetic determinants of SO. We randomly assigned 200 participants (57% men, 78% white) to a treatment or control condition. Participants in a treatment condition read an essay that summarized: (1) research implying that SO is biogenetically determined; (2) research implying that SO is socially constructed and countering beliefs regarding the discreteness, homogeneity, and informativeness of SO groups; or (3) research implying that SO is biogenetically determined as well as research implying that SO groups are socially constructed and not particularly discrete, homogenous, or informative. We expected that participants in both conditions targeting diverse beliefs pertaining to the social construction of SO would report the greatest decreases in beliefs in the discreteness, homogeneity, and informativeness of SO groups, in homonegative prejudice, and in binegativity. We expected that only participants in the condition excluding biogenetic determinants would report the greatest decreases in infrahumanization, and any observed changes would still be detectable a week after the intervention. We did not observe predicted shifts in SO beliefs. Only participants in the condition discussing biogenetic determinants reported significant decreases in homonegative prejudice and binegativity. There were no changes in infrahumanization.

Observed changes were still present a week after the intervention. We discuss the possibility that educational interventions targeting SO beliefs may produce long-lasting reductions in prejudice towards sexual minorities (SMs).

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CHAPTER 1

INTRODUCTION

Sexual minorities[1] experience a number of mental health disparities (e.g., suicide, substance abuse, psychological disorders) compared to their heterosexual peers (e.g., Hottes et al., 2016; King et al., 2008; Marshal et al., 2008). These negative outcomes are thought to be a result of the unique environmental stressors SMs endure on a regular basis, one of which is homonegative prejudice (Meyer, 2003). Since one mechanism that may lead to this prejudice is heterosexual people's beliefs about sexual orientation (e.g., Grzanka et al., 2016; Haslam & Levy, 2006), the current study aimed to target heterosexuals' beliefs about SO in order to reduce homonegative prejudice through SO beliefs.

More specifically, this study targeted beliefs related to psychological essentialism (i.e., the belief that belonging to a SO category is *immutable* – difficult to change, fixed early in life, and biologically-based; Bohan, 1996) and social constructionism (i.e., the belief that SO labels are developed by people and are different across cultures, times, and locations; Bohan, 1996) as they relate to SO beliefs. While there has certainly been considerable scholarship exploring SO from social constructionist perspectives (Bohan, 1996), essentialism has often been the framework guiding research and theory on SO over the last 30 years (Bailey et al., 2016; Bohan, 1996; Waidzunas, 2015). During the 1980s, the scientific community shifted its focus to conducting research that could support essentialist arguments of SO (e.g., people are born with their SO; Waidzunas, 2015). Research has gone as far as to search for the existence of a "gay

[1] For the sake of inclusivity, we use the term *sexual minority* (SM) to refer to all people who identify with a SO other than heterosexual/straight. This term includes lesbian, gay, and bisexual (LGB) people, as well as anyone else who does not identify their SO as heterosexual/straight.

gene" in gay men (Hamer et al., 1993; Sanders et al., 2015; Yu et al., 2015) and differences in brain structures between SMs and heterosexuals (LeVay, 1991; Savic & Lindstrom, 2008). While there is still no true consensus on what "causes" SO, much of the scientific community now believes that the origins of SO are biological, at least to some extent (Bailey et al., 2016; LeVay, 2017). Public opinion in the U.S. has also shifted over the last three decades; the majority of people no longer believe that SO is a choice (Washington Post-ABC News, 2014), an attribute of oneself that can be changed (Pew Research Center, 2015), or the result of upbringing and environment (Gallup, 2019).

Essentialist arguments of SO have often been used in appeals for equal rights (Diamond & Rosky, 2016; Osmundson, 2011; Waidzunas, 2015), and research shows that such approaches may be effective in changing homonegative attitudes, at least to an extent (Haslam & Levy, 2006; Jayaratne et al., 2006). However, scholars from various fields of study have argued that essentialist arguments are not the most effective strategy for reducing homonegative prejudice and should no longer be utilized for a variety of reasons (Bailey et al., 2016; Diamond & Rosky, 2016; Osmundson, 2011; Stein, 2011). For example, these authors argue that many of the claims that essentialist arguments make are not entirely accurate or scientific, and such strategies have had limited utility in the legal system. While there is no doubt that a relationship between heterosexuals' beliefs in the innateness of SO and their attitudes towards SMs exists, various studies have thrown into question the assumption that immutability beliefs *cause* reductions in homonegative prejudice (Falomir-Pichastor & Hegarty, 2014; Hegarty, 2002, 2010; Hegarty & Golden, 2008).

A body of research has suggested that SO beliefs are far more complex than the widely held one-dimensional conceptualization of essentialist beliefs centered on biological bases of SO; rather, SO beliefs are multidimensional in nature (Haslam & Levy, 2006; Haslam et al., 2000; Haslam et al., 2002; Hegarty, 2002; Hegarty & Pratto, 2001). Arseneau et al. (2013) developed the Sexual Orientation Beliefs Scale (SOBS) to investigate such multidimensional beliefs. In addition to *essentialist* beliefs (i.e., beliefs that SO categories are inherent and natural), the SOBS is unique in that it was developed to consider both *social constructionist* beliefs (i.e., that SO categories are created by people uniquely within their specific socio-historical contexts) and *constructivist* beliefs (i.e., that people have choice in determining to which SO category or categories they belong). The SOBS is made up of four unique, empirically-derived dimensions of SO categories: *Naturalness* (i.e., beliefs that SO is inborn and immutable), *Discreteness* (i.e., SO categories are distinct with clear boundaries between them), *Homogeneity* (i.e., people within a SO category are all the same), and *Informativeness* (i.e., knowing a person's SO says a lot about who that individual is). Through latent profile analysis using the SOBS, Grzanka et al. (2016) discovered that even those who held the highest levels of homonegative attitudes endorsed Naturalness beliefs. Notably, endorsement of the three other types of SO beliefs – Discreteness, Homogeneity, and Informativeness – were linked to greater homonegative prejudice.

With Grzanka et al. (2016) findings in mind, the current study asked: Could interventions that specifically target these types of SO beliefs reduce homonegative prejudice? And, if so, could these interventions be *more* effective than those targeting Naturalness beliefs? Fry et al. (2020) extended and applied Grzanka et al. (2016) findings by conducting the first true

experiment to investigate the impact of diverse SO beliefs on homonegative prejudice. In addition to replicating Fry et al. (2020) findings, we aimed to address limitations of their study by making several revisions in the study's design. We also extended their study by adding new constructs and measures that enabled us to explore new research questions.

Minority Stress and Negative Outcomes

Mental health disparities among SMs are pervasive and have been well-documented across the lifespan (see Meyer, 2003, for review). According to Meyer's (2003) Minority Stress Model, these mental health disparities are the result of experiencing *minority stress* – unique stressors resulting from the prejudice, stigma, and discrimination that lesbian, gay, and bisexual (LGB) individuals must endure on a regular basis. The stressful and hostile social environments that these factors create lead to negative mental health outcomes for SMs. In other words, being a SM does not result in poorer mental health; it is the way people are *treated* based on their SM identity that leads to these disparities.

An array of minority stressors has been well-documented in the literature (Meyer, 2003). For example, sexual minority youth (SMY) experience rejection that leads to homelessness. They frequently run away because their families reject them, and they are often forced out of the home by their parents (Durso & Gates, 2012). Sexual minority youth account for 26% of all youth utilizing housing programs. Homeless SMY are less likely to stay in a shelter than their heterosexual peers, putting themselves at risk by staying with a stranger (Rice et al., 2013) or in a public place (Rice et al., 2015).

Sexual minority youth also endure substantial victimization. In 2017, 70% of lesbian, gay, bisexual, transgender, and queer[2] (LGBTQ) youth reported being verbally harassed at school based on their SO in the last year (Kosciw et al., 2018). Nearly 60% felt unsafe at school, almost 30% were physically harassed, and 12% were physically assaulted. Sexual minority youth are also more likely to experience victimization for prolonged periods of time, even when controlling for demographic variables (Kaufman et al., 2019). This prolonged victimization is associated with high levels of anxiety.

Sexual minorities report substantial experiences of victimization in adulthood, as well. Katz-Wise and Hyde's (2012) meta-analysis found that SMs experience more victimization than their heterosexual peers. Fifty-five percent experienced verbal harassment, and 45% experienced sexual harassment. According to Federal Bureau of Investigation (FBI) data in the U.S., estimated hate-motivated crime rates (e.g., physical assaults) are higher for lesbian women (10 in 100,000) and gay men (26 in 100,000) than racial and religious minorities (Stotzer, 2012). In one urban sample, one in three SMs reported having had a hate crime experience before with an average of nearly five events in their lifetime (Burks et al., 2018). The most common hate crime experience was physical assault.

Sexual minorities experience discrimination throughout their lives. In 2017, 62% of LGBTQ students reported experiencing LGBTQ-related discrimination at school (e.g., discipline for public displays of affection, unable to attend a dance with a same-sex partner; Kosciw et al., 2018). Among adults, 41% report experiencing discrimination (Katz-Wise & Hyde, 2012). A large body of research (e.g., self-report surveys, income disparity data, controlled experiments)

[2] Our study did not address beliefs about gender identity. However, we do cite research in this paper that does not separate the experiences of LGB individuals and transgender individuals.

has consistently shown that SO-based workplace discrimination in the U.S. is pervasive (Badgett et al., 2007; Sears & Mallory, 2011). Gay men earn up to 32% less money than heterosexual men with similar qualifications (Badgett et al., 2007). In 2008, 27% of LGBT employees said that they had experienced discrimination at work in the last five years (Sears & Mallory, 2011). Workplace discrimination is often legal since SMs do not have legal protections in most states (Human Rights Campaign, 2022).

Sexual minorities frequently experience microaggressions – "the brief and commonplace daily verbal, behavioral, and environmental indignities, whether intentional or unintentional, that communicate hostile, derogatory, or negative racial, gender, sexual-orientation, and religious slights and insults to the target person or group" (Sue, 2010, p. 5). Sexual minorities experience a variety of microaggressions on a daily basis (Platt & Lenzen, 2013), and bisexual individuals report experiencing some microaggressions more than lesbian women and gay men (Sarno & Wright, 2013). They occur in an array of settings, including the workplace (Galupo & Resnick, 2016), academic training programs (Bryan, 2018), and psychotherapy (Shelton & Delgado-Romero, 2011).

Minority stressors lead to an array of mental health disparities for SMs (Meyer, 2003). For example, suicidality (i.e., suicidal ideation, intent/plans, and attempts) is more prevalent among SMY when compared to their heterosexual peers (Marshal et al., 2011). Marshall et al. meta-analysis showed that, on average, 28% of SMY reported a history of suicidality, compared to 12% of heterosexual youth. Sexual minority youth were nearly three times more likely to endorse a history of suicidality, even after controlling for other variables. Similarly, Miranda

Mendizabal's (2017) meta-analysis found that SMY were more than twice as likely to attempt suicide than their heterosexual peers.

Sexual minorities continue to be at greater risk for suicide attempts into adulthood. While a meta-analysis did not find evidence to suggest that SMs are at an elevated risk for deliberate self-harm behaviors (e.g., cutting without suicide intent), it revealed that SMs were twice as likely to attempt suicide than heterosexuals (King et al., 2008).[3] King et al. noted that lifetime prevalence of having a suicide attempt was especially high for gay and bisexual men. Community-based surveys have shown that one in five LGB adults report at least one previous suicide attempt (Hottes et al., 2016).

Sexual minorities are also at greater risk for substance abuse. King et al. (2008) found that LGB adults were 1.5 times more likely to abuse alcohol and other drugs than heterosexual adults. This meta-analysis found that lesbian and bisexual women were especially at elevated risk for alcohol and drug dependence and having a substance abuse disorder. Cochran et al. (2004) found that adults who have had same-sex sexual partners were more likely to report lifetime drug use. Marijuana use was especially elevated, such that these adults were more likely to meet the criteria for marijuana dependence syndrome than those who never had same-sex sexual partners. Men were more likely to abuse heroine and report daily drug use, while women were more likely to abuse analgesics. Cocaine use was elevated for both men and women.

These disparities in substance use begin prior to adulthood (Marshal et al., 2008). Marshal et al. meta-analysis found that SMY were almost twice as likely to use substances than their heterosexual peers. The risk was greater for bisexual and lesbian girl youth. Sexual minority

[3] It should be noted that some youth were part of this meta-analysis, although the majority of the studies included only adult participants.

youth were more likely to smoke cigarettes, drink alcohol, use marijuana and cocaine, and inject IV drugs.

Meta-analyses have shown that SMs are also at greater risk for developing psychological disorders than heterosexuals. LGB adults are at least 1.5 times more likely to develop depression or an anxiety disorder (King et al., 2008) and are more likely to have at least one psychological disorder in the last year (Mays & Cochran, 2001). At any point over the course of their life, lesbian women and gay men are approximately 2.5 times more likely to have had a psychological disorder (Meyer, 2003).

Finding ways to reduce heterosexual people's homonegative prejudice is essential. Reducing prejudice, stigma, and discrimination towards SMs could improve mental health outcomes in this population (Meyer, 2003). One mechanism that might lead to these negative attitudes and behaviors towards SMs is heterosexual people's beliefs about SO. An extensive body of research has shown that heterosexual people's beliefs about SO is associated with their levels of homonegative prejudice (e.g., Falomir-Pichastor & Hegarty, 2014; Grzanka et al., 2016; Haslam & Levy, 2006; Haslam et al., 2002; Hegarty, 2002, 2010; Hegarty & Pratto, 2001; Jang & Lee, 2014; Jayaratne et al., 2006; Lewis, 2009; Whitley, 1990). Rather than targeting heterosexuals' attitudes or behaviors directly, another intervention may be to target people's beliefs about SO instead. This is what the current study aimed to do.

Psychological Essentialism and Social Constructionism

The current study utilized psychological essentialism and social constructionism in its interventions to reduce homonegative prejudice. Therefore, we first explain both of these perspectives on social categories and introduce the widely held essentialist argument of SO.

Opposing Perspectives on Social Categories

Psychological essentialism and social constructionism are two different perspectives on social categories – so different that they are often assumed to be polar opposite beliefs (Bohan, 1996). Psychological essentialism is reflected by beliefs that a social category membership, such as SO, is natural. Essentialist views propose that traits and qualities are "resident within the individual" (Bohan, 1993, p. 6). Aspects of the person are "fundamental attributes that are conceived as internal, persistent, and generally separate from the on-going experience of interaction with the daily sociopolitical contexts of one's life" (p. 7). When applied to SO specifically, Bohan (1996) describes psychological essentialism as follows:

> From an essentialist stance, then, sexual orientation is an extant trait of the individual, a core aspect of one's character; such an identity is grounded in the sense that sexuality itself—and, more specifically, the sex of one's partner—is definitive of one's being. Although attitudes toward variations in sexual orientation may differ across time and culture, these identities themselves have existed always and everywhere, and thus represent a fundamental, essential form or manifestation of human experience. (p. 6)

As Bohan notes, essentialism argues that SO categories have always been the same, with the same meanings, throughout history and across cultures. Even if a person does not acknowledge their SO, or their culture fails to give it a meaning, their SO still exists as a freestanding quality. Therefore, an essentialist would argue that belonging to a SO category is natural, biological, and fixed.

Social constructionism, however, posits that a trait or quality is "not resident in the person but exists in those interactions that are socially construed" (Bohan, 1993, p. 7). According

to Bohan (1996), constructionism states that we cannot know reality directly. Instead, we must come to what we understand as "truth" by using the information available to us. In doing so, we are influenced by beliefs and interpretations in our culture, the language we use, and the categories we create to define our reality. Therefore, "Our experience is thus formed by discourse rather than by reality itself" (Bohan, 1996, p. 7). When applied to SO specifically, Bohan describes social constructionism as follows:

> Applied to sexual orientation, the constructionist approach suggests that sexual orientation is not a trait or quality of individuals. Rather, it is a socially constructed notion that imbues certain acts and experiences with a particular meaning: they are taken as expressions of an identity grounded in (what we term) sexual orientation.
>
> […] Viewed from a different historical or cultural position, these same phenomena [erotic and affective attachments] would carry a very different meaning. Same- or other-sex attachments would not necessarily be seen as constituting identity; indeed, there might be no construct of sexual orientation at all, no sense that the sex of one's partner is significant to one's sense of self." (p. 7)

Rather than being immutable and universal categories of human experience, SO labels (e.g., gay, lesbian) originate from particular sociohistorical contexts. Therefore, a social constructionist would argue that the labels we use to describe SO are developed by people and are different across cultures, times, and locations.

Psychological Essentialism's Influence on SO Research and Activism

While essentialism has come in and out of popularity over time, psychology as a field has adopted both social constructionist and essentialist frameworks for research and theory

pertaining to social categories (e.g., sex, gender; Fausto-Sterling, 2000; Hyde et al., 2019). However, Bohan (1996) argues that this has not been the case with SO. She suggests that while there has been considerable scholarship exploring SO from social constructionist perspectives (e.g., social psychology research), psychology has largely favored essentialism as its framework of choice for research and theory pertaining to SO. According to Bohan, most psychological research on SO is based in the assumption that researchers can find and describe the "true" nature of SM experiences. Furthermore, the majority of research regarding the psychology of SO works from the essentialist position that SO is a core quality that every person must come to terms with in some way. In this way, psychology has reflected society's belief that SO is an essential attribute of the self—the field has been shaped by this cultural belief while, at the same time, contributing to it. While the essentialist approach has received extensive criticism (see De Cecco & Elia, 1993; Diamond & Rosky, 2016; Stein, 2011, 1990), research based in essentialism has received widespread media attention (LeVay, 2017; Terry, 1999; Wilcox, 2003). Meanwhile, the social constructionist approach is less well-known to the lay public and has not directed the psychological literature in significant ways (Bohan, 1996).

We wish to acknowledge that Bohan's (1996) argument is overgeneralized, both failing to recognize the unique contributions of certain specializations in the field of psychology (e.g., social psychology) while also neglecting to acknowledge the existence of scholarship on SO that has *combined* social constructionist and essentialist frameworks (e.g., Sexual Configurations Theory; van Anders, 2015). However, the research psychology has produced pertaining to the origins of SO does suggest an essentialist leaning (Bailey et al., 2016). Most relevant to the

current study, research on people's beliefs about SO has focused primarily on their essentialist beliefs with little attention paid to social constructionist beliefs (Arseneau et al., 2013).

The essentialist argument of SO has regularly been used in appeals for equal rights, as well. Legal cases have utilized beliefs about the naturalness of being a SM as a strategy to appeal for equal treatment in the U.S. (Diamond & Rosky, 2016; Hacking, 2002; Mucciaroni & Killian, 2004; Osmundson, 2011; Waidzunas, 2015). Essentialist beliefs are also predominant in popular culture, perhaps one of the most notable examples being Lady Gaga's hit song *Born This Way* (Gaga, 2011). Gaga argues that there is nothing wrong with being a SM ("I'm beautiful in my way / 'Cause God makes no mistakes / I'm on the right track, baby"), because SMs are born with their SO ("I was born this way"). Pop stars Macklemore, Ryan Lewis, and Mary Lambert echo Gaga's message in their hit song *Same Love* with a not-so-subtle argument that SMs cannot change their SO ("And I can't change / Even if I tried / Even if I wanted to;" Haggerty et al., 2012). Washington state's 2012 campaign to legalize same-sex marriage adopted the song as its anthem (McKinley Jr., 2013).

The "Born This Way" Argument of SO

Cultural shifts. Over the past 30 years, Americans' views on SO and SMs have shifted dramatically. While reducing homonegative prejudice towards SMs to improve their mental health outcomes is still essential (Meyer, 2003), Americans have been developing more accepting views of SMs than they held in the past (Brown, 2017). When Gallup (2019) first began polling on SO in 1977, Americans were evenly divided on whether or not "gay or lesbian relations between consenting adults should or should not be legal" (43% legal versus 43% not legal; para. 1). Today, nearly three in four Americans say that same-sex relations should be legal,

and most Americans (51%) say that "new civil rights laws are needed to reduce discrimination" (Gallup, 2019, para. 8). Gallup found that only 14% of Americans supported gay adoption rights in 1977; today, support has risen to 75% (McCarthy, 2019). The overwhelming majority of Americans (93%) now believe that SMs should have equal employment opportunities. In 2017, 70% of Americans believed that society should accept homosexuality, reflecting a 7-percentage point increase in just one year (Pew Research Center, 2017b). For the first time, the majority of Republicans (54%) say that homosexuality should be accepted. Furthermore, the majority of Americans (57%) report that they would not be upset if they had a child who told them they were gay or lesbian (39% would be upset; Pew Research Center, 2015). Considering that 89% said that they would be upset when asked the same question in a 1985 *Los Angeles Times* poll, the difference over the last three decades is quite remarkable. Sexual minorities are noticing the shift. In 2013, a Pew Research Center survey found that 92% of LGBT-identifying adults felt that society had become more accepting of them over the last 10 years (Brown, 2017).

Arguably, the most profound shift in Americans' views on SO and SMs has been in the growing support for same-sex marriage (Morini, 2017). Support for same-sex marriage is higher than ever before (Pew Research Center, 2017a). According to Gallup (2019), 63% of Americans believe that same-sex marriages should be recognized as valid. Pew Research Center (2019) polling has found similar support (61% favor versus 31% oppose). For the first time, the majority of Baby Boomers and Black Americans report supporting same-sex marriage (Pew Research Center, 2017a). While the majority of Republicans and Republican-leaning independents still do not support same-sex marriage, they are evenly divided on the issue for the first time (48% oppose versus 47% support). Nearly two in three white mainline Protestants favor same-sex

marriage with Catholics not far behind at 61% support (Pew Research Center, 2019). While only 29% of white evangelical Protestants support same-sex marriage, support among this group has doubled over the last decade.

This change in public opinion has been profound and rapid, especially given that, as recently as 2010, more Americans opposed (48%) than supported (42%) same-sex marriage (Pew Research Center, 2017a). Through his analysis of the evolution of same-sex marriage and SM rights in American public opinion, Morini (2017) found that, while younger Americans are the most supportive, there has been a clear shift towards support for same-sex marriage across all age groups in the U.S. Although data show that Americans are becoming more liberal on social issues in general, the largest shift over the last two decades has been in attitudes towards same-sex relations, with a solid majority now finding same-sex relations morally acceptable. Morini concluded, "Public attitudes towards gay and lesbian rights represent one of the quickest evolutions in the history of American moral values. The politics of the issue have shifted very fast and gay marriage has widely become the status quo" (para. 14).

Interestingly, Americans' beliefs about the origins and immutability of SO itself have also shifted over the last few decades. Every 10 years since 1994, a national poll has asked, "Do you think being homosexual is something that people choose to be, or do you think it's just the way they are?" (Washington Post-ABC News, 2014, p. 16). Most recently, in 2014, the majority of respondents (65%) answered that "being homosexual" is "just the way they are," compared to 25% who reported that "being homosexual" is "something that people choose." These results were different from 2004 (57% "way they are" versus 33% "choice") and 1994 (49% "way they are" versus 40% "choice"). Americans are also more likely to believe that SO is immutable than

they believed in the past. In the most recent Pew Research Center (2015) poll on this topic, 60% of respondents reported that a gay or lesbian person's SO cannot be changed, compared to just one in three people who said that SO can be changed. As recently as 2003, Americans were evenly divided on this question.

The existence of a cultural shift in beliefs about SO is even clearer when considering public opinion in the 1970s and 1980s. Leitenberg and Slavin (1983) asked students taking an introductory psychology course "for how many homosexuals did they think the following statement was true: 'Are they born that way?'" (p. 342). Nearly 47% answered "few or none," while fewer than 10% answered "all or almost all." In 1977, Gallup (2019) asked respondents, "In your view, is being gay or lesbian something a person is born with, or due to factors such as upbringing and environment?" (para. 7). The majority (56%) believed that upbringing and environment lead to people becoming gay or lesbian, while few (13%) believed that people are born gay or lesbian. In 2018, 50% believed that people are born gay or lesbian, while 30% believed that upbringing and environment lead to being gay or lesbian. Indeed, Americans have shifted towards believing that SMs are born with their SO and away from believing that SO is a choice (Washington Post-ABC News, 2014), an attribute of oneself that can be changed (Pew Research Center, 2015), or the result of upbringing and environment (Gallup, 2019).

How did these cultural shifts occur? One may wonder: how did these dramatic cultural shifts occur? And, when considered in the context of other social issues (Morini, 2017), how did they occur so quickly? According to Waidzunas (2015), part of the answer lies in sexual orientation change efforts (SOCE) to "cure" people of same-sex desire. Waidzunas argues that SOCE (better known as "conversion therapies") used science in an attempt to prove their

legitimacy. While the "evidence" they present is mere pseudoscience, these SOCE have had a strong impact on both the Gay Rights Movement and the focus of scientific research. Prior to the 1980s, the Gay Rights Movement focused on critiquing social norms and sexual liberation. In reaction to SOCE, advocates of SM rights and the scientific community shifted their focus to arguing for the innateness—and therefore immutability—of SO through biological research. By finding biological evidence, advocates and science could argue that SO is an attribute that cannot be changed and one that is not a choice, contrary to what SOCE were attempting to prove. Indeed, SOCE were successful in creating changes, but not in the ways they had ever intended.

It is likely that broader social forces have contributed to this shift, as well. For instance, feminist theories of "biomedicalization" (Clarke et al., 2003, 2010) describe how modern social life, including beliefs, behavior, social institutions, and knowledge, has become organized on biogenetic terms derived from advanced biomedical technosciences. According to Clarke et al. (2003), "The shift to biomedicalization is a shift from enhanced control over external nature (i.e., the world around us) to the harnessing and transformation of internal nature (i.e., biological processes of human and nonhuman life forms), often transforming 'life itself'" (p. 164). Clarke et al. suggest that biomedicalization began around 1985, but it has accelerated since the completion of the first map of the human genome in 2001.

Terry (1999) proposes another potential social force in her exploration of "how homosexuality, once considered an obscure and unsettling violation, has become a topic of obsessive national interest in American culture" (p. 1). Terry argues that scientists and physicians have been influential in bringing SMs into the public spotlight and influencing opinion, discourse, and public policies regarding homosexuality. The gay community has been

receptive to science and medicine's findings, in hopes that the new knowledge they generate will be effective in reducing homonegative prejudice (even though this has not always the case).

Indeed, decades of research on sexuality has provided evidence for all of these arguments. Through studies of genetics, endocrinology, and physical attributes, a large body of research has concentrated on generating evidence that SO is biological and innate (Bailey et al., 2016; LeVay, 2017). For instance, ever since Hamer et al. (1993) reported the first potential genetic linkage to SO in gay men, numerous studies (e.g., Sanders et al., 2015; Yu et al., 2015) have examined the genetic structures of gay men in hopes of finally discovering a "gay gene" to show that SO is inherited (Allen, 2014; Terry, 1999). In alignment with Terry's (1999) argument that science has brought SMs into the public eye, these studies have received extensive media attention (Wilcox, 2003). When LeVay (1991) published his groundbreaking findings that the anterior hypothalamus was smaller in deceased gay men's brains than in deceased heterosexual men's brains, most leading U.S. newspapers published stories about the new study (LeVay, 2017), marking the beginning of the media's preoccupation with research on the biological origins of SO (Wilcox, 2003). Other biological research (e.g., endocrinology studies) has also received media attention. We provide a thorough review of the biological research on SO over the last three decades in an upcoming section.

While there is still no true consensus, much of the scientific community agrees that the origins of SO are biological, at least to some extent (Bailey et al., 2016; LeVay, 2017). Bailey et al. (2016) state that, while "the most scientifically plausible causal hypotheses are difficult to test" (p. 46), there is more evidence supporting biological causes of SO (e.g., genetics) than social causes (e.g., early sexual experiences). LeVay (2017) is more assertive in his position,

stating, “I argue that the same processes that are involved in the biological development of our bodies and brains as male or female are also involved in the development of sexual orientation” (p. xiv). At the end of his book, LeVay elaborates on his position:

> Sexual orientation is an aspect of gender that emerges from the prenatal sexual differentiation of the brain. Whether a person ends up gay, straight, or bisexual depends in large part on how this process of biological differentiation goes forward, the lead actors being genes, sex hormones, and the brain systems that they influence.
>
> […] Currently, in some form or another, it [this theory] represents a near-consensus view among scientists who study sexual orientation. (p. 163)

It should be noted that, even though LeVay suggests that scientists who study SO agree with his biological theory, there is no way to entirely rule out non-biological influences (i.e., environmental factors, personal choice). Even he acknowledges that the origins of SO are likely multifactorial.

Since around the 1990s, the gay community has largely been in agreement with the scientific community that the origins of SO are biological in nature (Burr, 1993; Terry, 1999). Burr (1993), a gay journalist, argued the following in an article in the *Atlantic Monthly*:

> Homosexuality’s invitation to biology has been standing for years. Homosexuals have long maintained that sexual orientation, far from being a personal choice or lifestyle (as it is often called), is something neither chosen nor changeable; heterosexuals who have made their peace with homosexuals have often done so by accepting that premise. The very term “sexual orientation,” which in the 1980s replaced “sexual preference,” asserts the deeply rooted nature of sexual desire and love. It implies biology. (p. 48)

Burr's perspective is notable for a couple of reasons. First, Burr provides a primary source example supporting Waidzunas's (2015) argument that SOCE had a powerful effect in pointing advocates of SM rights in the direction of biology. Burr's assumptions are that "biology ≠ choice" and "biology = immutability." By embracing biology, one can now argue that there is no personal choice in SO and that SO cannot be changed, contrary to what SOCE argue that they can do. Second, Burr's (1993) perspective is an example of an assumption widely held by the scientific community and gay rights activists to this day: "biology = acceptance by heterosexuals."

These biological assumptions of SO are so deeply ingrained in the gay community that SMs who challenge them face scrutiny. For example, *Sex in the City* actress Cynthia Nixon received pushback in 2012 after describing her SO as "a choice" to *New York Times Magazine* (Witchel, 2012). In her interview, Nixon was quoted as follows:

> I gave a speech recently, an empowerment speech to a gay audience, and it included the line "I've been straight and I've been gay, and gay is better." And they tried to get me to change it, because they said it implies that homosexuality can be a choice. And for me, it is a choice. I understand that for many people it's not, but for me it's a choice, and you don't get to define my gayness for me. A certain section of our community is very concerned that it not be seen as a choice, because if it's a choice, then we could opt out. I say it doesn't matter if we flew here or swam here, it matters that we are here and we are one group and let us stop trying to make a litmus test for who is considered gay and who is not […] Why can't it be a choice? Why is that any less legitimate? It seems we're just

ceding this point to bigots who are demanding it, and I don't think that they should define the terms of the debate. (para. 21)

Jowett and Barker (2018) investigated how a gay media outlet's readers responded to Nixon's remarks by examining online comments in response to an article (McCormic, 2012) about Nixon's interview. Jowett and Barker (2018) conducted a discursive analysis of 198 online comments to identify themes in readers' responses – themes suggesting that SMs largely agree with Burr (1993). Some suggested that biological essentialism was common knowledge by appealing to scientific facts (e.g., "It's been proven that it's part of your DNA, not a matter of choice," "catch up on your science") or common sense (e.g., "If we had a choice to be gay, be ridiculed by others, beaten because we are different who on this planet would 'choose' to be gay;" Jowett & Barker, 2018, pp. 773-774). Others claimed that Nixon was incorrect in stating that she had a choice and was not really gay (e.g., "Obviously Nixon should identify as a bi woman with a preference for women;" p. 775). Some worried that her comments were inherently dangerous because they provided leverage for "bigots" (e.g., "Cynthia Nixon's stupidity and irresponsibility is quite breath-taking […] All the religious lunatic and bigots are going to jump on her incredibly irresponsible words and use them as an excuse to bash us all;" p. 777).

Is the "Born This Way" strategy effective? Empirical evidence suggests that laypeople's assumptions about the effectiveness of the "Born This Way" argument are accurate, at least to an extent. Prior research examining heterosexuals' beliefs about SO and their correlates with attitudes towards SMs has mainly focused on the belief that SO is innate (e.g., Haslam & Levy, 2006; Haslam et al., 2002; Hegarty, 2002; Hegarty & Pratto, 2001; Jang & Lee,

2014; Jayaratne et al., 2006; Lewis, 2009; Whitley, 1990). This extensive body of work does, in fact, suggest that believing that SO is innate is predictive of positive attitudes towards SMs.

A series of studies performed with college students yielded similar findings. Whitley (1990) found that students who perceived SMs as having more control over the causes of their SO held greater antigay attitudes. Whitley speculated that this may be part of the mechanism by which college sexuality courses reduce these attitudes, given that sexuality textbooks imply uncontrollability (see Weiner et al., 1988) of SO through their presentation of biological theories. Hegarty and Pratto (2001) found that believing that SO was immutable was positively correlated with greater tolerance of lesbian women and gay men. Hegarty (2002) replicated this finding in another sample. Similarly, Haslam et al. (2002) and Haslam and Levy (2006) both found that tolerance was positively correlated with college students' beliefs in the immutability and biological basis of homosexuality.

Jayaratne et al. (2006) findings were congruent with these studies, this time using a large representative sample. Jayaratne et al. recruited 600 white Americans through random digit dialing and interviewed them by phone to explore the relationship between their genetic lay theories of SO and attitudes towards gay men and lesbian women. As predicted, endorsement of genetic lay theories of SO was associated with less prejudice toward gay men and lesbian women, even while controlling for a variety of demographic variables. Jayaratne et al. also asked respondents to indicate how bothered they would be if a hypothetical daughter or son told them that they were lesbian or gay. The more participants endorsed genetic explanations for SO, the less upset they reported they would be if their hypothetical child told them that they were lesbian or gay.

Jang and Lee (2014) took this line of research one step further. Using a true experimental design, they showed that they could prime participants' genetic explanations for SO, thereby producing a strong positive correlation between genetic explanations and attitudes towards SMs. Jang and Lee recruited a national sample of nearly 300 people to participate in an online experiment using Lady Gaga's song *Born This Way* (Gaga, 2011) to prime genetic explanations of SO. They randomly assigned participants to either (a) listen to the song with lyrics displayed on their screen, (b) listen to the song, (c) listen to the instrumental version of the song without lyrics, or (d) a control group. Interestingly, participants assigned to the two conditions who listened to *Born This Way* with lyrics endorsed genetic explanations of SO and more favorable attitudes towards SMs to a greater extent. The researchers concluded:

> Participants who listened to "Born This Way" [with lyrics] evaluated gay rights policies with a heavier weight on genetic explanations of gay origins […] Although listening to the song did not change attitudes toward gays directly, the implications of the results are not so minimal. (p. 126)

However, the researchers acknowledged that a limitation of their study was having no way to know the duration of the song's effects – a major limitation that the current study aimed to avoid.

One thing is clear, though; people who believe that SMs are born with their SO are more likely to support a broad variety of LGB rights (Lewis, 2009). Lewis acquired individual-level data from 24 different surveys conducted between 1977 and 2005 based on random samples of the U.S. population by seven professional survey organizations (e.g., Gallup). He discovered 40 survey questions asking people's beliefs about the origins of homosexuality and 85 questions on support for a variety of SM rights (e.g., same-sex marriage, employment protections). People

who believed that homosexuality is something a person is born with were more likely to support SM rights on all 85 questions across all 24 surveys. Even more notably, these findings were statistically significant ($p < .05$, one-tailed) *in all 85 cases*. After controlling for demographic, political, and religious variables, the link was still statistically significant for 84 of the 85 questions. The link is strong and has been growing over time for almost all groups of people and across nearly all gay rights issues.

Social psychology has typically used attribution theory (Weiner, 1985) to explain this pattern of findings. Attribution theory posits that people's reactions to stigmas, achievements, or conditions are largely based on what they believe caused them. Perceptions of control are key. People treat a stigmatized person less punitively if they believe that the person's stigmatized trait is not their fault and beyond their personal control. When people believe that the origins of the stigmatized trait are under the victim's personal control, this results in less pity, more hostility and intolerance, and fewer intentions to help the victim (Weiner et al., 1988). In other words, prejudice results from perceptions of *choice*.

There is a large body of research showing that people do think and make attributions according to attribution theory's main tenants, suggesting that this is indeed a reasonable, well-supported theory to explain how people think (Corrigan et al., 2003; Crandall et al., 2001; Crandall & Reser, 2005; DeJong, 1980; Nutter et al., 2018; Weiner, 1985; Weiner et al., 1988). For example, Weiner et al. (1988) found that people tended to be less sympathetic towards those who contracted AIDS as a result of their own behaviors than they were towards those who were infected through a contaminated blood transfusion. Attribution theory has also been applied to discrimination towards those with psychological disorders (Corrigan et al., 2003). Corrigan et al.

found that believing that a person was responsible for the onset of their mental illness resulted in less pity, more anger, and more fear towards that individual. Participants were more likely to report avoiding the person, refusing to offer them help or hire them for a job, and supporting involuntary admissions to residential treatment programs and separation from the community. Attribution theory has often been applied to obesity, as well (Crandall et al., 2001; Crandall & Reser, 2005; DeJong, 1980; Nutter et al., 2018). While believing that people are responsible for their obesity has been found to predict anti-fat prejudice (Crandall et al., 2001), believing that obesity is a disease and less in a person's control leads to more positive feelings towards obese people (Nutter et al., 2018).

When applied to SO, attribution theory proposes that those who believe that homosexuality is the result of personal choice or environmental causes interpret this as meaning that SMs can control their SO (Jang & Lee, 2014). Since they are in control of their SO, SMs should bear the negative consequences of their choice. On the other hand, those who believe in biological origins of homosexuality believe that SMs have no choice in their SO and are therefore free from moral condemnation. Rather, they are merely unfortunate victims of chance.

The Origins of "Born This Way": A Review of the Biological Research on SO over the Last 30 Years

In reaction to SOCE's use of "science" to prove their legitimacy in the 1980s, the scientific community pursued research that it hoped would show that SO is biological in nature and, therefore, immutable (Waidzunas, 2015). An unintended consequence of SOCE was a rich body of literature on genetic correlates of SO, endocrinology and SO, and physical differences between SMs and heterosexuals. While the current study focused on SO *beliefs* rather than

biology, a review of this literature is still appropriate, given that the following body of work was used to write the interventions participants read in this study.

While much of the scientific community agrees that the origins of SO are biological – at least to some extent – there is still no true consensus on what "causes" SO (Bailey et al., 2016; LeVay, 2017). Though some are adamant that SO is almost entirely biological (LeVay, 2017), others are less definitive in their position (Bailey et al., 2016). Some have criticized this body of work extensively for its flaws (Diamond & Rosky, 2016; Osmundson, 2011), which we discuss in the next section. This is also a good time to remind the reader that causation should not be inferred from correlation alone (Aldrich, 1995; Yule & Kendall, 1950). Notably, much of the research that follows is correlational in nature. Rather than viewing this section as an endorsement of biological arguments, then, we encourage the reader to use a critical lens while reading what follows and draw their own conclusions.

Genetic Correlates of SO

Genetic studies. Genetics research has suggested that there may be genetic differences between gay men and heterosexual men. Through DNA linkage analyses of 40 pairs of gay brothers, Hamer et al. (1993) discovered that specific DNA markers on the X chromosome were more common in gay men than heterosexual men. Pairs of gay brothers shared five DNA markers located in the distal portion of chromosome Xq28, leading Hamer et al. to conclude, "We have now produced evidence that one form of male homosexuality is preferentially transmitted through the maternal side and is genetically linked to chromosomal region Xq28" (p. 325). Hu et al. (1995) successfully replicated Hamer et al. (1993) findings. However, they

discovered that the linkage between DNA markers on chromosome Xq28 and SO did not also exist for lesbian women.

Using another small sample of 52 pairs of gay brothers, Rice et al. (1999) failed to replicate Hamer et al. (1993) original findings. However, Sanders et al. (2015) replicated Hamer et al. (1993) original findings in the largest replication study to date. Using 409 pairs of gay brothers, they found linkage on both chromosome Xq28 and the pericentromeric region on chromosome 8. Sanders et al. (2015) noted that the linkage on chromosome Xq28 may especially be significant, given that similar studies (Hamer et al., 1993; Hu et al., 1995) have also found evidence for a linkage to this chromosome (sometimes referred to as the "gay gene"). While Hamer stated in an interview that the new research "clarifies the matter absolutely" (Servick, 2014, para. 1), Sanders et al. (2015) research has received criticism, both for utilizing the now outdated genetic linkage technique and the fact that two of the linkages are not statistically significant. Clearly, the scientific community has been divided on the existence of a "gay gene" (Servick, 2014).

The most notable study of all, though, is arguably Ganna et al. (2019) large-scale genome-wide association study (GWAS). In the largest investigation of the genetic origins of SO ever published, Ganna et al. conducted a GWAS on nearly 500,000 people to discover five loci associated with same-sex sexual behaviors. They concluded that genetic variants explained between 8% and 25% of the variation in same-sex sexual behaviors for both males and females, which could not allow for predicting a person's sexual behaviors to any meaningful extent. Most significantly, Ganna et al. concluded that not one, but *many* genes influence same-sex sexual behaviors. There is clearly no single genetic determinant, or "gay gene," as previous research has

long suggested (Hamer et al., 1993; Hu et al., 1995; Sanders et al., 2015). Ganna et al. (2019) also emphasize that it is unclear how sociocultural influences may interact with the genetic influences they discovered.

Family studies. The genetic argument for SO has been further explored by familial studies. Hamer et al. (1993) found that gay men reported having more gay maternal uncles and gay maternal male cousins than would be expected by chance. However, they did not have more gay male relatives on their father's side of the family than would be expected. Similarly, Camperio-Ciani et al. (2004) found that gay men had more gay relatives on the maternal side of their family. Both studies concluded that men's SO may be genetically determined by their mothers. Furthermore, since the X chromosome is inherited maternally, these results are consistent with research suggesting that genetic influences on SO are X chromosome linked (Sanders et al., 2015; Yu et al., 2015). In addition to finding that gay men had more gay relatives than heterosexual men, Schwartz et al. (2010) found that these men were more likely to have first-degree gay relatives than second-degree gay relatives.

Some research has focused on the biological siblings of SMs specifically. In a sample of 50 gay men and 50 heterosexual men between the ages of 25 and 35, gay men reported having more gay biological brothers than heterosexual men (Pillard et al., 1982). Approximately 25% of gay men's biological brothers were also reported to be gay in this study. Bailey and Benishay (1993) conducted a similar study with a sample of lesbian women and heterosexual women. They found that lesbian women reported a greater proportion of lesbian woman sisters than the heterosexual women.

Twin studies have drawn similar conclusions. Bailey and Pillard (1991) collected data from a sample of gay men who either had adopted brothers, fraternal twins, or identical twins. Similar to what would be expected in the general population, 11% of the adoptive brothers were gay themselves. However, 22% of dizygotic twin brothers were gay, and 52% of monozygotic twin brothers were gay. Bailey and Pillard's findings suggest that it is more likely that a man will have the same SO as his brother when he shares more of his genetic makeup with him. Bailey et al. (1993) found similar results when they conducted the study with lesbian women. Similar to what would be expected in the general population, 6% of adoptive sisters were also lesbian women. However, 16% of dizygotic twin sisters were also lesbian women, and 48% of identical twin sisters were lesbian women. In a study of mostly male fraternal and identical twins, Whitam et al. (1993) discovered that if one monozygotic twin identified as gay or lesbian, the other twin was also gay or lesbian in nearly two-thirds of the pairs. For dizygotic twins, this was only the case for approximately 30% of the pairs. However, it should be noted that twin studies have been criticized for their sampling biases, which most likely overestimate the true magnitude of genetic effects on SO (Bailey et al., 2016). Bailey et al. estimate that, while these genetic effects do exist, they are much less robust than twin studies suggest.

Taken together, these findings suggest that there is likely *some* genetic component to SO for both gay men and lesbian women. However, it does not seem appropriate to claim that any of this research "clarifies the matter absolutely" (Servick, 2014 para. 1). This body of literature suffers from a number of limitations, including failed replications, questionable choice of techniques, small sample sizes, and sampling bias. The correlational designs do not get us closer to being able to make definitive causal claims. For example, could participants' environments

and life experiences have in some way altered some of their genetic structures? This work also leaves us with another important unanswered question: *how much* influence does this genetic component have?

Endocrinology Studies and SO

Prenatal hormone environment. Endocrinology research has suggested that SO is determined, at least in part, by the prenatal hormone environment that SMs are subjected to. Animal studies have shown that prenatal sex hormones play a significant role in the development of mammals' brains by feminizing, defeminizing, masculinizing, and demasculinizing brain regions (Ellis & Ames, 1987; Money, 1987). These prenatal hormones play a significant role in influencing the animal's sexual behavior. Ellis and Ames (1987) argued that human SO is determined through the same biological processes as other mammals. Their theory states that a complex combination of hormonal, genetic, environmental, and neurological factors work together in utero to determine what a person's SO will be. Ellis and Ames referred to the second to fifth months of gestation in humans as "the crucial timing," during which the hypothalamic-limbic regions of the brain are permanently changed (p. 251). It is important to note that using animal research to study human SO has been criticized since animal behaviors (e.g., mounting, lordosis) do not generalize to human SO (Bailey et al., 2016). However, Bailey et al. suggest that disregarding such research "would be premature" since, "Sometimes good hypotheses are difficult to test" (p. 72).

In alignment with Ellis and Ames's (1987) theory, Ehrhardt et al. (1985) compared a sample of women who had been prenatally exposed to the nonsteroidal synthetic estrogen diethylstilbestrol (DES) to a non-exposed matched control group. Approximately a quarter of the

participants with prenatal DES exposure reported that they were lesbian or bisexual women, which was significantly more than the control group. These findings were replicated in another DES-exposed female sample (Meyer-Bahlburg et al., 1995). While one cannot draw causal conclusions from these studies, the results suggest that prenatal estrogen exposure may be one important factor contributing to SO later in life.

Since childhood preferences are a strong predictor of same-sex desire later in life (Bailey et al., 2016; Bailey & Zucker, 1995), Berenbaum and Snyder (1995) investigated playmate and activity preferences in a sample of children with congenital adrenal hyperplasia (CAH), a disorder that exposes the fetus to high levels of androgens. While the additional androgen does not affect male fetuses, it has a masculinizing effect on female fetuses. Boys with CAH were similar in their preferences to healthy controls. However, the girls with CAH showed greater preferences to male playmates, activities, and toys. Berenbaum and Snyder suggested that their findings demonstrated the influences that early androgen levels may play in later same-sex attraction. Indeed, research has consistently shown that women with CAH are more likely to identify as lesbian or bisexual than women without CAH (Meyer-Bahlburg et al., 2008). Rates of identifying as lesbian or bisexual woman are also positively correlated with CAH-severity classification (i.e., degree of prenatal androgen exposure).

Other research has investigated the fraternal birth order effect. Blanchard and Bogaert (1996b) discovered that identifying as a gay man and the number of older brothers he had were positively associated. Each older brother that a gay man had increased his probability of being gay by 33%. There were no associations, however, between being a gay man and parents' ages, number of younger brothers, number of younger sisters, or number of older sisters. Blanchard

and Bogaert (1996a) replicated these findings by conducting the same analyses on the historical sexuality data from Kinsey's original interviews (Gebhard & Johnson, 1979). The fraternal birth order effect has been replicated numerous times (Bogaert & Skorska, 2011) and is so robust that a regression analysis suggested that approximately 1 in 7 gay men may attribute their SO to the effect (Cantor et al., 2002). The fraternal birth order effect may be explained by the "maternal immune hypothesis," which asserts that a woman's body develops immunities against the fetus's male hormones after every male birth (MacCulloch & Waddington, 1981).

Physiological reactions to pheromones and hormones. Another line of endocrinology research has investigated the way SMs physically react to hormones and pheromones compared to their heterosexual counterparts. Gladue et al. (1984) injected gay men, heterosexual men, and heterosexual women with an estrogen preparation that is known to increase levels of luteinizing hormone (LH) in females only. After the injection, Gladue et al. recorded the participants' levels of testosterone and LH in response to the injection over the course of four days. The gay men's LH release patterns were unlike those of either the heterosexual men or the heterosexual women. While still lower than the release pattern found in the heterosexual women, it was higher than the levels found in the heterosexual men. Interestingly, testosterone levels in gay men were significantly lower than those measured in heterosexual men three days post injection. This difference persisted on Day 4, signaling that testosterone levels were slower to return to baseline in the gay men. Gladue et al. concluded that biology must play at least some role in SO.

Research has also found that gay men respond differently to putative pheromones than heterosexual men (Savic et al., 2005). Savic et al. exposed gay men, heterosexual women, and heterosexual men to the testosterone derivative androstadienone (AND), primarily detected in

male sweat, and the estrogen-like steroid estratetraenol (EST), primarily found in female urine. Using a combination of magnetic resonance imaging (MRI) scans and positron emission tomography (PET) measurements, they measured the participants' patterns of brain activation in response to smelling AND and EST. Gay men and heterosexual women both experienced hypothalamic activation in response to AND, while heterosexual men experienced this brain activation in response to smelling EST. Most activation was observed in the anterior hypothalamus and the medial preoptic area, both of which are involved in sexual behavior in animal studies. In a similar study with lesbian women, Berglund et al. (2006) found that lesbian women processed AND stimuli by activation of the olfactory networks, unlike heterosexual women who processed the stimuli by activation of the anterior hypothalamus. Instead, lesbian women showed activation in the anterior hypothalamus when processing EST stimuli, just like the heterosexual men did.

Like genetics research, this body of endocrinology work suggests that SO is likely biological in nature to *some* degree, even if this research does not define how much that is. Some of this work suffers from limited external validity. (Can we really generalize a female rat's lordosis behavior to human SO?) Similar to genetics research, we also cannot make causal claims from the correlational designs that these endocrinology studies utilize. Indeed, it is entirely possible that participants' environments and life experiences may have led to changes in their endocrine systems.

Physical Differences between SMs and Heterosexuals

Physical features. Another focus in the research literature has been on documenting the physical differences between the bodies of SMs and heterosexuals, which is thought to be a

result of the prenatal hormone environment. A meta-analysis of 20 studies concluded that gay and lesbian woman participants were 39% more likely to be left-handed than heterosexuals (Lalumiere et al., 2000). Given that one's dominant hand is determined prenatally, Lalumiere et al. suggested that their findings may provide further evidence for SO being determined prior to birth. In a study investigating ratios of index and ring finger lengths, Lippa (2003) found that gay men's digit ratios were significantly higher than those of heterosexual men, regardless of ethnic group. Given that finger length is a physical feature thought to be a result of prenatal androgen exposure, these findings may provide further evidence for a prenatal determination of SO. Similarly, Grimbos et al. (2010) meta-analysis found that lesbian women's digit ratios were lower than those of heterosexual women on both hands.

Other work has investigated dermatoglyphics (i.e., attributes of the ridged skin on primates' fingers, toes, and soles). Hall and Kimura (1994) measured gay and heterosexual men's total number of ridges and ridge asymmetry. There were no differences between gay and heterosexual men's total number of ridges. Gay men had fewer ridges on their right hands than on their left hands. However, the majority of heterosexual men had fewer ridges on their left hands than their right hands. Since humans' dermatoglyphic features develop by the sixteenth week of gestation and are permanent characteristics, Hall and Kimura concluded, "Regardless of the exact mechanism, the association between dermatoglyphic asymmetry and sexual orientation suggests that sexual orientation in at least some men is linked to biological events that occur early in fetal life" (p. 1205).

Bogaert (2010) found differences in physical body size between gay and heterosexual men. In a sample of over 11,000 participants, he found that gay and bisexual men were

physically shorter and weighed less than the heterosexual men. However, he did not find significant height and weight differences between lesbian and bisexual women and heterosexual women.

There is also evidence suggesting that average penis size may differ based on SO. Bogaert and Hershberger (1999) conducted analyses on the data from the original Kinsey interviews conducted between 1938 and 1963 (Gebhard & Johnson, 1979). In the interviews, researchers measured the dimensions of the participants' penises, collecting data on five different measures of penis length and circumference. Gay men's penises were significantly larger than heterosexual men's penises on every measure. Interviewers assisted with the measurements, suggesting that the findings cannot be due merely to social desirability bias between the groups of men. Bogaert and Hershberger (1999) suggested that these differences could be the result of variations in prenatal hormones, providing further evidence that exposure to certain prenatal hormone environments play at least some role in sexual desire.

Structural differences in the brain. Some research suggests that the brain is different in SMs, as well. LeVay (1991) dissected 41 human brains from people who were similar in age. He found that the anterior hypothalamus, a part of the brain responsible for regulating sexual behaviors, was smaller in the gay men's brains than in the heterosexual men's brains. Interestingly, the size of the anterior hypothalamus in gay men was similar to the size of this brain region in heterosexual women. More specifically, LeVay measured the volumes of cell groups in the interstitial nuclei of the anterior hypothalamus (INAH) 1, 2, 3, and 4. There were no differences in INAH 1, 2, or 4. However, the volume of INAH 3 in heterosexual male brains was more than twice that of the gay male brains. INAH 3 volume was similar for gay men and

heterosexual women. LeVay acknowledged that these findings should be interpreted with caution, though. The gay men had died of acquired immunodeficiency syndrome (AIDS), so there was no way to know if the abnormally small size of INAH 3 in their brains was due to their disease rather than their SO. LeVay could not obtain brain tissue from lesbian women, either. In fact, Byne et al. (2001) failed to fully replicate these results. While gay men did have a smaller INAH 3, this finding did not reach the level of statistical significance (i.e., $p = .057$), and no difference in the number of neurons was detected. Given that the sample was small, containing only 14 gay men, Bailey et al. (2016) have argued, "Scientifically, Byne et al. research should not be the last word on the INAH 3 and sexual orientation" (p. 71).

Allen and Gorski (1992) investigated the anterior commissure. This fiber tract is known to be larger in the midsagittal area in women. Gay men's anterior commissures were 18% larger than heterosexual women's and 34% larger than heterosexual men's anterior commissures.

Savic and Lindstrom (2008) used magnetic resonance volumetry measurements and PET measurements to investigate differences in the brain. Both lesbian women and heterosexual men had a rightward cerebral asymmetry. Both gay men and heterosexual women had symmetrical cerebral hemispheres. Savic and Linstrom also discovered sex-atypical amygdala connections in both gay men and lesbian women. Like heterosexual women, gay men's connections from the left amygdala were more widespread. Like heterosexual men, lesbian women's connections from the right amygdala were more widespread. In both gay men and heterosexual women, these connections were through the anterior cingulate and the contralateral amygdala. In heterosexual men and lesbian women, however, these connections were through the putamen, the caudate, and the prefrontal cortex.

Taken together, these various structural differences – like genetic and endocrinological differences – suggest that there may be at least *some* aspect of SO that is determined biologically before birth, even though we have no way of knowing *how much* of a role biology plays. However, like research on endocrinology, these structural differences in the brain are also susceptible to reverse causality explanations. It is quite possible that participants' environments and life experiences produced the observed changes in their brains. The current study certainly did not aim to settle this "nature versus nurture" debate. Rather, this study utilized this rich body of research in its interventions to shift SO beliefs in different directions.

The Need to Move beyond "Born This Way": Critiques of the Predominant Approach

Such rapid shifts in Americans' views on SO over the last three decades (Brown, 2017; Pew Research Center, 2017a; Washington Post-ABC News, 2014) may make it seem as though the current essentialist "born this way" argument of SO must be the most effective strategy for reducing homonegative prejudice. However, a plethora of evidence demonstrates that this is simply not accurate, and critiques of the "born this way" approach are in abundance. In this section, we present evidence that "born this way" claims (1) are not entirely accurate or scientific, (2) have had limited utility in the legal system, (3) are unjust, and (4) are risky with limited potential for benefits.

The Claims Are Not Entirely Accurate or Scientific

Many scholars maintain that "born this way" claims are neither accurate nor scientific (Bailey et al., 2016; Diamond & Rosky, 2016; Stein, 2011; Terry, 1999). Diamond and Rosky (2016) argue that scientific research has failed to show that SO is uniformly biologically determined upon birth, noting that "immutability claims have been oversimplified and

overgeneralized" (p. 365). Nearly all scientists agree that SO has multiple causes, and those causes include multiple nonbiological factors interacting with the biological ones. Furthermore, causal factors may differ by individual and by sex. For example, there is more evidence for a genetic influence on SO for men than women (Bailey et al., 2016). Bailey et al. similarly concluded, "No specific theory of what causes people to be attracted to men, to women, or to both has received enough support to win the backing of all reasonable scientists, most of whom remain open-minded to a large extent" (p. 87). Stein (2011) argues that scientific research on SO is still in its early stages. He reminds us, "Biological research into sexual orientation has a poor track record when it comes to reliability; what appear to be valid results today could turn out to be mistakes" (pp. 643-644). Perhaps Terry (1999) has summarized the problem best:

> The argument for homosexual immutability betrays a misreading of the scientific research itself. Nothing in any of these studies can fully support the idea that homosexuality is biologically immutable; each study leaves open the possibility that homosexuality is the result of a combination of biological and environmental factors, and several suggest that homosexuality may be tied to a predisposition in temperament that could manifest itself in a number of ways. All agree that biological, social, and psychological factors interact to produce and change the signs of homosexuality. (p. 394)

Diamond and Rosky (2016) argue that, while research investigating genetic markers and hereditability provide evidence for genetic *contributions* to SO, neither provides evidence that SO is genetically *determined*. Exactly what role the X chromosome plays in sexuality is still hotly debated (Osmundson, 2011), yet the media has neglected to report on studies (e.g., Rice et al., 1999) concluding that there is no gene linked to male homosexuality (Allen, 2014). In

actuality, the weak heritability rates for SO clearly show that no single "gay gene" could possibly exist; such rates indicate that socialization and societal factors must play a larger role in the development of SO than the scientific literature acknowledges (Osmundson, 2011). (We would also like that add that in utero influences could also play an unknown role.) Indeed, Ganna et al. (2019) discovered that there is no single "gay gene." Furthermore, Bailey et al. (2016) concluded in their review of these studies that the approximate hereditability rate of SO is only .32 (i.e., genetic factors account for just 32% of population variability in SO).

Bailey et al. (2016) also argue that the results of genetics studies have been exaggerated due to sampling biases, stating, "Our best estimate of the magnitude of genetic effects is moderate—certainly not overwhelming" (p. 76). Osmundson (2011) agrees, noting that self-selection bias threatens the validity of twin studies, even if the sample size is large; the families that were the most likely to respond to researchers' questions were more likely accepting of their children's SO. Upon reviewing the most reliable twin registry studies, Bailey et al. (2016) concluded that SO must be influenced by environmental factors. They estimated that the median concordance rate (i.e., the likelihood that a person is gay or lesbian when their identical twin is gay or lesbian) is only 25%. Given that identical twins share 100% of their genes, a 100% concordance rate (i.e., gay-gay or lesbian-lesbian twin pairs) would be expected if SO was completely genetically determined. There must be some genetic *contribution* – one in four is a higher concordance than would be expected by chance – but this is far from evidence of a genetic *determination*.

Studies related to brain development and prenatal hormones are similarly subject to issues of selection bias and small sample sizes; SMs who consent to having their brain examined

upon autopsy, or even undergoing brain scans, likely have a unique relationship with their SO that other SMs do not (Osmundson, 2011). An obvious criticism of endocrinology research regarding SO is that these studies often rely on animal models, which do not generalize well to humans (Bailey et al., 2016; Diamond & Rosky, 2016). Direct evidence suggesting that prenatal hormones influence SO is limited. While girls with CAH provide researchers with opportunities to explore how prenatal androgen exposure affects female SO, this research does not suggest that SO is entirely genetic. As Diamond and Rosky (2016) note, we would expect 100% of women with CAH to be either lesbian or bisexual if prenatal androgen exposure really was a primary contributor to SO in women. Yet, longitudinal research has shown that most women with CAH identify as heterosexual (Meyer-Bahlburg et al., 2008).

Diamond and Rosky (2016) also argue that immutability arguments are unscientific, given that longitudinal, population-based studies have shown that same-sex attractions naturally change over time for some people. For example, Savin-Williams et al. (2012) analyzed data from a large representative sample of over 12,000 adolescents collected by the National Longitudinal Study of Adolescent Health (Add Health). They found that a number of young adults described their SO differently in Wave 4 than they did in Wave 3 just six years earlier. Based on studies like these, Diamond and Rosky (2016) conclude, "Although some sexual-minority individuals report consistent patterns of same-sex attraction over time, other sexual-minority individuals undergo changes: sometimes increases/decreases in same-sex attractions and sometimes increases/decreases in other-sex attractions" (p. 370). Qualitative interview studies have found that women often experience changes in sexual attraction as unintentional, surprising, and linked to a specific relationship (Diamond, 2008; Golden, 1987).

Current scientific evidence for choice exists but is weak since most of these studies are limited to self-report data on people's personal views about their SO (Diamond & Rosky, 2016). For example, Herek et al. (2010) used a national probability sample of SM adults and discovered that 60% of bisexual men and women, 30% of lesbian women, and 10% of gay men reported having some element of choice in their SO. Of course, people define "choice" differently (Golden, 1994). Some women have reported that they decided to consciously think about whether or not they were capable of a same-sex relationship (Golden, 1996), while others reported that they consciously decided to attend to their feelings of same-sex attraction (Diamond, 2008). Diamond and Rosky (2016) contend that, while we know that some perceive choice in their SO, we do not yet know what this means.

Ward (2015) challenges essentialist arguments of SO in her analysis of several unique social spaces where heterosexual white men have sex with other heterosexual white men while still identifying as straight (e.g., the military, biker gangs, fraternities). Such sexual acts, she argues, are evidence of the fluidity and complexity in human sexual desire. According to Ward, some of these heterosexual white men can continue identifying as straight thanks to their gender performance and white privilege – power dynamics that cannot be explained by biological determinism. Sexual contact with men is redefined as accidental, meaningless, and/or necessary (e.g., sexual hazing rituals in the military and fraternities).

Limited Utility in the Legal System

Many have argued that "born this way" immutability arguments have limited utility in the legal system when advocating for SM rights (Bailey et al., 2016; Diamond & Rosky, 2016; Mucciaroni & Killian, 2004; Osmundson, 2011; Stein, 2011). For instance, Bailey et al. (2016)

suggest that “vast amounts of time have been wasted through the use of imprecise language and dubious arguments concerning the linkage of scientific findings on sexual orientation to political conclusions regarding LGB rights” (p. 47) and that “the links between scientific findings and desirable social policies have often been overstated and misidentified” (p. 47). Regardless of causation, people who believe that homosexuality results in negative moral, psychological, or social functioning outcomes are the ones who will oppose rights for SMs. They conclude, “These grounds—rather than questions of causations and choice—are the appropriate grounds on which the battle for equal rights for nonheterosexual people should be fought” (p. 62). There is a plethora of evidence to support their position.

In actuality immutability arguments for SM civil rights are not all that common. Mucciaroni and Killian (2004) examined the content of 10 legislative floor debates on antidiscrimination laws from 1984 to 1996. While discussions regarding the origins of SO did increase since groundbreaking scientific research was published in the early 1990s, the immutability argument was still rarely utilized (i.e., not mentioned at all in 77% of speeches in general debate). When the immutability argument was invoked, legislators only mentioned science half of the time, relying on more compelling, relatable anecdotal evidence instead (e.g., “I am a fifty-five year old gay man and I am not just going through a ‘phase’ […] Why in the world would I have chosen it?” p. 73). Rather, proponents of SM rights were more likely to argue that discrimination is wrong and a real problem. Some proponents argued that even if SO was a choice, it should not matter since other choices (e.g., religion, marital status) are protected by law.

When immutability arguments are utilized, they are often ineffective. Courts have routinely denied the immutability of SO (Osmundson, 2011). In cases regarding the legalization of same-sex marriage at the state level, some courts refused to accept that SO was immutable when the argument was used (Stein, 2011). For example, the Washington Supreme Court ruling in *Andersen v. King County* (2006) stated:

> The plaintiffs do not cite other authority or any secondary authority or studies in support of the conclusion that homosexuality is an immutable characteristic. But plaintiffs must make a showing of immutability, and they have not done so in this case. (p. 974)

In fact, opponents of SM rights are somewhat more willing to claim that SO is a choice themselves than they were in the past (*Andersen v. King County*, 2006; Mucciaroni & Killian, 2004). Yet, endorsement of immutability does not change their minds. Even worse, immutability arguments have been used *against* SMs in legal cases. In his analysis, Osmundson (2011) discusses examples of court cases that successfully used scientific data as evidence to *deny* SM rights. Ironically, the increased focus on scientific studies in the media may have actually led to the increase in arguments about the need to protect children from SMs (Mucciaroni & Killian, 2004).

Upon legal analysis, some scholars have concluded that immutability arguments are unnecessary since the legal system has successfully defended SMs on other grounds (Diamond & Rosky, 2016; Mucciaroni & Killian, 2004; Osmundson, 2011). For example, Mucciaroni and Killian (2004) concluded in their analysis that "the immutability claim and scientific studies lacked sufficient relevance to play a decisive role in the debate" (p. 66) and that "they were unnecessary in order for either side to make a plausible case in favor of (or against) gay rights

legislation" (p. 66). Osmundson (2011) cites several judicial decisions legalizing same-sex marriage at the state level in which the biological basis for sexuality was not part of the decision. Some of these cases relied on the argument that a person's SO should not be infringed upon because it is a central component of their identity.

Osmundson (2011) also notes that race is defined as a protected class, even though we do not have a definitive biological or genetic definition of race. Religion is also a protected class, even though religious beliefs are considered a choice. Based on this, he argues that "the fact that there is no consensus on a scientific basis of sexuality should not stop the enactment of laws and policies that protect gay men and lesbian women against government or private infringement on their right to equal protection under the Fourteenth Amendment" (p. 23). Federal legislation granting special protection under the law to the LGBT community and outlawing discrimination based on SO or gender would remove immutability from the equation completely.

Through an extensive analysis of U.S. court decisions regarding SO, Diamond and Rosky (2016) similarly contend that immutability arguments should not be used to argue for SM civil rights. They cite a number of U.S. legal decisions over the last 20 years – including more recent Supreme Court rulings regarding same-sex marriage – that have protected SM rights on grounds other than immutability, indicating that immutability arguments are not necessary. They point out that immutability is a factor that the Supreme Court has historically *considered*, but the Court has not treated immutability as a *requirement*. *United States v. Windsor* (2013) and *Hollingsworth v. Perry* (2013) did not take up the immutability question at all in the end. Even though the *Obergefell v. Hodges* (2015) decision referenced immutability, the topic played very little in the legal reasoning underlying the ruling.

Instead, Diamond and Rosky (2016) present five alternative legal strategies that have been more successful than immutability. (1) The legal definition of immutability has changed such that the question is no longer whether or not SMs *can* alter their SO but *should* they be asked to do so. Legally, asking someone to change their SO to avoid discrimination is not appropriate. (2) While less successful, another legal strategy has been to argue that any discrimination against SMs is technically sex discrimination, given that the definition of SO depends on one's sex. (3) A particularly effective legal approach, however, has been to target the "anti" intent of laws to marginalize and stigmatize SMs. (4) Also effective, advocates have focused on how the children of SMs are the ones who are harmed by anti-gay laws, and courts have a duty to protect these children from harm. (5) Finally, arguing for the freedom of choice is another successful legal strategy because choice is protected by the Due Process Clause. This was effective in the *Obergefell v. Hodges* (2015) case. In the Supreme Court's ruling in *Obergefell*, the Court stated:

> The right to marry is fundamental under the Due Process Clause [because] the right to personal *choice* regarding marriage is inherent in the concept of individual *autonomy* […] *decisions* concerning marriage are among the most intimate that an individual can make [emphasis added]. (p. 12)

Indeed, advocates can take other, more effective legal strategies for SM rights that do not need to include immutability.

Immutability Arguments Are Unjust

Diamond and Rosky (2016) present an argument suggesting that immutability arguments are actually unjust to SMs. Here, we summarize the main tenants of this argument, along with evidence to support them.

Diamond and Rosky (2016) argue that immutability arguments of SO are unfair in that these arguments suggest that other-sex attractions are superior to same-sex attractions by suggesting that SMs should not be held "responsible" for their unfortunate luck. Likewise, Walters (2014) claims that the "tolerance" immutability arguments ask for "allows homosexuality to remain designated as 'less than' heterosexuality, as a problem, as a dilemma, as a threat to the moral good" (p. 10). Diamond and Rosky (2016) contend that immutability arguments of SO are also unfair because they favor SMs who experience their SO as fixed throughout their lives over SMs who experience their SO as fluid, implying that the latter group are less deserving of legal protections. They caution:

> When advocates for sexual-minority rights use the immutability of sexual orientation as a basis for protection from discrimination, they implicitly convey that the rights of some sexual minorities—the early-developing, exclusive, "gold star" types—are more deserving of protection than are others. (p. 383)

Indeed, the focus on immutability favors gay men over all other SMs (Allen, 2014), even though they make up one small segment of the community. One journalist may have stated it best:

> […] the studies that do enjoy widespread media circulation focus on a very narrow segment of the LGBT community: gay men. Information on the potential genetics of

> lesbianism is much harder to come by and bisexual people, who constitute more than 50 percent of the LGBT community in the U.S., are rarely mentioned in the conversation about the genetics of sexual orientation. Even if a conclusive link is found between genetic markers and male homosexuality, that still leaves most of the queer community unaccounted for. (Allen, 2014, para. 6).

It should not be surprising, then, that gay white men seem to be the most enthusiastic supporters of immutability arguments (Terry, 1999).

Diamond and Rosky (2016) note that bisexuals have been left out of immutability debates in both the scientific and legal domains since they do not fit into the homosexual-heterosexual binary. Bisexuals threaten immutability claims by their very existence given that, by definition, they have an element of choice in whether or not to engage in same-sex behaviors. Indeed, most bisexuals (60%) report believing that they have some choice in their SO (Herek et al., 2010). Since choice arguments have been used against SMs in the legal realm, Diamond and Rosky (2016) note that bisexuals are often resented because they have the ability to choose to be in other-sex relationships. They warn that immutability arguments could threaten bisexuals' legal rights for this very reason. This is especially problematic since more people identify as bisexual than gay or lesbian exclusively.

Diamond and Rosky (2016) also contend that immutability arguments are unfair to those who feel that they *do* have some element of choice in their SO. This affects many SMs since perceptions of choice are not as rare as we have been led to believe (Herek et al., 2010). Diamond and Rosky (2016) discuss how these SMs are often publicly reprimanded, an excellent example being when *Sex and the City* star Cynthia Nixon was openly criticized for describing

her SO a choice (Jowett & Barker, 2018; McCormic, 2012; Witchel, 2012). Osmundson (2011) warns that "a biological understanding of sexuality may actually serve to further marginalize groups for which sexuality contains some aspects of choice" (p. 25).

The Risks Associated with Promoting Immutability Beliefs

In addition to being a poor legal strategy, a number of scholars have argued that there is not much to be gained from immutability strategies on any level (Hegarty, 2002; Stein, 2011; Walters, 2014). However, there are great risks to promoting immutability beliefs that far outweigh any potential (and minimal) benefits (Osmundson, 2011; Stein, 2011; Terry, 1999; Weinrich, 1995). Indeed, history has shown the dangers associated with essentializing race and gender; essentialist arguments have often been evoked as a strategy to justify and promote anti-Black racism (Eberhardt, 2005) and sexism (Heyman & Giles, 2006; Tavris, 1999) through claims of biological inferiorities. We provide a discussion of this troubling history in a forthcoming section.

Walters (2014) criticizes the biological immutability approaches embraced by advocates, arguing that SMs in the U.S. have settled for tolerance and acceptance rather than full civil rights. She asks, "But is a tolerant America what we—that is, gay and straight alike—really want? Or, put another way, is it *all* that we want [emphasis original]?" (p. 8). Sexual minorities have yet to be fully integrated into American life, and "born this way" ideology – a narrow vision of social inclusion – is partially to blame for this. Walters points out that "no civil rights movement worthy of the name has banked its future on being tolerated or accepted" (p. 12). Rather, she argues that "respect and recognition and belonging are the gold standard, not a tepid

tolerance that shuts the door on deep freedom" (p. 13) and that "tolerance is not the same as freedom" (p. 16).

Walters' (2014) argument is consistent with attribution theory (Weiner, 1985), the typical theoretical framework for changing homonegative attitudes through promotion of immutability beliefs. Hegarty (2002) notes that attribution theory "suggests that stigmatized groups can—at best—hope for pity and tolerance for their unchosen and inevitably devalued differences" (p. 164). Research has shown as much to be true when applied to other stigmatized traits (Weiner et al., 1988). Given this, Hegarty (2002) recommends that psychologists think twice before using attribution theory as a theoretical framework; doing so may be aiming for nothing more than tolerance and pity for SMs. At the same time, we would like to suggest that it is critical to distinguish between using attribution theory to explain prejudices versus using it for justice and advocacy efforts; while an attributional analysis is certainly consistent with the data regarding people's prejudices and is a good theoretical framework for research, it is not a good basis for legal protections.

Bailey et al. (2016) argue that people choose actions rather than feelings. Therefore, same-sex desire is irrelevant because choosing to have same-sex partners is the real lifestyle choice. After all, "a LGB person can decide to be celibate, closeted, single, and childless" (Stein, 2011, p. 639). Stein cautions that someone who believes that SMs are born with their SO may believe that SMs should not be discriminated against based on their *attractions* since that is not their choice; yet, they may still think it acceptable to discriminate against SO based on how they *act on* those attractions. Indeed, opponents of gay rights have argued that even if SO is not a choice, behavior is (Mucciaroni & Killian, 2004). For example, courts have claimed that

"regardless of sexual orientation, any person can marry a person of the opposite sex" (*Hernandez v. Robles*, 2006).

Stein (2011) further warns that immutability arguments have "significant risks associated with them," reminding us that "history has shown that any theory of the origins of sexual orientation may be turned against LGB people" (p. 654). He cautions that the "born this way" argument could encourage the view that SMs are diseased since, until very recently in history (depending on place and scale of time, of course), homosexuality was classified as such. Weinrich (1995) predicts how this very scenario could occur:

> [T]he only reason why biological explanations have the potential to be a sociopolitical advance for gay people is that the enemies of gay liberation have prematurely, and in my opinion stupidly, committed themselves to the position that homosexuality is an environmentally caused disorder. Now that the environmental part of this position is crumbling, this political group may become embarrassed, and the cause of gay liberation will be, for the moment, advanced. But we can predict that the next generation of right-wing theoreticians will reject these views and simply assert that homosexuality is a genetic pathology (or if they're really smart, a multifactorial one). (p. 201)

Just because the immutability argument may have some utility now does not mean that it will not be redefined as pathology in the future.

Instead, Stein (2011) recommends, "It is better to talk directly about justice, fairness, and equality for LGB people than to try to recast such questions as scientific, psychological, or metaphysical questions" (p. 655). Osmundson (2011) agrees, warning, "Conclusive evidence of a genetic or hormonal basis of human sexuality may […] lead to the reclassification of

homosexuality as a medical disorder and redefine queerness as biology gone wrong" (p. 15). Indeed, Mucciaroni and Killian (2004) have speculated that gay rights advocates may have avoided utilizing immutability arguments in legislative debates for fear that opponents would begin arguing that SMs suffer from a biologically-based disease. They note that one opponent of SM rights argued in a legislative floor debate, "We don't know if this is nature or nurture; inborn or learned. It was mentioned that it was fixed at an early age. This is most likely an *in-born problem* [emphasis added]." (p. 71). Sexual minorities themselves, especially gay suicidal teens, may view themselves as diseased or defective and conceptualize this as one more reason to die by suicide (Terry, 1999).

Stein (2011) further warns that the "born this way" argument may lead to prospective parents attempting to use reproductive technologies to prevent having an LGB child. If a prenatal screening procedure for SO is ever available, people may choose to abort those pregnancies to ensure having only heterosexual children. The "born this way" argument may also promote psychological, dietary, and pharmaceutical "treatments" for parents who want to change their SM child's SO.

In fact, we can already see an example where this is already happening—a possible foreshadowing (Osmundson, 2011). CAH is usually caused by a single genetic mutation, and genetic tests can detect it prenatally. Carriers of CAH can undergo steroid drug treatment during pregnancy to prevent not only the cosmetic effects of CAH (e.g., enlarged genitalia) but also the masculinization of the brain that is thought to lead to higher rates of lesbianism in this population (see Meyer-Bahlburg et al., 2008). Osmundson's (2011) warning speaks for itself:

> Here we have a known case of a genetic and hormonal basis for gender nonconformity and lesbianism. The ramifications, however, are certainly not acceptance for the individual but quite the opposite: women are subject to hormonal therapy while developing in the womb. This "treatment" has the high hopes of restoring normative sexual and gender identity and behavior. While this particular case may not be generalizable, it should at the very least give pause to the LGBT activists arguing that if sexuality is biologically determined it would lead directly to acceptance and equal protection under law. (pp. 18-19)

Terry (1999) provides further caution, noting that "human engineering […] may be revised to mean altering unhealthy or unruly individuals at the genetic level" (p. 396). Indeed, "There is a growing popular trend toward regarding biological evidence for things like homosexuality as a possible means for targeting 'carriers' and removing them from the gene pool" (p. 396).

While this section has focused on the dangers and limitations associated with adopting strictly essentialist arguments of SO, we wish to acknowledge that social constructionist arguments of SO are not without their own limitations in their most extreme forms (Epstein, 1987). Epstein makes a case for why neither side of the essentialist-constructionist debate has been entirely useful in guiding politics for SMs. He argues, "While it is important to challenge essentialism, particularly in its most insidious forms, we need not do so by reverting to a dogmatic constructionism" (p. 23). Epstein suggests that taking too strong of a social constructionist stance "not only poses a threat to contemporary legitimations of lesbians and gay men: it is also theoretically unsound and analytically incomplete" (p. 23). Epstein shows us that

it is important to resist making heavy-handed arguments one way or the other about essentialism and social constructionism.

The Complex Relationship between SO Beliefs and Homonegative Attitudes

Previous research has posited that essentialist beliefs about the innateness of SO predict positive attitudes toward SMs (Haslam & Levy, 2006; Haslam et al., 2002; Hegarty, 2002; Hegarty & Pratto, 2001; Jang & Lee, 2014; Jayaratne et al., 2006; Lewis, 2009; Whitley, 1990). Indeed, this extensive body of work shows that those who believe SO to be innate do hold more positive attitudes toward SMs than those who believe SO to be a choice. However, beliefs about SO are far more complex than a one-dimensional conceptualization of essentialist beliefs centered on biological determinants of SO; research on multidimensional beliefs about SO suggests that a more complex array of beliefs may affect attitudes toward LGB individuals (Haslam & Levy, 2006). This section explores – and makes a case for – the existence of a much more complex relationship between SO beliefs and homonegative attitudes.

Correlation Does Not Imply Causation: The Directionality Problem

While there is clearly an association between people's beliefs in the innateness of SO and their attitudes towards SMs, one must remember that the existence of a correlation alone – no matter how well documented – does not constitute causation (Aldrich, 1995; Yule & Kendall, 1950). In other words, one cannot state that people's beliefs regarding the origins of SO (e.g., innateness, choice) *cause* their attitudes based on the correlational nature of most research on this question. While others have noted the lack of evidence to support assumptions that SO beliefs cause attitudes toward SMs (Diamond & Rosky, 2016), Stein (2011) may have explained this problem best:

> I am skeptical about the way some LGB rights advocates implicitly interpret these opinion polls. These polls establish a correlation between supporting LGB rights and thinking that sexual orientations are innate or not a choice; they do not show that supporting LGB rights is *caused by* believing that sexual orientations are innate or not a choice [emphasis original]. In fact, the causal connection might well be reversed, namely supporting LGB rights might make people more likely to believe that sexual orientations are biologically based or not chosen. Or, these beliefs might both be caused by some third belief. Either of these explanations for the correlation between supporting LGB rights and believing that LGB people are "born that way" would undermine the pragmatic use of the etiological argument. For all of the above reasons, attempts to make a pragmatic argument for LGB rights based on the idea that sexual orientations are natural kinds—whether due to biology or immutability—are misguided and futile. (p. 645)

Stein provides two alternative explanations for the link between SO beliefs and attitudes towards SMs that merit further consideration. First, the causal mechanism could be *reversed* (i.e., people's positive attitudes about SMs somehow cause them to develop beliefs in the innateness of SO). Second, there could be some *third variable* – a variable Stein speculates could be a "third belief" – that serves as the causal mechanism linking SO beliefs and attitudes.

Through a series of studies (Falomir-Pichastor & Hegarty, 2014; Hegarty, 2002; Hegarty & Golden, 2008), Hegarty has investigated biological theories of SO alongside other beliefs and homonegative attitudes, providing compelling evidence to suggest that Stein (2011) may be correct. Hegarty (2002) asked separate samples of American and British heterosexual-identified college students to complete measures about (1) their attitudes towards gay men and lesbian

women and (2) their beliefs about SO's *immutability* (i.e., "the fixity of individual sexual orientation over the lifespan;" p. 156) and *fundamentality* (i.e., "the idea that 'homosexual' and 'heterosexual' are exhaustive and mutually exclusive natural categories;" p. 156). A month later, he also asked participants about (3) the values that they thought each of the beliefs about SO's immutability and fundamentality expressed.

Among both the U.S. and British samples, Hegarty (2002) found that tolerant attitudes were positively correlated with immutability beliefs *only if* participants thought that immutability beliefs would be held by tolerant heterosexual people. These findings suggest that heterosexuals may develop their immutability beliefs to fit their preexisting political positions. People may see immutability beliefs as being associated with tolerant people, and, in order to align themselves with the opinions of the group with which they identify, people who are tolerant of SMs adopt biological beliefs, while people who are condemning of SMs adopt choice beliefs. In other words, heterosexuals form their beliefs about immutability to align with the attitudes towards SMs that they already hold.

Hegarty's (2002) argument may be complemented by the cultural differences he discovered between his American and British participants. Condemning attitudes were positively correlated with fundamentality beliefs in both samples. However, there was only an association between immutability and tolerance in the American sample. Hegarty speculated that this may indicate a cultural phenomenon. In the 1990s, American mainstream newspapers and news magazines reported on the discovery of a potential genetic marker for homosexuality in a positive light and regarded these studies as good science (Conrad & Markens, 2001). The British press, however, reported negatively on this research. Given these cultural influences, it would

make sense that American heterosexuals would interpret immutability arguments as tolerant while British heterosexuals would not (Hegarty, 2002). This has likely introduced an additional confound into much of the correlational research on the link between immutability and tolerance, as most of this research has relied exclusively on American participants.

Hegarty and Golden (2008) conducted one of the only true experiments to directly test attribution theory's (Weiner, 1985) hypothesis that the attributions people make about the causes of SO affect their attitudes towards SMs (Weiner et al., 1988). Participants reported their attitudes towards SMs and read information to manipulate their attributional beliefs about the origins of SO. In the uncontrollable condition, participants read about the results of bogus research studies suggesting that SO is biologically determined, as well as information suggesting that SO cannot be changed. In the controllable condition, participants read about bogus research refuting biological determinism, as well as information suggesting that SO can be changed. Then, participants listed their thoughts and reported their attitudes once more.

Contrary to what attribution theory and the "born this way" argument of SO would predict, Hegarty and Golden (2008) did not find significant differences in homonegative prejudice between the conditions (i.e., participants who were led to believe that being a SM is uncontrollable did *not* report less homonegative prejudice than participants who were led to believe that being a SM is controllable). This would suggest that immutability beliefs do not have a causal effect on heterosexuals' attitudes towards SO. On the contrary, these data may suggest that the causal mechanism is reversed, as Stein (2011) and Hegarty (2002) have both suggested – participants who reported more homonegative prejudice initially generated more thoughts about how homosexuality has controllable causes, regardless of condition. According to

Hegarty and Golden (2008), this may suggest that heterosexist people think about homosexuality as controllable in order to rationalize their homonegative prejudice.

Falomir-Pichastor and Hegarty (2014) discovered that biological theories served as a mechanism for heterosexual men to distinguish themselves from SMs when they felt threatened. Heterosexual men with a tendency to feel threatened by homosexuality were more likely to endorse biological theories of SO under certain conditions, especially when egalitarian social norms were made salient. More specifically, straight men with (1) narrow prototypes for their gender identity, (2) high gender self-esteem, (3) high endorsement of traditional gender roles, and (4) high homonegative attitudes were more likely to endorse "born this way" beliefs when they were presented with evidence that equal treatment is normative. Notably, these findings were congruent with Hegarty's (2002) discovery that heterosexuals form their beliefs about immutability to align with the attitudes towards SMs that they already hold:

> Given that these findings were observed specifically among heterosexual men with anti-gay attitudes, they provide clear support for the hypothesis that such reactive endorsement of the biological theory can be a vehicle for the expression of anti-gay rather than pro-gay sentiment. (Falomir-Pichastor & Hegarty, 2014, p. 744)

The findings are consistent across Hegarty and colleagues' work (Falomir-Pichastor & Hegarty, 2014; Hegarty, 2002; Hegarty & Golden, 2008) – people choose their beliefs about SO to align with their preexisting attitudes towards SMs.

Lewis (2009) came to a similar conclusion after using logistic regression models to analyze individual-level polling data from surveys conducted between 1977 and 2005 in the U.S. He discovered that those who believed that homosexuality is something a person is born with

were more likely to support SM rights, and this association grew in strength over time. (This is only up until 2005, of course; we do not know what has happened to the relationship since then.) However, Lewis also explored evidence for a potential causal direction of the association by controlling for a variety of factors. Across all eight surveys examined, he found that moral judgment of same-sex behavior was the best predictor of beliefs about the innateness of homosexuality. People who believed that homosexual behavior was sinful or morally wrong were 22 to 48 percentage points less likely to say that homosexuality is something a person is born with than people who did not believe that homosexual behavior is wrong. Lewis argues that his findings suggest that people develop their beliefs about the origins of SO to match their religious values. Those who have already decided to condemn homosexuality for religious or moral reasons are more likely to believe that (1) being a SM is a choice and (2) oppose SM rights. "Moral condemnation," then, may be one of the potential unknown "third beliefs" that Stein (2011) alluded to. Indeed, Haddock et al. (1993) study suggests that the moral values angle is, in fact, distinct. This is further notable once we consider that once an attitude is moralized, it is harder to change (Skitka, 2010). As Hegarty (2002) previously suggested, Lewis (2009) also suggests that people who have already decided to accept homosexuality may adopt "born this way" beliefs as part of a collection of tolerant beliefs. He concludes:

> In sum, belief that homosexuality is innate is strongly linked to support for LGB rights, but convincing Americans that homosexuality is something people are (or are not) born with does not appear to be a strong policy tool for shifting opinion on LGB rights. (p. 690)

Notably, not one of the aforementioned studies provide evidence to suggest that immutability beliefs are the causal mechanism of prejudice reduction that attribution theory (Weiner, 1985) has long posited.

Challenges to Attribution Theory

Social psychology has long favored attribution theory's (Weiner, 1985) causal argument that immutability beliefs directly reduce stigmatization (Weiner et al., 1988). Attribution theory research on perceived controllability and stigma towards obesity consistently indicates that people do, in fact, think and make attributions according to the theory's main tenants; in this sense, attribution theory has shown to be a reasonable, well-supported theory when it comes to how people think (Crandall et al., 2001; Crandall & Reser, 2005; Nutter et al., 2018). When it comes to homonegative prejudice, though, a number of competing theories may better explain the immutability-tolerance relationship and do so with stronger empirical support (Falomir-Pichastor & Hegarty, 2014; Hegarty, 2002; Hegarty & Golden, 2008; Lewis, 2009). Symbolic meanings, the justification-suppression model of prejudice, and social identity theory are three of these competing theories.

Hegarty (2002) provided evidence that the symbolic meanings people construct about SO beliefs may explain the relationship between immutability and tolerance better than attribution theory. While attitudes reflect knowledge about the target object itself (in this case, SM people), they may also serve as a mechanism to express one's personal and political values (Maio & Olson, 2000). While instrumental attitudes evaluate the attitude object, these symbolic attitudes express broad social values (Herek, 2000). Importantly, symbolic attitudes are socially constructed and do not develop directly from interactions with the attitude object. Attitudes

towards SMs become a means for heterosexual people to express their political identities. For example, Herek (2000) found that heterosexuals use people with AIDS as a way to express their homophobia. Symbolic meanings for the same attitude object can vary between social groups. Therefore, the relationship between tolerant attitudes and immutability beliefs may be moderated by the constructed meaning of those beliefs as expressions of certain political positions (Hegarty, 2002). Hegarty's finding that immutability beliefs were only positively correlated with tolerant attitudes by heterosexuals who viewed immutability beliefs as an expression of an affirmative position towards SMs supports this symbolic meaning theory.

Another theory, the justification-suppression model of prejudice, states that people justify their pre-existing prejudices by developing attributional beliefs that validate them (Crandall & Eshleman, 2003). Since expressing prejudice violates social norms, "genuine prejudice" – "pure, unadulterated, original, unmanaged, and unambivalently negative feelings toward members of a devalued group" (p. 418) – must be suppressed. To express genuine prejudice, it must be justified through a range of cognitive rationalizations. Attributing a stigmatized trait to controllable causes is one strategy to justify expressing one's prejudice towards a group. Therefore, the justification-suppression model expects that more prejudiced people are the most motivated to think about controllable origins of stigmatized traits to rationalize their prejudices. Hegarty and Golden's (2008) finding that participants who reported more initial prejudice towards stigmatized traits, including homosexuality, generated more causal thoughts suggesting that those traits were controllable is consistent with the justification-suppression model. "Born this way" beliefs may have been a justification to help heterosexist participants comfortably express their prejudice towards SMs.

According to another theory, social identity theory, people are motivated to maintain distinct social identities, and they do this by differentiating their own groups from comparison groups (Tajfel & Turner, 1986). The reactive distinctiveness hypothesis predicts that people with especially strong identifications to their group are more likely to react to distinctiveness threats by asserting social identity boundaries to distinguish themselves from other groups and restore distinctiveness (Jetten et al., 2004). Group distinctiveness threats, then, lead to differentiation. Falomir-Pichastor and Hegarty's (2014) findings provide empirical support for a social identity theory and reactive distinctiveness explanation of the immutability-tolerance link. Heterosexual men endorsed the biological theory of SO to maintain their distinctiveness from gay men when they felt threatened by egalitarian norms. For some heterosexual men, public support for equality may threaten their sense of being distinct from gay men, thereby triggering a reactive distinctiveness response.[4]

Taken together, these three theories throw attribution theory's assumption that immutability beliefs cause homonegative prejudice reduction into question. While attribution theory is certainly a reasonable, well-supported theory when it comes to stigma (Crandall et al., 2001; Crandall & Reser, 2005; Nutter et al., 2018), symbolic meanings, the justification-suppression model of prejudice, and social identity theory show us alternative mechanisms that may also explain the relationship we see between immutability and prejudice.

[4] While beyond the scope of this discussion, we would also like to direct the reader to consider optimal distinctiveness theory's potential contributions to understanding the immutability-tolerance relationship and homonegative prejudice, as well (see Brewer, 1991; Leonardelli et al., 2010).

The Complexity of Essentialist Beliefs

The "born this way" approach assumes a simple one-dimensional conceptualization of essentialist beliefs centered on the immutability of SO alone. However, this is only part of the story; people's beliefs about SO are far more complex than a one-dimensional conceptualization (Haslam & Levy, 2006; Haslam et al., 2000; Haslam et al., 2002; Hegarty, 2002; Hegarty & Pratto, 2001). This section explores just how complex essentialist beliefs are.

Essentialist beliefs and other social identities. Psychological research suggests that endorsing essentialist beliefs about social identities (e.g., gender, race) is generally associated with a range of negative implications. For example, those who hold essentialist beliefs are more likely to make quick judgements about others and hold punitive attitudes (Heyman & Giles, 2006). They are more likely to engage in negative stereotyping (Bastian & Haslam, 2006; Haslam et al., 2000) and report greater prejudice (Jayaratne et al., 2006). In general, this trend is consistent across research on race and racism (Eberhardt, 2005; Jayaratne et al., 2006; Williams & Eberhardt, 2008) and gender and sexism (Heyman & Giles, 2006; Tavris, 1999). Historically, essentialist arguments have been evoked as a tool to justify and promote anti-Black racism (Eberhardt, 2005) and sexism (Heyman & Giles, 2006; Tavris, 1999) by suggesting that Black people and women are biologically inferior to the supremacy of white men. From a historical perspective, then, essentializing groups tends to end poorly for those who hold marginalized identities and is not the way to develop positive attitudes.

Essentialism's historical role in promoting anti-Black racism, oppression, and white supremacy is especially chilling and warrants attention (see Eberhardt, 2005, for a more thorough discussion). In the 1800s, scientists from various disciplines used the tools of

neuroscience in very intentional efforts to document Black people's inferiority and inhumanity. Neuroscientists and other researchers searched for as many physical, neurobiological differences between racial groups as they could find to justify the existence of extreme racial inequality. Such goals were often the driving motivation behind conducting research on the brain. Researchers calculated the size of people's skulls and consistently found that white skulls were larger than those of Black people. They used this finding to justify their belief that Black people were fundamentally different from white people, who were assumed to be superior in every way. These researchers assumed that any differences they observed in skull measurements were indicative of racial differences in brain functioning. Most scholars of the 1800s believed that such anatomical differences explained intellectual differences between white and Black people. Any observed brain difference was interpreted as supporting evidence that the Black race was innately inferior and the white race superior. Racial groups were eventually ranked on a continuum of worth based on the physical measurements of their brains. Then, researchers developed images of different skulls to explain racial differences. They successfully altered public understanding of race in unsettling ways. White people came to see Black people as anatomically occupying a position between human and ape.

Today, the association between essentialist beliefs and racism is particularly noteworthy, as well. Jayaratne et al. (2006) examined the relationship between white people's genetic lay theories for perceived racial differences and their attitudes towards Black people. They assessed the degree to which participants believed that genetic factors explained perceived racial differences across four racially stereotyped characteristics (math ability, intelligence, the drive to succeed, and tendency to act violently). They included a measure of Traditional Racial Prejudice

(e.g., “How bothered would you be if your son or daughter married a Black person?” p. 83) and a measure of Modern Racial Prejudice (e.g., “Blacks are too dependent on government help for getting ahead;” p. 83). Participants who strongly endorsed a genetic lay theory for perceived racial differences were more likely to report that they would be bothered by their child dating or marrying a Black person. These participants also reported more prejudice towards Black people.

Extending beyond racial prejudice, Williams and Eberhardt (2008) investigated whether or not believing that racial categories are biologically determined could reduce people’s desires to interact with people from marginalized racial groups. When people of various racial groups believed that racial group membership was biologically determined, they were more likely to accept racial inequities, even after controlling for racial prejudice. These individuals were more likely to view racial inequities as natural and unproblematic and were less emotionally moved by such disparities. Williams and Eberhardt also discovered that, regardless of race, those who believed racial group membership to be biological were less interested in interracial interaction, even after controlling for racial prejudice. These individuals had fewer racially diverse relationships and reported being less motivated to develop racially diverse friendships. Williams and Eberhardt suggested that believing in a biological basis for race may provide people with a way to justify racial inequities and continued marginalization of historically marginalized groups.

Tavris (1999) argues that essentializing gender has limitations that have led to negative implications, as well. She explains how “essentialism confuses snapshots with blueprints” (p. 7). While research studies on gender differences that give us snapshots are fine, the problem is when people take a gender difference found in a research study and overgeneralize it (as they often

do), interpreting it to reflect an essential, fixed, built-in quality. Essentialism also inaccurately implies that gender differences are timeless and universal, something that biological research has been particularly guilty of. Furthermore, essentializing gender results in faulty patterns of reasoning and promotes stereotypic thinking. This stereotypic thinking biases what researchers see and what they fail to notice. For example, stereotypes about men being aggressive and women being nurturing have resulted in researchers often overlooking men's nurturance and women's aggression. Essentialism also tends to conflate sex with circumstances, failing to recognize how gender differences often dissipate once we consider external factors like power relations and context. Notably, essentializing gender – such as by making claims that women's hormones make them "irrational" or that women have "deficient brains" – promotes sexist assumptions that men are biologically superior to women. While less extreme than beliefs about biological superiority, the stereotype content model (Fiske et al., 2002) has helped explain how people tend to believe that biological differences make men and women naturally better or worse in specific ways (e.g., competence, warmth; Eckes, 2002), as well.

Similar to biological research on racial differences (Eberhardt, 2005), research on biological sex differences has a history of misusing data to promote sexist arguments that women are biologically inferior to men (Heyman & Giles, 2006; Tavris, 1999). Starting in the late 1800s, Heyman and Giles (2006) describe how psychologists began promoting many essentialist arguments to encourage and justify negative views of women. For example, psychologists argued that the size of women's brains was closer to that of gorillas than men, suggesting that girls should not receive the same education as boys. This history reminds us of the potential dangers

of promoting essentialist arguments of SO that so many others have warned us of (Osmundson, 2011; Stein, 1990; Terry, 1999; Weinrich, 1995).

A multidimensional conceptualization of essentialist beliefs. A new body of research has shown that essentialist SO beliefs are multidimensional in nature, suggesting that a more complex collection of beliefs than immutability beliefs alone may affect attitudes towards SMs (Haslam & Levy, 2006; Haslam et al., 2000; Haslam et al., 2002; Hegarty, 2002; Hegarty & Pratto, 2001). This work clearly suggests that SO beliefs are much more complex than the widely held one-dimensional conceptualization of essentialist beliefs centered on biological bases of SO.

Hegarty and Pratto (2001) discovered a two-dimensional structure of essentialist beliefs. They asked a sample of college students to respond to nine SO "belief items" (e.g., "Sexual orientation is caused by biological factors such as genes and hormones;" p. 129). A factor analysis revealed two factors: *Immutability* and *Fundamentality*. Hegarty and Pratto defined Immutability as "reflecting the degree to which sexual orientation is understood to be fixed across the life span" (p. 128) and Fundamentality as "the belief that persons can be classified as homosexual and heterosexual and that there are fundamental psychological differences between the members of these two groups" (p. 128). While Immutability was associated with greater tolerance towards lesbian women and gay men, Fundamentality was associated with greater prejudice. Immutability beliefs were also negatively associated with Fundamentality beliefs. In two new samples (one American, one British), Hegarty (2002) replicated both of these dimensions, as well as their correlations with attitudes towards lesbian women and gay men.

Haslam et al. (2000) also discovered a two-factor structure of essentialist beliefs. Participants rated 40 social categories (e.g., social class, age group) on nine elements of

essentialism (i.e., discreteness, uniformity, informativeness, naturalness, immutability, stability, inherence, necessity, and exclusivity). The *Natural Kind* factor was made up of beliefs in the biological basis, immutability, discreteness, defining features, and historical invariance of a social category. The *Entitativity* factor was made up of beliefs in the existence of deep-seeded similarities among people within a social category and the social category's inductive potential. The Entitativity – but not the Natural Kind – factor negatively correlated with group status, such that lower status groups (e.g., AIDS patients, Jews) were viewed as more of a homogenous entity than higher status groups.

Haslam et al. (2002) replicated Haslam et al. (2000) Natural Kind and Entitativity factors in a study investigating beliefs about gay men, women, and Black people. Essentialist beliefs were associated with homonegative prejudice but not with sexism or racism. Entitativity was positively correlated with homonegative prejudice. However, the correlations with Natural Kind beliefs were more complex. While endorsing beliefs in the immutability and biological basis of homosexuality were both linked to less homonegative prejudice, endorsing beliefs in the discreteness of homosexuality was associated with greater homonegative prejudice.

Haslam and Levy (2006) built upon previous studies of homonegative prejudice and essentialist SO beliefs with a series of larger-scale studies. They found a robust three-factor structure of essentialist beliefs, which they termed *Immutability*, *Discreteness*, and *Fundamentality*. Haslam and Levy defined Immutability as "the belief that homosexuality is biologically based, immutable, and fixed early in life" (p. 471), Discreteness as "the belief that [homosexuality] constitutes a discrete, entitative type with defining features" (p. 471), and Fundamentality as "the belief that [homosexuality] is cross-culturally and historically universal,"

(p. 471). Endorsement of the Immutability dimension was associated with less homonegative prejudice, while endorsing the Discreteness dimension was associated with more homonegative prejudice. (The Discreteness demension is similar to Hegarty and Pratto's (2001) Fundamentality dimension, although Discreteness is more specific.) Endorsing the Universality dimension of SO was associated with less homonegative prejudice and less endorsement of Discreteness beliefs. However, Universality was associated with greater endorsement of Immutability beliefs.

Moving towards Intervention

Hegarty (2010) incorporated Haslam and Levy's (2006) three-factor framework into a cross-lagged, classroom-based intervention study in the United Kingdom (U.K.) that investigated changes in undergraduate college students' homonegative prejudice and essentialist beliefs after taking an LGBT psychology course that *excluded* biological theories of SO. While taking a human sexuality course has been associated with prejudice reduction, Hegarty (2010) questioned social psychology's assumption that learning about biological theories of SO is the causal mechanism (Altemeyer, 2002; Whitley, 1990). At the beginning of the semester, Hegarty (2010) gave students questionnaires to assess current interest in various LGBT topics, homonegative prejudice, essentialist beliefs regarding SO (adapted from Haslam & Levy, 2006), and demographics. The post-seminar survey included all of the measures again, except for the addition of an open-ended question asking students to explain how their beliefs and attitudes were different now as a result of the course.

The students reported significant reductions in homonegative prejudice toward SMs (Hegarty, 2010). They also reported reductions in three essentialist beliefs: (1) SO is caused by biological factors, like genes and hormones, (2) SO has defining features, and (3) SO has clear

boundaries. Furthermore, students said that they were less interested in theories about the origins of SO and biological theories of SO at the end of the course. When Hegarty examined just the more prejudiced students, he found that they continued reporting that SO categories had distinct boundaries. While they no longer believed that SO could be changed, the more prejudiced students endorsed the belief that SO categories have defining features more strongly than at the beginning of the semester. Those who reported the greatest reduction in prejudice also reported the most reduction in the belief that SO categories have clear boundaries.

Hegarty (2010) argued that the reductions in discreteness beliefs and reductions in homonegative prejudice were "causally related," even though he acknowledged that the directionality of this relationship between the two variables was unclear. Nonetheless, these findings suggest that teaching about biological theories of SO may not be the cause of prejudice reduction in human sexuality courses that others have long argued (Altemeyer, 2002; Whitley, 1990). Rather, this research adds to the body of previous work (Haslam & Levy, 2006; Haslam et al., 2000; Haslam et al., 2002; Hegarty, 2002; Hegarty & Pratto, 2001) suggesting that homonegative prejudice is related to believing in the discreteness of SO categories. Furthermore, students explained in their open-ended responses that learning about sexual fluidity – a topic that challenges discreteness – was liberating. One student wrote, "It [the class] has made me think of sex, gender and sexual orientation as much more fluid concepts and very much open to a person's interpretations" (Hegarty, 2010, p. 14).

While Hegarty (2010) conducted the most in-depth investigation of changes in essentialist beliefs and homonegative prejudice following a human sexuality course to date, there were a number of limitations. The sample was small (n = 37), homogenous (84% white, 86%

women, 92% British), and subject to self-selection bias. Since the seminar in LGBT psychology was an optional course, the students who chose to register were likely more open-minded regarding LGBT issues. Furthermore, the U.K. is more socially and legally supportive of equality for SMs than the U.S., where much of the previous research on prejudice and essentialism has taken place. Since the study was not an experiment, it was subject to threats to internal validity. There is no way to know if there were factors unrelated to the course contributing to the observed changes. While a relationship was discovered, there is no way to know the directionality of that relationship.

While the current study did not address whether attitudes or beliefs came first, we attempted to address several of Hegarty's (2010) limitations and the questions provoked by his work. For example, our use of a true experimental design allowed us to isolate extraneous variables and reduce threats to internal validity to do what he could not: infer true causation. The sample was larger (n = 200), more diverse, and less subject to self-selection bias. Participants were also required to access the study from within the U.S.

A Different Way to Measure SO Beliefs: The Sexual Orientation Beliefs Scale (SOBS)

Building on Haslam and Levy's (2006) three-factor framework – the framework Hegarty (2010) utilized – Arseneau et al. (2013) created the SOBS to investigate a broader spectrum of beliefs about SO than previous research had studied. Similar to Haslam and Levy's (2006) scale, the SOBS examines *essentialist* beliefs (i.e., beliefs that SO categories are inherent and natural). However, the SOBS is unique in that it was developed to consider both *social constructionist* beliefs (i.e., that SO categories are created by people uniquely within their specific socio-historical contexts) and *constructivist* beliefs (i.e., that people have choice in determining to

which SO category or categories they belong). Specific items on the SOBS reflect *social constructionist* (e.g., "Social and environmental factors are the main basis of an individual's sexual orientation;" p. 412) and *constructivist* (e.g., "Individuals choose their sexual orientation;" p. 412) themes.

Arseneau et al. (2013) developed two forms of the measure – one for heterosexual populations and another for LGBT populations. Both versions revealed a multidimensional framework of SO beliefs, highlighting distinctions between multifarious beliefs. The SOBS is made up of four unique, empirically-derived dimensions of SO categories: *Naturalness*, *Discreteness*, *Homogeneity*, and *Informativeness*. The Naturalness subscale measures the belief that SO is inborn and immutable. The Discreteness subscale taps into the belief that SO categories are distinct with clear boundaries between them. The Homogeneity subscale measures the belief that people within a SO category (such as individuals who identify as "gay") are all the same. The Informativeness subscale taps into the belief that knowing a person's SO says a lot about who that individual is. These dimensions built upon Haslam and Levy's (2006) explanation of immutability, discreteness, and universality as distinct forms of essentialist beliefs. Notably, the SOBS is the first psychometrically validated measure to examine both social constructionist and constructionist beliefs about SO within the context of psychological essentialism.

The SOBS (Arseneau et al., 2013) has helped research explore the relationship between SMs SO beliefs and attitudes. Morandini et al. (2015) used the SOBS to investigate the effects of gay men's essentialist beliefs about SO on their internalized homonegativity, sexual identity uncertainty, and psychosocial well-being. They concluded that "essentializing sexual orientation

has mixed implications" (p. 413) for gay men. Viewing SO as biologically-based and existing in discrete categories predicted less sexual identity uncertainty. While endorsing biological beliefs of SO predicted less internalized homonegativity among gay men, discreteness beliefs were linked to more internalized homonegativity.

Similarly, Morandini et al. (2017) used the SOBS (Arseneau et al., 2013) to explore the effects of lesbian and bisexual women's SO beliefs on their SO uncertainty, psychological well-being, and internalized sexual stigma. For both lesbian and bisexual women, endorsing naturalness beliefs were associated with lower internalized stigma, while endorsing discreteness beliefs was linked to greater internalized stigma. Just as Morandini et al. (2015) had found for gay men, biological beliefs and discreteness beliefs had opposite effects on internalized homonegativity for lesbian and bisexual women. More recently, the SOBS has also been utilized in healthcare (Banerjee et al., 2018) and laboratory (Fritzlen et al., 2019) settings.

Using the SOBS (Arseneau et al., 2013), Grzanka et al. (2016) explored SO belief patterns through latent profile analysis. Latent profile analysis is an analytic approach that reveals patterns in participants' responses across multiple continuous variables. Unlike most variable-centered quantitative approaches that place the analytic focus on the variables of interest, latent profile analysis is uniquely person-centered in that it shifts the analytic focus to the people under investigation (Grzanka, 2016; Zeiders et al., 2013). Latent profile analyses on responses from two samples composed primarily of heterosexual college students revealed two identical response patterns (Grzanka et al., 2016). In the second sample only, an additional third response pattern emerged. One group endorsed relatively high scores on all four SOBS subscales (Naturalness, Discreteness, Homogeneity, and Informativeness). Another group of respondents

endorsed the lowest scores on Naturalness and the highest scores on Discreteness, Homogeneity, and Informativeness relative to the two other groups. A third group endorsed low scores on Discreteness, Homogeneity, and Informativeness but high scores on Naturalness. Notably, Naturalness dimension scores were high across all three response patterns (i.e., all were above the scale's 2.5 midpoint). However, respondents in the group that endorsed the lowest scores on the Discreteness, Homogeneity, and Informativeness subscales also reported the lowest levels of homonegativity.

Grzanka et al. (2016) findings are consistent with public opinion research in the U.S. (Pew Research Center, 2015; Washington Post-ABC News, 2014) suggesting that most people—even those who hold the highest levels of homonegative attitudes—endorse the "born this way" argument. However, endorsement of three other types of SO beliefs – Discreteness, Homogeneity, and Informativeness – is linked to greater heterosexism. Grzanka et al. (2016) findings both extend the findings of previous work (Haslam & Levy, 2006; Hegarty, 2002; Hegarty & Pratto, 2001) and complement recent studies (Falomir-Pichastor & Hegarty, 2014; Hubbard & Hegarty, 2014) suggesting that additional research on SO beliefs is merited. Building on Hegarty's (2010) conclusions, Grzanka et al. (2016) findings suggest that specific types of essentialist beliefs—more specifically, beliefs about the discreteness, homogeneity, and informativeness of SO categories—may be better predictors of homonegative prejudice than "born this way" beliefs.

With Grzanka et al. (2016) conclusions in mind, the current study asked: Could interventions that specifically target these types of SO beliefs reduce homonegative prejudice?

And if so, could such interventions be *more* effective than those targeting "born this way" beliefs? The current study predicted that the answer would be "yes" to both of these questions.

Fry et al. (2020) Study

Fry et al. (2020) extended and applied Grzanka et al. (2016) findings by conducting the first true experiment to investigate the impact of diverse SO beliefs on homonegative prejudice and support for gay men's and lesbian women's civil rights. More specifically, they hypothesized that targeting discreteness, homogeneity, and informativeness beliefs about SO may be more effective in decreasing homonegativity and increasing support for gay men's and lesbian women's civil rights than targeting only naturalness beliefs about SO. Fry et al. wrote three essays discussing different lay beliefs about SO as measured by the SOBS (Arseneau et al., 2013). The first essay only discussed scientific research promoting naturalness beliefs by suggesting that SO has biogenetic origins ("Born This Way" condition). The second essay discussed scientific research refuting discreteness, homogeneity, and informativeness beliefs (Social Constructionism condition). A third essay combined the previous two by discussing scientific research that both promoted naturalness beliefs and refuted discreteness, homogeneity, and informativeness beliefs (Hybrid Essentialism condition). They also included a control condition, in which participants did not read an essay but completed the same survey measures as the other participants.

Fry et al. (2020) recruited 201 participants through Amazon's Mechanical Turk (MTurk) service to complete online survey measures 6 to 8 days before the intervention (Time 1). At Time 2, they randomly assigned these participants to either one of the three treatment conditions to read an essay or a control condition. Participants then completed the measures a second time.

They used a 2 (*Time*) x 4 (*Condition*) mixed between-within subjects factorial design (pre-/post-test) to examine shifts in SO beliefs, potential homonegative prejudice reduction, and potential increased support for gay men's and lesbian women's civil rights in each condition.

Fry et al. (2020) expected that those assigned to the conditions that targeted multiple SO beliefs would (1) show the strongest reductions in beliefs about the discreteness, homogeneity, and informativeness of SO, (2) exhibit the strongest reductions in homonegative prejudice, and (3) report the greatest increases in their support for gay men's and lesbian women's civil rights. As predicted, SO beliefs shifted in expected directions across all experimental conditions. Although they observed a small main effective of time on level of homonegative prejudice, Fry et al. did not find a main effect of condition or changes in support for gay men's and lesbian women's civil rights. However, their post hoc analyses showed that the two conditions targeting social constructionist beliefs accounted for most of the homonegative prejudice reduction they observed. With further investigation, Fry et al. concluded that these findings could potentially inform the development of more effective interventions aimed at reducing homonegative prejudice for SMs.

The Current Study

The current study aimed to replicate and extend that of Fry et al. (2020). In addition to replicating Fry et al. findings, we aimed to address many of the limitations of their study by making several improvements in the study's design. We also extended their study by adding new constructs and measures that enabled us to explore new research questions.

The current study had three specific aims. The first aim was to replicate Fry et al. (2020) original finding that participants randomly assigned to the Social Constructionism and Hybrid

Essentialism conditions (i.e., the two conditions targeting SO beliefs) demonstrate greater reductions in their beliefs in the discreteness, homogeneity, and informativeness of SO categories than participants assigned to the "Born This Way" and control conditions. The second aim was to determine which conditions (i.e., intervention essays) were most effective in producing reductions in homonegative prejudice towards gay men, binegativity towards bisexual men, and infrahumanization towards gay and bisexual men at Time 1. The third aim was to examine whether or not any observed changes in SO beliefs, homonegative prejudice, binegativity, and infrahumanization immediately after the interventions at Time 1 would still be present, to some extent, 6 to 8 days after the interventions at Time 2. Each of these aims will be explained further.

Addressing Fry et al. (2020) Limitations

Strength of manipulation. While the interventions clearly shifted SO beliefs in the expected directions, Fry et al. (2020) manipulation may not have been strong enough to differentiate the effects of different types of SO beliefs on homonegative prejudice. After reading a short research essay of 800 to 850 words, participants only answered three multiple-choice reading comprehension questions before proceeding onto the measures without being asked to process the essay they had just read. Did the participants have an opportunity to fully process the content of the essay? Given that biogenetic ideas about the origins of same-sex desire are central in educational programing and social justice advocacy about LGB rights (Diamond & Rosky, 2016; Osmundson, 2011), some participants may have already heard of the ideas they read about in the "Born This Way" condition. In the other treatment conditions, however, participants were likely learning about social constructionism for the first time and may not have had the

opportunity to fully digest these new ideas, which may have gone against their understanding of SO categories.

Furthermore, studies in the literature on attitude change have consistently found that interventions conveying brief messages can effectively change attitudes with lasting effects if the recipient engages in effortful, active processing of the information (Petty & Krosnick, 1995). For example, Broockman and Kalla (2016) were able to effectively reduce antitransgender prejudice through door-to-door canvassing conversations that incorporated strategies known to promote active cognitive processing. Could a weak manipulation explain some of the null findings and why some of the effects were only marginally significant in Fry et al. (2020) study?

While the intervention essays and reading comprehension questions remained the same, the current study aimed to employ a stronger, more effective manipulation. Participants assigned to one of the three treatment conditions were asked to respond to two open-ended reflective questions asking them to write about their thoughts and reactions to the research essay that they just finished reading. With Broockman and Kalla's (2016) study in mind, our goal was to encourage participants to process the content of the interventions on a deeper level. We further aimed to target participants' affect by prompting them to consciously connect with their feelings about the intervention.

Constructs and measures. Several construct validity concerns in Fry et al. (2020) study needed to be addressed. Some of the constructs and measures were not suitable for answering the study's research questions. More specifically, three subscales of the Lesbian, Gay, Bisexual Knowledge and Attitudes Scale for Heterosexuals (LGB-KASH; Worthington et al., 2005) measured constructs that were not relevant to the study. The Knowledge of LGB History,

Symbols, and Community subscale and the Religious Conflict subscale were not analyzed, as they did not relate to any of the constructs of interest (i.e., SO beliefs, homonegative prejudice, support for LGB civil rights). Fry et al. (2020) used the Internalized Affirmativeness subscale to measure homonegative prejudice, but these are actually very different constructs. The Internalized Affirmativeness subscale includes items related to questioning one's own SO (e.g., "I have had sexual fantasies about members of my same sex;" Worthington et al., 2005, p. 109) and participation in activism (e.g., "I would display a symbol of gay pride (pink triangle, rainbow, etc.) to show my support of the LGB community;" p. 109) rather than items focused exclusively on homonegative prejudice. This might explain the null findings on this subscale, even though effects were found on the Modern Homonegativity Scale – Gay Men (MHS-G; Morrison & Morrison, 2002).

Fry et al. (2020) also observed both ceiling and floor effects in their data. While they had intended to use the LGB-KASH Hate subscale (Worthington et al., 2005) as a measure of homonegative prejudice, Fry et al. (2020) observed a floor effect so strong that they could not analyze the data. In other words, reporting hate towards LGB people was so rare that those who did became extreme outliers in the dataset. These findings were not entirely surprising. Due to social desirability bias, participants may have been less likely to endorse items such as, "I sometimes think about being violent toward LGB people" (Worthington et al., 2005, p. 109), even if it were true. Furthermore, this measure was not an appropriate choice for measuring homonegative prejudice, given that homonegative prejudice often does not reach the level of "hate."

On the other hand, Fry et al. (2020) observed ceiling effects on both of their measures of support for LGB rights. The high scores on the Support for Gay and Lesbian Civil Rights Scale (SGLCR; Brown & Henriquez, 2011) and the LGB-KASH LGB Civil Rights subscale (Worthington et al., 2005) may have also been due to social desirability bias. When it comes to civil rights, people may know what the socially acceptable answers are now, even if they do not agree with them personally. Therefore, such survey measures with high face validity may not be suitable for measuring support for LGB civil rights anymore. Given that people often report supporting LGB civil rights while maintaining their homonegative prejudice anyway (Kite & Whitley, 1996; Lewis, 2003; Ventura et al., 2004), support for LGB civil rights is a less important construct and could be eliminated. Given the aforementioned concerns, the LGB-KASH (Worthington et al., 2005) and the SGLCR (Brown & Henriquez, 2011) were not used in the current study.

Fry et al. (2020) included four single-item Feeling Thermometers (Olson & Zabel, 2016) as one way to measure homonegative prejudice. Feeling Thermometers have frequently been used to measure people's feelings towards LGB people (Dessel, 2010; Fritzlen et al., 2019; Haddock et al., 1993; Herek, 2002) and have the benefit of correlating with "a remarkable number of other measures" (Olson & Zabel, 2016, p. 568). However, by analyzing participants' raw scores rather than computing "a standardized feeling thermometer index of explicit prejudice" (Fritzlen et al., 2019, p. 4) for analysis, these measures may have been less sensitive. It is possible that findings that were only approaching statistical significance (i.e., p = .07-.08) in Fry et al. (2020) study would have been significant if standardized scores had been calculated. The current study used Feeling Thermometers that were standardized using Fritzlen et al. (2019)

procedure. This included adding "filler" social identities (e.g., single mothers, Mormons) so that a standardized score could be calculated for each participant's ratings on the items of interest.

Finally, Fry et al. (2020) did not ask about participants' educational attainment. Since MTurk samples are typically more educated that the U.S. population (Shapiro et al., 2013), it is possible that the sample was made up of people with higher levels of education. Given that the interventions are in the form of research essays containing scientific research, they might be more effective for those with college degrees. Also of note, greater educational attainment has been associated with reduced prejudice towards SMs (Napier & Jost, 2008). The current study asked for highest level of educational attainment (e.g., high school diploma).

Duration of effects. Fry et al. (2020) administered measures 6 to 8 days before the interventions (Time 1) and again immediately after the interventions (Time 2). However, like most experimental prejudice reduction interventions (Paluck et al., 2021), Fry et al. (2020) design did not allow them to examine the duration of the observed effects. By not using a longitudinal design after administering the interventions, they could not know if there were any long-term shifts in SO beliefs and homonegative prejudice. Yet, the answer to this question is one of great importance; any observed effects may have more potential to inform the development of interventions to reduce homonegative prejudice when the shifts in SO beliefs and homonegative prejudice remain long-term.

One important consideration for this is how actively the information is processed; indeed, when people engage in effortful, active cognitive processing, even brief messages have the potential to change attitudes with lasting effects (Petty & Krosnick, 1995). Broockman and Kalla (2016) demonstrated through their door-to-door canvassing intervention how a 10-minute

conversation using strategies to encourage active processing resulted in substantial reductions in antitransgender prejudice that persisted three months after the intervention. However, such findings appear to be the exception rather than the rule in the literature where brief interventions rarely yield lasting effects on prejudice-reduction (Paluck & Green, 2009). For example, Cramwinckel et al. (2021) found that observed reductions in modern LGBT negativity disappeared within one week. More often, it seems that intensive, long-term interventions are required for observed decreases in prejudice to remain over time (Cook, 1969; Laar et al., 2005).

The current study investigated the duration of effects. Participants completed measures immediately after the intervention (Time 1) and again 6 to 8 days later (Time 2). This enabled us to assess what, if any, effects of the interventions remained approximately one week after the manipulation.

Extending Fry et al. (2020) Study

In addition to a stronger manipulation and measuring the duration of observed effects, the current study investigated two new constructs that Fry et al. (2020) did not: binegativity and infrahumanization. More specifically, we measured binegativity towards bisexual men and infrahumanization towards gay and bisexual men.

Binegativity. Binegativity (formerly known as "biphobia") refers to "a set of prejudiced attitudes about individuals with a bisexual sexual orientation" (Yost & Thomas, 2012, p. 691). While bisexuals experience similar stressors as lesbian women and gay men, they also experience additional, unique stressors (Deihl & Ochs, 2010). Bisexuals are often stereotyped as people who are "unsure" of their SO, cheat on their romantic partners, and carry sexually transmitted infections (Burleson, 2014; Eliason, 2001; Spalding & Peplau, 1997). In addition to

discrimination from heterosexuals, bisexual people endure discrimination from the lesbian/gay community. Furthermore, lesbian women and gay men often resent bisexuals because they have the ability to choose to be in other-sex relationships (Diamond & Rosky, 2016). Even still, research suggests that bisexual people endure more discrimination from heterosexuals than lesbian women and gay men (Arnett et al., 2019; Roberts et al., 2015).

These unique minority stress experiences (Meyer, 2003) have been associated with greater health disparities for bisexuals. For example, Katz-Wise et al. (2017) found that bisexual-specific minority stress predicted worse physical and general health and more pain above and beyond general minority stress effects. Dyar et al. (2019) discovered that bisexuals were at higher risk for physical health conditions than other SMs. Arnett et al. (2019) found that experiencing antibisexual discrimination from heterosexuals related to trauma symptoms. These trauma symptoms, in turn, had negative implications for both mental and physical wellbeing. Given such health disparities, the Institute of Medicine (2011) has acknowledged the importance of attending to bisexual individuals' unique experiences.

However, heterosexuals' beliefs about bisexuality have largely been absent in the literature (see Grzanka et al., 2016, for a discussion). This is unfortunate since, "Quite simply, individuals with bisexual attractions are not 'exceptions' within the sexual minority populations, but the most common type of sexual minority" (Diamond & Rosky, 2016, p. 381). One exception is Hubbard and de Visser's (2015) study exploring relationships between attitudes toward bisexuals and essentialist beliefs. They found that endorsing discreteness beliefs was associated with more negative attitudes toward bisexuals.

Interestingly, research has also shown that heterosexuals (especially heterosexual men) hold more prejudice towards bisexual men than they hold towards gay men, lesbian women, and bisexual women (Eliason, 2001; Kite & Whitley, 1996; Yost & Thomas, 2012). For example, Yost and Thomas (2012) investigated the impact of gender on heterosexuals' attitudes about bisexuals. Heterosexual participants endorsed more binegativity towards bisexual men than bisexual women. Similarly, more participants attributed negative characteristics to bisexual men in open-ended responses. While heterosexual women's reported binegativity did not differ depending on the gender of the target, heterosexual men reported more binegativity toward bisexual men than toward bisexual women. This gender difference was partially explained by heterosexual men's eroticization of lesbian sex.

Given that bisexual men face more prejudicial attitudes than other SMs, (Eliason, 2001; Kite & Whitley, 1996; Yost & Thomas, 2012), the current study included the Gender-Specific Binegativity Scale-Men (GSBS-Men; Yost & Thomas, 2012). This psychometrically validated measure, based on the psychometrically validated Biphobia Scale (Mulick & Wright, 2002), measured participants' levels of binegativity towards bisexual men, specifically.

Infrahumanization. Leyens et al. (2000) argued that people sometimes treat individuals of outgroups as "infrahumans." When someone categorizes people who are different from themselves as "other" or discriminates against them, this also leads to the person denying that the target group possesses one or more human characteristics. An outgroup is "infrahumanized," then, when one perceives their own group as holding more uniquely human traits than an outgroup (Leyens et al., 2007). Put another way, "infra-humanization is a process by which

people consider their ingroup as fully human and outgroups as less human and more animal-like" (Leyens et al., 2007, p. 140; Leyens et al., 2000).

While primary emotions (e.g., fear, disgust) are typically associated with both humans and animals, secondary emotions (e.g., pride, nostalgia) are typically only associated with humans (Leyens et al., 2000). Secondary emotions tend to be less visible and more related to morality. They contain more of a cognitive (than instinctual) component and are socially constructed (i.e., they are learned over time rather than inborn). Thought of another way, secondary emotions are "part of the human essence" (p. 195).

After synthesizing evidence from the current body of research, Leyens et al. (2000) concluded:

> If people think that their group is superior to other groups, are concerned about their own group, and attribute different essences to their ingroup and outgroups, then they will attribute 'the' human essence to their ingroup and infrahumanize outgroups by attributing to the latter fewer secondary emotions, or even by denying the secondary emotions, which are considered typically human characteristics. (pp. 193-194)

In other words, if one believes that their group has "the human essence, others' essence can only be infrahuman" (p. 194). Notably, the valence (i.e., positive vs. negative) of the secondary emotion is irrelevant; it is the belief that the outgroup does not possess these innately human emotions (the good *and* the bad that make us human) that indicates infrahumanization (Leyens et al., 2007; Leyens et al., 2000). Furthermore, this pattern of differences in attributions must *not* be present for *primary* emotions; if ingroup members attribute more primary *and* secondary

emotions to their own group, this may mean that they just believe their group to be more emotional than the outgroup, rather than more human (Leyens et al., 2007).

Through a series of studies, Leyens et al. (2001) found more evidence to support their argument. Members of both high- and low-status groups attributed a greater number of positive and negative secondary emotions to themselves (i.e., the ingroup) than the outgroup. In another type of task, participants were also reluctant to attribute secondary emotions to the outgroup. Cortes et al. (2005) found that participants attributed more secondary emotions (both positive and negative) to the ingroup than the outgroup. As expected, they did not see this pattern of data for primary emotions.

According to Leyens et al. (2007), "The question remains open as to which outgroups are infra-humanized" (p. 151). While research has investigated infrahumanization of racial, cultural, and nationality outgroups (Cortes et al., 2005; Leyens et al., 2007; Leyens et al., 2001), heterosexuals' infrahumanization of SMs has yet to be investigated. Infrahumanization relies on people holding essentialist beliefs about groups (Leyens et al., 2007). For example, Bastian and Haslam (2008) found that Australians who held stronger essentialist beliefs reported more infrahumanizing attitudes towards an outgroup than those who reported weaker essentialist beliefs. Infrahumanization also relies on people being divided into ingroups and outgroups with strict boundaries (Leyens et al., 2007).

The current study was the first to experimentally explore the impact of essentialist and social constructionist beliefs on heterosexuals' infrahumanization towards SMs. Given that essentialist beliefs make infrahumanization more likely while social constructionist beliefs make infrahumanization less likely (Bastian & Haslam, 2008; Leyens et al., 2007), the current study

included a measure of infrahumanization first developed and used by Stathi et al. (2017). This scale combines two previous measures of infrahumanization (Cortes et al., 2005; Vezzali et al., 2012) and measured participants' levels of infrahumanization towards gay men and bisexual men specifically.

Hypotheses

In light of the aforementioned body of literature, the multidimensional, empirically-derived framework of SO beliefs established by Arseneau et al. (2013) and Grzanka et al. (2016), and Fry et al. (2020) findings, we formed three hypotheses.

Hypothesis 1. First, we predicted that participants randomly assigned to the Social Constructionism and Hybrid Essentialism conditions (i.e., the two conditions targeting multiple SO beliefs) would demonstrate greater reductions in their beliefs in the discreteness, homogeneity, and informativeness of SO categories than participants assigned to the "Born This Way" and control conditions, thereby replicating Fry et al. (2020) findings.

Hypothesis 2. Second, we expected that immediately after the interventions at Time 1, participants in the Social Constructionism and Hybrid Essentialism conditions would exhibit greater reductions in homonegative prejudice towards gay men and binegativity towards bisexual men than participants in the "Born This Way" and control conditions. While we anticipated that the "Born This Way" condition could also have reduced homonegative prejudice and binegativity, we expected that "Born This Way" would be less effective at doing so than the other two experimental conditions.

We also expected that participants in the Social Constructionism condition would exhibit greater reductions in infrahumanization than participants in the "Born This Way" condition.

While we suggested that it was possible that the Hybrid Essentialism condition would also reduce infrahumanization to some extent, given that half of the intervention essay promotes social constructionist beliefs (i.e., refutes beliefs in the discreteness, homogeneity, and informativeness of SO categories), one must remember that the other half of the essay promotes essentialist beliefs (i.e., promotes beliefs in the naturalness of SO categories). Therefore, we expected that the effects would "cancel each other out," thereby resulting in levels of infrahumanization similar to the control condition.

Hypothesis 3. Third, we hypothesized that the observed changes in SO beliefs, homonegative prejudice, infrahumanization, and binegativity immediately after the interventions at Time 1 would still be present, to some extent, 6 to 8 days after the interventions at Time 2. However, we expected that the remaining effects would be weaker at Time 2 than at Time 1, and some effects that were statistically significant at Time 1 would no longer be significant at Time 2.

CHAPTER 2

METHODS

Participants

We recruited participants through Amazon's Mechanical Turk (MTurk) service from March 2021 to September 2021. While we acknowledge that MTurk samples tend not to be representative of the U.S. population when it comes to religion (Burnham et al., 2018), political affiliation (Berinsky et al., 2012), or education (Shapiro et al., 2013), prior research suggested to us that this platform would result in a more representative sample than we could obtain through our psychology department subject pool (Buhrmester et al., 2011). To be eligible, participants were required to meet the following eligibility criteria: (1) be at least 18 years old at the time of the first survey; (2) identify their SO as straight/heterosexual; (3) be able to read English; (4) have a valid, active MTurk worker account; (5) have not participated in "Examining Beliefs and Attitudes about Social Issues" in 2018 (i.e., Fry et al., 2020); and (6) access the surveys from a user domain within the U.S.

The initial sample comprised 690 participants. Fourteen (2.0%) were excluded for not having a valid survey code for payment that matched survey data in the dataset. Another 177 (25.7%) were excluded because they did not complete the Time 2 survey. An additional 97 (14.1%) were excluded for identifying their SO as something other than "heterosexual/straight" on the demographic questionnaire. Next, 194 (28.1%) were excluded for incorrectly answering more than one reading comprehension check question. Five (0.7%) were excluded for incorrectly

responding to more than one validity check item at either time point.[5] Two (0.3%) more were excluded for not writing at least one English word as part of their two essay reflection questions, and 1 (0.1%) was excluded for omitting more than 15% of the survey items at either time point. This yielded a final sample of 200 participants for analysis with a mean age of 39.34 years (*SD* = 12.35, range = 22 to 76).

In terms of gender, 86 (43.0%) participants identified as women, 114 (57.0%) identified as men, 1 (0.5%) identified as transgender, 0 (0.0%) identified as gender nonbinary, 0 (0.0%) identified as genderqueer, and 0 (0.0%) identified as an other gender. For race/ethnicity, 26 (13.0%) identified as Black/African American, 11 (5.5%) identified as Asian/Asian American, 156 (78.0%) identified as White/European American, 8 (4.0%) identified as Latino/Latina/Latinx, 2 (1.0%) identified as Middle Eastern/Arab, 3 (1.5%) identified as Native American/Alaskan Native, 0 (0.0%) identified as Native Hawaiian/Pacific Islander, and 1 (0.5%) identified as other. Given that identifying as heterosexual/straight was required by the inclusion criteria, all 200 (100.0%) participants in the final sample identified as heterosexual/straight. Regarding religious affiliation, 38 (19.0%) identified as Protestant, 99 (49.5%) identified as Catholic, 1 (0.5%) identified as Latter-Day Saint, 1 (0.5%) identified as Jehovah's Witness, 4 (2.0%) identified as Orthodox Christian, 12 (6.0%) identified as Other Christian, 3 (1.5%) identified as Jewish, 3 (1.5%) identified as Buddhist, 2 (1.0%) identified as Muslim, 1 (0.5%) identified as Hindu, 1 (0.5%) identified as affiliating with another world religion, 36 (18.0%) identified as unaffiliated, and 2 (1.0%) identified as "not sure" of their religious affiliation.

[5] We adopted the procedures used by Fry et al. (2020) for validity checks. Each of the six measures at Time 1 and Time 2 included a single validity check item somewhere in the measure. This item asked participants to provide a specific response to the item (e.g., "Please select 'Agree' in this row").

For highest level of education attained, 5 (2.5%) had a high school diploma or equivalent, 18 (9.0%) had some college but no degree, 8 (4.0%) held an associate's degree, 117 (58.5%) held a bachelor's degree, 49 (24.5%) held a master's degree, and 3 (1.5%) held a doctoral or professional degree. In terms of political affiliation, 121 (60.5%) identified as Democrat, 1 (0.5%) identified as Green, 6 (3.0%) identified as Libertarian, 40 (20.0%) identified as Republican, 27 (13.5%) identified as Independent/unaffiliated, 1 (0.5%) identified their political affiliation as "other," and 4 (2.0%) identified their political affiliation as "none." The sample leaned just slightly conservative as measured on a scale ranging from 1 (*Most PROGRESSIVE / LIBERAL*) to 10 (*Most CONSERVATIVE*) (M = 6.03, SD = 3.04). One's family's social class was measured on a scale from 1 (*LOWER* class) to 10 (*UPPER* class), and the mean response was 6.35 (SD = 1.89). One's own social class was measured using the same scale, and the mean response was 6.51 (SD = 1.85). Finally, 25 (12.5%) participants identified as having a disability, and 44 (22.0%) identified as veterans.

Experimental Manipulation

Intervention Essays The current study utilized the same intervention essays as Fry et al. (2020). The three essays summarized research related to different lay beliefs about SO as measured by the subscales of the SOBS (i.e., Naturalness, Discreteness, Informativeness, and Homogeneity; Arseneau et al., 2013). Each essay was 800 to 850 words in length and written in language accessible to a lay audience (see Appendix A, Appendix B, and Appendix C for the intervention essays). The argument and main points were presented in the first paragraph in each essay.

The essay for the "Born This Way" condition (Condition A) summarized current scientific research suggesting that SO is biogenetic (i.e., SO originates in the human genetic

code) and is shaped prenatally (i.e., Naturalness). This essay summarized research on genes/heredity, endocrinology, and the brain/anatomy as its evidence (see Appendix A). The essay for the "Social Constructionism" condition (Condition B) summarized current scientific research suggesting that SO categories are not as discrete as we might typically think (Discreteness), SO category members are extremely heterogeneous (Homogeneity), and knowing a person's SO says fairly little about who the person is (Informativeness). This essay omitted any reference to the naturalness of SO (see Appendix B). The essay for the "Hybrid Essentialism" condition (Condition C) combined the main arguments from the "Born This Way" condition and "Social Constructionism" condition essays. However, it condensed these arguments to keep the essay relatively the same length as the other two (see Appendix C).

Comprehension Check

After each essay, participants were presented with three multiple-choice comprehension check questions to test their understanding of what they read (see Appendix D, Appendix E, and Appendix F for reading comprehension questions). These questions were the same as those used by Fry et al. (2020). Participants could look back at the essay to answer the questions if they chose. Of the 139 participants randomly assigned to an intervention essay, 77 (55.4%) answered two questions correctly, while 62 (44.6%) answered all three questions correctly. Participants who answered fewer than two of these questions correctly were excluded from the final sample.

Reflection Questions

To strengthen the manipulation, participants assigned to one of the three treatment conditions were asked to respond to two open-ended questions designed to have them reflect on the research essay they read. The questions asked: (1) "What was the key point of the essay that

you just read?" and (2) "What do you think about the author's main argument in the essay that you just read?" Participants were asked to write at least 50 words for each response, as indicated by a word count below each text box as they were writing. The instructions assured participants there were no "incorrect" answers. With previous research suggesting the importance of active processing in mind (Broockman & Kalla, 2016; Petty & Krosnick, 1995), the purpose of these questions was to encourage participants to process the content of the essays on a deeper cognitive level, targeting their affect by prompting them to consciously connect with their feelings about the intervention.

Measures

Sexual Orientation Beliefs Scale (SOBS) Participants completed SOBS Form 2 (Arseneau et al., 2013) to assess their beliefs about SO. The 31-item measure includes four separately scored subscales: (1) Naturalness (e.g., "It is impossible to truly change one's sexual orientation;" p. 415), (2) Discreteness (e.g., "Sexual orientation is a category with distinct boundaries: A person is either gay/lesbian or heterosexual;" p. 415), (3) Homogeneity (e.g., "People who share the same sexual orientation pursue common goals;" p. 415), and (4) Informativeness (e.g., "It's useful to group people according to their sexual orientation;" p. 415). The SOBS Form 2 uses a 5-point, Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores are obtained by calculating the mean of item scores on each subscale, resulting in four scores ranging from 1 to 5. Higher scores indicate stronger endorsement of the construct. Cronbach's alphas for each subscale in the original study were as follows: Naturalness = .77; Discreteness = .84; Homogeneity = .75; Informativeness = .78 with these four factors accounting for 42% of the cumulative variance (Arseneau et al., 2013). In the current study, internal consistency for each

subscale at Time 1 was as follows: Naturalness = .58; Discreteness = .69; Homogeneity = .85; Informativeness = .79. Internal consistency for each subscale at Time 2 was as follows: Naturalness = .58; Discreteness = .73; Homogeneity = .85; Informativeness = .83.

Modern Homonegativity Scale – Gay Men (MHS-G) Participants completed the 12-item MHS-G (Morrison & Morrison, 2002) to measure their homonegative attitudes. Rather than assessing overt homonegativity, the MHS examines subtler negative attitudes towards gay men and lesbian women. While there are no subscales, the measure combines three interconnected themes: (1) gay men and lesbian women make unreasonable arguments for changes in society, (2) occurrences of heterosexism are rare, and (3) gay men and lesbian women do not fully integrate into society because they overstate the importance of their SO. The MHS uses a 5-point, Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores indicating greater homonegative attitudes. The sum of the individual item scores results in a total score ranging from 12 to 60. The measure has good reliability ($\alpha = .87$) and evidence of construct validity (Morrison & Morrison, 2002). There are separate versions of the measure for gay men (MHS-G) and lesbian women (MHS-L). Given that the current study is focused on homonegative prejudice towards SM men specifically, only the MHS-G was administered. In the current study, Cronbach's alpha was .90 at Time 1 and .91 at Time 2.

Gender-Specific Binegativity Scale – Men (GSBS-Men)

The 30-item psychometrically validated GSBS-Men (Yost & Thomas, 2012), adapted from the psychometrically validated Biphobia Scale (Mulick & Wright, 2002), was administered to measure participants' binegativity towards bisexual men. Mulick and Wright (2002) developed the Biphobia Scale to measure people's negative thoughts (e.g., "I think bisexuality is

wrong;" p. 57), negative feelings (e.g., "I feel uneasy around bisexual people;" p. 57), and discriminatory behaviors (e.g., "I avoid bisexual people;" p. 57) toward bisexuality and bisexuals. The GSBS uses a 6-point, Likert-type scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*), with higher scores indicating greater binegativity. To score the instrument, raw scores on the 30 items are averaged, resulting in a mean score ranging from 1 to 6. The GSBS-Men has a single factor accounting for 43% of the variance and has good reliability ($\alpha = .95$). In the current study, Cronbach's alpha was .97 at Time 1 and .97 at Time 2.

Infrahumanization Measure

Participants also completed Stathi et al. (2017) measure of infrahumanization, which they developed by combining two previous infrahumanization measures (Cortes et al., 2005; Vezzali et al., 2012). Participants are presented with a list of 16 emotions. The primary emotions subscale is made up of 8 primary emotions ($\alpha = .79$), 4 of which are positive (e.g., "happiness") and 4 of which are negative (e.g., "aversion"). The secondary emotions subscale is made up of 8 secondary emotions ($\alpha = .79$), 4 of which are positive (e.g., "contentment") and 4 of which are negative (e.g., "melancholia"). Participants are asked to indicate the extent to which they think people from a target outgroup experience each emotion on a 7-point semantic differential scale, ranging from 1 (*not at all*) to 7 (*very much*). To score each subscale, raw scores for the 8 emotions are averaged, resulting in mean scores ranging from 1 to 7 on each subscale. Higher scores on the primary emotions subscale indicate higher attributions of primary emotions to the target outgroup, while higher scores on the secondary emotions subscale indicate higher attributions of secondary emotions to the target outgroup. In accordance with previous research (Stathi et al., 2017; Vezzali et al., 2012), the current study used the secondary emotions subscale

as its measure of infrahumanization. Because secondary emotions indicate attributions of humanness to an outgroup (Leyens et al., 2000; Vezzali et al., 2012), higher scores on the secondary emotions subscale indicate lower levels of infrahumanization.

In order to measure infrahumanization towards gay men and bisexual men separately, the measure was presented twice. One time, the instructions read, "Please indicate to what extent you think gay men feel each of the following emotions." The other time, the instructions read, "Please indicate to what extent you think bisexual men feel each of the following emotions." The order in which the surveys were presented was counterbalanced to negate any potential order effects. Internal consistency for each subscale at Time 1 was as follows: Gay Men Primary Emotions = .86; Gay Men Secondary Emotions = .87; Bisexual Men Primary Emotions = .87; Bisexual Men Secondary Emotions = .88. Internal consistency for each subscale at Time 2 was as follows: Gay Men Primary Emotions = .84; Gay Men Secondary Emotions = .86; Bisexual Men Primary Emotions = .85; Bisexual Men Secondary Emotions = .86. While we administered the full measures, we did not include the primary emotions subscales in our analyses, as these did not measure infrahumanization.

Feeling Thermometer Participants completed a "feeling thermometer" (Olson & Zabel, 2016) to measure their overall subjective attitudes toward a variety of social groups on a scale ranging from 0° (*extremely negative*) to 100° (*extremely positive*). Participants could select any whole number in this range. Higher "temperatures" on the thermometer represent more positive attitudes towards that social group. Social groups were presented in a random order and included "gay men," "bisexual men," "lesbian women," "bisexual women," and filler social groups (e.g., single mothers, Mormons). Following Fritzlen et al. (2019) procedure, we converted the raw

scores for each of the four SM identities into *z*-scores (i.e., subtracted the participant's average rating of all other social groups from the participant's rating of the target identity, then divided the difference by the standard deviation of the participant's ratings of all social groups). More positive *z*-scores indicate more positive attitudes toward the target identity compared to the other social groups.

Demographic Questionnaire At Time 1 only, participants completed a demographic questionnaire. Participants provided their (1) age (as a whole number in years); (2) gender identity; (3) race/ethnicity; (4) sexual orientation; (5) nationality; (6) religious affiliation; (7) family's social class (on a 10-point semantic differential scale); (8) personal social class (on a 10-point semantic differential scale); (9) disability status; (10) veteran status; (11) political affiliation; (12) conservativeness (on a 10-point semantic differential scale); and (13) highest level of education attained. The two questions pertaining to social class were based on the MacArthur Subjective Social Status Scale (Adler et al., 2000).

Procedure

The University of Tennessee, Knoxville Institutional Review Board approved all procedures and materials for this study. This research study fully abided by The American Psychological Association's ethical guidelines for human participants in research (American Psychological Association, 2017).

We recruited our participants through MTurk, an online marketplace that "functions as a one-stop shop for getting work done" by allowing people to solicit others to do tasks for them for payment (Buhrmester et al., 2011, p. 3). MTurk "workers" (i.e., people who choose to complete tasks for cash payment) can search for available tasks on the MTurk website. While MTurk

"requesters" (i.e., those who pay workers to complete tasks) can offer most any task that can be completed with a computer, the platform is ideal for researchers who can use the website's features to complete projects from beginning to end. Indeed, MTurk provides all of the main requirements for conducting a research study, including a large subject pool, a compensation system for participants, and tools to assist with study design, recruitment of participants, and data collection. The ability to link participants to online survey tools like *Qualtrics* makes MTurk an especially useful resource for conducting research in the social sciences, including psychology (for a more thorough review of MTurk and its features, see Buhrmester et al., 2011).

Participants were recruited through MTurk from March 2021 to September 2021. Once an MTurk worker logged into their MTurk account, the current study appeared under the title "Examining Beliefs and Attitudes about Social Issues II (Part 1) [~45 minutes]" on the MTurk Human Intelligence Task (HIT) Groups webpage under the Requester "Kevin Fry." Here, workers were able to preview a brief, vague description of the study, along with qualifications, time allotted, and keywords. Once a worker decided to click the "Accept & Work" button on the HIT, they were directed to the MTurk interface for the HIT, which included the title, description, qualifications, instructions, survey link to access the study in *Qualtrics*, and box to paste their survey code into in order to receive payment upon completion of the survey.

Once workers clicked on the link, they were taken to the Time 1 survey in *Qualtrics*. The first page was the consent form. If they consented electronically, *Qualtrics* randomly assigned participants to one of the four conditions: the "Born This Way" condition (Condition A), the "Social Constructionism" condition (Condition B), the "Hybrid Essentialism" condition

(Condition C), or the control condition (Condition D).[6] Those randomly assigned to Conditions A, B, or C were instructed to read their respective essays, answer the three comprehension check questions, and answer the two reflection questions. Once finished, they were taken to the measures and demographic questionnaire. Participants randomly assigned to Condition D were taken directly to the measures and demographic questionnaire following electronic consent. Upon completion, participants were directed to a debriefing form that explained the procedure for completing the second part of the study. Upon submission, *Qualtrics* assigned workers a random number that they were then instructed to paste into the survey code box on the MTurk HIT interface in order to receive payment of $1.00 for the 30 to 45 minutes of their time.

Six days after participating in Time 1, participants received an MTurk bonus payment of $0.25. The bonus payment notification email contained a reminder message letting participants know that their 72-hour window was now open to participate in Time 2. Since MTurk workers are always anonymous (other than their Worker ID), the bonus payment feature in MTurk enabled us to send an email message to each worker without knowing their identity. Participants had from midnight EST on Day 6 until 11:59 PM EST on Day 8 to complete Time 2.

Workers returned to MTurk to register for Time 2, which appeared under the title "Examining Beliefs and Attitudes about Social Issues II (Part 2) [~20 minutes]" on the MTurk HIT Groups webpage under the Requester "Kevin Fry." The HIT interface they saw was similar to Time 1 and included the link to the Time 2 survey in *Qualtrics*. Once workers clicked on the link, they were taken to the Time 2 survey in *Qualtrics*. Once again, the first page was the consent form. Once they consented electronically, *Qualtrics* took participants to the measures

[6] Once we had obtained enough participants in the control condition for our analyses, we began randomly assigning participants to one of the three treatment conditions instead.

once again. The measures were all the same as those administered at Time 1. However, the demographic questionnaire was not included again. Upon completion, participants were directed to another debriefing form. Upon submission, *Qualtrics* assigned workers another random number that they were instructed to paste into the survey code box on the MTurk HIT interface in order to receive payment of $2.00 for the additional 15 to 20 minutes of their time. Even though MTurk workers were asked to do less work at Time 2, they received more compensation in an attempt to encourage them to complete the entire study.

Analyses

Following Cohen's (1992) recommendations for analyses of variance, we aimed to power the current study at .80 with an alpha of .05 to detect a medium effect size (d = .25). Using Cohen's (1988) effect size specifications, an a priori power analysis in *G*Power 3.1* for "ANOVA: Repeated measures, within-between interaction" revealed that a total sample size of 180 would be necessary to achieve this level of statistical power. Based on this, we aimed to recruit 45 participants for each of the four conditions to achieve an *N* of 180. Prior to hypothesis testing, we examined *N* for each condition. While the Social Constructionism (*n* = 52), Hybrid Essentialism (*n* = 47), and control (*n* = 61) conditions all contain desired power, the Born This Way condition (*n* = 40) is slightly underpowered. Even so, we decided that we had sufficient power to move forward with our analyses.

All other statistical analyses were conducted in *SPSS Version 27*. We conducted descriptive analyses across all demographic variables to obtain frequency distributions, means, and standard deviations. We determined mean scores with standard deviations for the 20 dependent variables obtained from the measures and computed Pearson's correlations between

the dependent variables. As a random assignment check, we used one-way ANOVA and chi-square tests for independence to investigate whether or not there were statistically significant differences between each of the four conditions within key demographic variables. We conducted 2 (*Time*: Time 1, Time 2) x 4 (*Condition*: "Born This Way" – Condition A, "Social Constructionism" – Condition B, "Hybrid Essentialism" – Condition C, Control – Condition D) repeated measures ANOVAs with between-subjects comparisons and Tukey's HSD post hoc tests to examine changes from Time 1 to Time 2 and between the four conditions. To explore significant interaction effects, we examined simple main effects of condition at Time 1 and Time 2 using one-way ANOVA with Tukey's HSD post hoc tests and simple main effects of time for each condition using paired-samples *t*-tests. When assumptions of ANOVA were violated, we performed log linear transformations and conducted the analyses again using Games-Howell post hoc tests. In these cases, we used Welch's ANOVAs with Games-Howell post hoc tests to examine simple main effects.

CHAPTER 3

RESULTS

Means, standard deviations, and Pearson correlations for all key variables are in Table 1. Prior to testing our hypotheses, we wanted to ensure there were no statistically significant differences in key demographic variables between the four conditions as a random assignment check. The results of a one-way ANOVA showed there were no significant differences in participant age by condition, $F(3, 196) = 0.34$, $p = .80$, $\eta_p^2 = .01$. Next, we recoded gender into a binary variable, only including participants who identified as a "man" or a "woman" in the analysis. A chi-square test for independence revealed no significant differences in participant gender by condition, $\chi^2(3, 198) = 4.44$, $p = .22$, phi = .15. We next recoded race into a binary variable, identifying participants as either "White" or a "Person of Color." (Those indicating their race as anything other than "White" were coded as a "Person of Color," even if they also identified as "White.") A chi-square test for independence revealed no significant differences in participant race by condition, $\chi^2(3, 200) = 2.82$, $p = .42$, phi = .12. We therefore concluded that random assignment was successful.

Next, we examined boxplots of all key outcome variables to look for outliers and found no extreme outliers (i.e., data points more than 3 times smaller or larger than the interquartile range). Therefore, there was no reason to exclude any dependent variable from our analyses due to outliers.

Next, we examined our data for normality. Given the relatively small number of data points per condition and the restricted range of our Likert scale data, we concluded that Shapiro-Wilk tests would be too sensitive. Instead, we decided to assess for normality by examining

skewness and kurtosis values. After reviewing the statistics literature, we discovered that several authors consider skewness values between -2 and 2 and kurtosis values between 0 and 7 to be acceptable (Byrne, 2016; Curran et al., 1996; Hair et al., 2010; West et al., 1995). These authors state that if skewness and kurtosis values fall into these ranges, the data can be considered normally distributed and appropriate for analyses. For the Born This Way condition, skewness values ranged from -0.51 to 0.66, and kurtosis values ranged from 1.72 to 4.18. For the Social Constructionism condition, skewness values ranged from -1.22 to 0.11, and kurtosis values ranged from 1.92 to 6.31. For the Hybrid Essentialism condition, skewness values ranged from -0.67 to 0.88, and kurtosis values ranged from 1.64 to 4.56. For the control condition, skewness values ranged from -1.05 to 1.07, and kurtosis values ranged from 1.85 to 6.01. Based on these ranges, we deemed all our key outcome variables to be roughly normally distributed.

We next checked for the assumptions of covariances and homogeneity of variances necessary for repeated measures ANOVAs with between-subjects comparisons. For each analysis, we examined Box's Test of Equality of Covariance. Box's *M* was violated for the analysis for the SOBS Discreteness dimension. Next, we examined Levene's Test of Equality of Error Variances for each analysis and found five violations. Levene's Test was violated for the analyses for the SOBS Discreteness dimension, the SOBS Naturalness dimension, the MHS-G, the GSBS-Men, and the Infrahumanization Questionnaire (Bisexual Men). To address these violations, we decided to perform log linear transformations on the data associated with each of these analyses. We performed all five analyses again using the transformed data and discovered that there were no longer violations for the analyses for the SOBS Naturalness dimension and the Infrahumanization Questionnaire (Bisexual Men). For the remaining three analyses, we

encourage readers to interpret these findings with caution. While these five analyses were performed using transformed data, the original untransformed means and standard deviations are always reported for the reader's ease of interpretation.

With these considerations in mind, we proceeded with interpreting each AVOVA. To test our hypotheses, we first conducted 2 (*Time*: Time 1, Time 2) x 4 (*Condition*: "Born This Way" – Condition A, "Social Constructionism" – Condition B, "Hybrid Essentialism" – Condition C, Control – Condition D) repeated measures ANOVAs with between-subjects comparisons and Tukey's HSD post hoc tests to examine main effects and interaction effects. When assumptions of covariances and/or homogeneity of variances were violated, Games-Howell post hoc tests were used to exercise more caution. To further probe significant interaction effects, we conducted one-way ANOVAs with Tukey's HSD post hoc tests to examine simple main effects of condition at each time point. When assumptions of covariances and/or homogeneity of variances were violated in the first analysis, we examined simple main effects of condition by conducting Welch's ANOVAs with Games-Howell post hoc tests to exercise more caution. When indicated, we also conducted paired-samples *t*-tests to further probe interaction effects by examining simple main effects of time for each condition.

Sexual Orientation Beliefs

SOBS Discreteness Dimension Results showed there was no time by condition interaction, $F(3,196) = 2.33$, $p = .08$, $\eta_p^2 = .03$. There was no main effect of time, $F(1,196) = 0.96$, $p = .33$, $\eta_p^2 = .01$, with levels of discreteness holding constant across Time 1 ($M = 3.01$, $SD = 0.73$) and Time 2 ($M = 3.08$, $SD = 0.78$). There was also no main effect of condition, $F(3,196) = 2.34$, $p = .07$, $\eta_p^2 = .04$, with participants assigned to the "Born This Way" ($M = 3.00$, $SD = 0.87$), Social

Constructionism (M = 3.07, SD = 0.58), Hybrid Essentialism (M = 2.85, SD = 0.71), and control (M = 3.20, SD = 0.58) conditions all reporting similar levels of discreteness. Since there was no interaction effect, we did not probe further by examining simple main effects.

Taken together, these findings do not support our first hypothesis. Participants randomly assigned to the Social Constructionism and Hybrid Essentialism conditions did not demonstrate greater reductions in their beliefs in the discreteness of SO categories than those assigned to the "Born This Way" and control conditions.

SOBS Naturalness Dimension Results showed there was no time by condition interaction, $F(3,196) = 1.24$, $p = .30$, $\eta_p^2 = .02$. There was also no main effect of time, $F(1,196) = 1.04$, $p = .31$, $\eta_p^2 = .01$, indicating that there were no significant difference in levels of naturalness from Time 1 (M = 3.23, SD = 0.48) to Time 2 (M = 3.27, SD = 0.49). However, there was a significant main effect of condition with a medium-to-large effect size, $F(3,196) = 6.91$, $p < .001$, $\eta_p^2 = .10$, which we probed further (see Figure 1). A Games-Howell post hoc test revealed that participants assigned to the "Born This Way" condition reported higher Naturalness Dimension scores (M = 3.53, SD = 0.48) than participants assigned to the Social Constructionism (M = 3.17, SD = 0.43, $p < .01$), Hybrid Essentialism (M = 3.21, SD = 0.39, $p < .01$), and control (M = 3.17, SD = 0.34, $p < .001$) conditions. Since there was no interaction effect, we did not probe further by examining simple main effects.

While beliefs in the naturalness of SO categories were not included in our first hypothesis, these findings provide support for our third hypothesis that predicted that the observed changes in SO beliefs immediately after the interventions at Time 1 would still be present at Time 2. Indeed, there was no main effect of time or interaction effect, suggesting that

participants assigned to the "Born This Way" condition reported higher Naturalness Dimension scores than participants assigned to the other three conditions at both time points.

SOBS Homogeneity Dimension Results showed there was no time by condition interaction, $F(3,196) = 1.19$, $p = .32$, $\eta_p^2 = .02$. There was no main effect of time, $F(1,196) = 0.13$, $p = .72$, $\eta_p^2 < .01$, with levels of homogeneity holding constant across Time 1 ($M = 3.34$, $SD = 0.83$) and Time 2 ($M = 3.32$, $SD = 0.84$). There was also no main effect of condition, $F(3,196) = 2.23$, $p = .09$, $\eta_p^2 = .03$, with participants assigned to the "Born This Way" ($M = 3.19$, $SD = 0.74$), Social Constructionism ($M = 3.31$, $SD = 0.86$), Hybrid Essentialism ($M = 3.20$, $SD = 0.77$), and control ($M = 3.53$, $SD = 0.70$) conditions all reporting similar levels of homogeneity. Since there was no interaction effect, we did not probe further by examining simple main effects.

Taken together, these findings do not support our first hypothesis. Participants randomly assigned to the Social Constructionism and Hybrid Essentialism conditions did not demonstrate greater reductions in their beliefs in the homogeneity of SO categories than those assigned to the "Born This Way" and control conditions as we had expected.

SOBS Informativeness Dimension Results showed there was no time by condition interaction, $F(3,196) = 2.00$, $p = .12$, $\eta_p^2 = .03$. There was also no main effect of time, $F(1,196) = 0.93$, $p = .34$, $\eta_p^2 = .01$, indicating that there were no significant differences in levels of informativeness from Time 1 ($M = 3.44$, $SD = 0.69$) to Time 2 ($M = 3.46$, $SD = 0.74$). There was also no main effect of condition, $F(3,196) = 1.95$, $p = .12$, $\eta_p^2 = .03$, with participants assigned to the "Born This Way" ($M = 3.47$, $SD = 0.70$), Social Constructionism ($M = 3.35$, $SD = 0.74$), Hybrid Essentialism ($M = 3.34$, $SD = 0.62$), and control ($M = 3.61$, $SD = 0.62$) conditions all reporting

similar levels of informativeness. Since there was no interaction effect, we did not probe further by examining simple main effects.

Taken together, these findings do not support our first hypothesis. Participants randomly assigned to the Social Constructionism and Hybrid Essentialism conditions did not demonstrate greater reductions in their beliefs in the informativeness of SO categories than those assigned to the "Born This Way" and control conditions as we had expected.

Homonegative Prejudice towards Gay Men

MHS-G Results showed there was no time by condition interaction, $F(3,196) = 0.48$, $p = .70$, $\eta_p^2 = .01$. There was no main effect of time, $F(1,196) = 1.21$, $p = .27$, $\eta_p^2 = .01$, with levels of modern homonegativity towards gay men holding constant across Time 1 ($M = 37.14$, $SD = 9.87$) and Time 2 ($M = 36.98$, $SD = 10.42$). However, there was a medium main effect of condition, $F(3,196) = 4.79$, $p < .01$, $\eta_p^2 = .07$, which we probed further (see Figure 2). A Games-Howell post hoc test revealed that participants assigned to the "Born This Way" condition reported lower levels of modern homonegativity towards gay men ($M = 33.29$, $SD = 12.60$) than participants assigned to the Social Constructionism condition ($M = 40.06$, $SD = 8.53$, $p = .02$). Since there was no interaction effect, we did not probe further by examining simple main effects.

Taken together, these findings do not support our second hypothesis. Participants randomly assigned to the Social Constructionism and Hybrid Essentialism conditions did not exhibit greater reductions in homonegative prejudice towards gay men than participants assigned to the "Born This Way" and control conditions as we had expected. Rather, we observed quite the opposite; "Born This Way" participants reported lower levels of modern homonegativity towards gay men than Social Constructionism participants. However, these findings do support

our third hypothesis that the observed changes in homonegative prejudice after the interventions at Time 1 would still be present at Time 2. Indeed, there was no main effect of time or interaction effect, suggesting that "Born This Way" participants reported lower levels of modern homonegativity towards gay men than Social Constructionism participants at both time points.

Feeling Thermometer (Gay Men) Results showed there was no time by condition interaction, $F(3,186) = 2.05$, $p = .11$, $\eta_p^2 = .03$. There was no main effect of time, $F(1,186) = 2.06$, $p = .15$, $\eta_p^2 = .01$, with "temperature" indicating feelings towards gay men compared to other social groups (as indicated by a *z*-score) holding constant across Time 1 ($M = -0.42$, $SD = 0.97$) and Time 2 ($M = -0.49$, $SD = 1.00$). There was also no main effect of condition, $F(3,186) = 0.94$, $p = .43$, $\eta_p^2 = .02$, with participants assigned to the "Born This Way" ($M = -0.26$, $SD = 0.87$), Social Constructionism ($M = -0.42$, $SD = 0.91$), Hybrid Essentialism ($M = -0.53$, $SD = 0.83$), and control ($M = -0.54$, $SD = 0.84$) conditions reporting similar feelings towards gay men. Since there was no interaction effect, we did not probe further by examining simple main effects.

Taken together, these findings do not support our second hypothesis. Participants randomly assigned to the Social Constructionism and Hybrid Essentialism conditions did not exhibit greater reductions in homonegative prejudice than those assigned to the "Born This Way" and control conditions.

Binegativity towards Bisexual Men

GSBS-Men

Results showed a significant time by condition interaction with a medium effect size, $F(3,196) = 4.39$, $p = .01$, $\eta_p^2 = .06$ (see Figure 3). There was no main effect of time, $F(1,196) = 2.99$, $p = .09$, $\eta_p^2 = .02$, with levels of binegativity towards bisexual men holding constant across

Time 1 (M = 3.08, SD = 1.24) and Time 2 (M = 3.11, SD = 1.22). However, there was a significant main effect of condition with a medium effect size, $F(3,196) = 4.84$, $p < .01$, $\eta_p^2 = .07$, which we probed further. A Games-Howell post hoc test revealed that participants assigned to the "Born This Way" condition reported less binegativity towards bisexual men (M = 2.58, SD = 1.25) than participants assigned to the control condition (M = 3.43, SD = 1.03, $p < .01$). We probed the significant interaction effect further by examining simple main effects.

There was also a medium simple main effect of condition at Time 1, *Welch's* $F(3,101.26) = 6.00$, $p < .001$, estimated $\omega^2 = .07$, which we probed further. A Games-Howell post hoc test revealed that participants assigned to the "Born This Way" condition reported less binegativity towards bisexual men at Time 1 (M = 2.44, SD = 1.21) than participants assigned to the Social Constructionism (M = 3.26, SD = 1.30, $p = .03$) and control (M = 3.44, SD = 1.06, $p < .001$) conditions. In addition, there was a significant simple main effect of condition at Time 2 with a small-to-medium effect size, *Welch's* $F(3,100.89) = 3.36$, $p = .02$, estimated $\omega^2 = .03$, which we probed further. A Games-Howell post hoc test revealed that participants assigned to the "Born This Way" condition reported less binegativity towards bisexual men at Time 2 (M = 2.73, SD = 1.34) than participants assigned to the control condition (M = 3.42, SD = 1.06, $p = .03$.)

Taken together, these findings do not support our second hypothesis. Participants randomly assigned to the Social Constructionism and Hybrid Essentialism conditions did not exhibit greater reductions in binegativity towards bisexual men than those assigned to the "Born This Way" and control conditions. Rather, we observed the opposite, with "Born This Way" participants reporting less binegativity towards bisexual men than Social Constructionism participants at Time 1. These findings provide support for our third hypothesis, however. We

predicted that the observed changes in binegativity immediately after the interventions at Time 1 would still be present at Time 2, even though some effects that were statistically significant at Time 1 would no longer be significant at Time 2. Indeed, we observed a significant simple main effect of condition at both time points, with "Born This Way" participants reporting less binegativity towards bisexual men than control participants at both Time 1 and Time 2. As predicted, not all effects remained; while "Born This Way" participants reported less binegativity towards bisexual men than Social Constructionism participants at Time 1, this effect disappeared at Time 2.

Feeling Thermometer (Bisexual Men)

Results showed a significant time by condition interaction with a medium effect size, $F(3,186) = 3.02$, $p = .03$, $\eta_p^2 = .05$ (see Figure 4). There was no main effect of time, $F(1,186) = 1.75$, $p = .19$, $\eta_p^2 = .01$, with "temperature" indicating feelings towards bisexual men compared to other social groups (as indicated by a *z*-score) holding constant across Time 1 ($M = -0.21$, $SD = 1.01$) and Time 2 ($M = -0.29$, $SD = 1.06$). There was also no main effect of condition, $F(3,186) = 0.42$, $p = .74$, $\eta_p^2 = .01$, with participants assigned to the "Born This Way" ($M = -0.15$, $SD = 0.83$), Social Constructionism ($M = -0.20$, $SD = 0.77$), Hybrid Essentialism ($M = -0.34$, $SD = 0.79$), and control ($M = -0.29$, $SD = 0.98$) conditions reporting similar feelings towards bisexual men. We probed the significant interaction effect further by examining simple main effects.

We did not find a simple main effect of condition at Time 1, $F(3,188) = 1.53$, $p = .21$, $\eta_p^2 = .02$, with participants assigned to the "Born This Way" ($M = -0.04$, $SD = 0.86$), Social Constructionism ($M = -0.15$, $SD = 1.03$), Hybrid Essentialism ($M = -0.14$, $SD = 1.08$), and control ($M = -0.42$, $SD = 1.00$) conditions reporting similar feelings towards bisexual men at

Time 1. There was also no simple main effect of condition at Time 2, $F(3,188) = 1.04$, $p = .38$, $\eta_p^2 = .02$. Once again, participants assigned to the "Born This Way" ($M = -0.26$, $SD = 1.02$), Social Constructionism ($M = -0.25$, $SD = 1.04$), Hybrid Essentialism ($M = -0.53$, $SD = 0.87$), and control ($M = -0.17$, $SD = 1.21$) conditions reported similar feelings towards bisexual men.

To further explore the interaction effect, we also examined simple main effects of time for each condition. There was no simple main effect of time for the "Born This Way" condition, $t(33) = 1.40$, $p = .17$ (two-tailed), $\eta_p^2 = .06$, with feelings towards bisexual men remaining much the same from Time 1 ($M = -0.04$, $SD = 0.86$) to Time 2 ($M = -0.26$, $SD = 1.02$). There was also no simple main effect of time for the Social Constructionism condition, $t(50) = 0.53$, $p = .60$ (two-tailed), $\eta_p^2 = .01$, with feelings towards bisexual men holding constant across Time 1 ($M = -0.15$, $SD = 1.03$) and Time 2 ($M = -0.25$, $SD = 1.04$). However, there was a simple main effect of time for the Hybrid Essentialism condition with a medium-to-large effect size, $t(45) = 2.27$, $p = .03$ (two-tailed), $\eta_p^2 = .10$; feelings towards bisexual men were significantly more positive at Time 1 ($M = -0.14$, $SD = 1.08$) than at Time 2 ($M = -0.53$, $SD = 0.87$). There was no simple main effect of time for the control condition, $t(58) = -1.93$, $p = .06$ (two-tailed), $\eta_p^2 = .06$, with feelings towards bisexual men remaining much the same from Time 1 ($M = -0.42$, $SD = 1.00$) to Time 2 ($M = -0.17$, $SD = 1.21$).

Taken together, these findings do not support our second hypothesis. Participants randomly assigned to the Social Constructionism and Hybrid Essentialism conditions did not exhibit greater reductions in binegativity towards bisexual men than those assigned to the "Born This Way" and control conditions as we had expected. These findings may also suggest lack of support for our third hypothesis. We found that feelings towards bisexual men became

significantly more negative at Time 2 for Hybrid Essentialism participants. If there was any effect of the intervention at Time 1, this could be evidence of the effect wearing off.

Infrahumanization towards Gay and Bisexual Men

Infrahumanization Questionnaire (Gay Men) Results showed there was no time by condition interaction, $F(3,196) = 1.65$, $p = .18$, $\eta_p^2 = .03$. There was no main effect of time, $F(1,196) = 0.22$, $p = .64$, $\eta_p^2 < .01$, with infrahumanization towards gay men holding constant across Time 1 ($M = 4.78$, $SD = 1.28$) and Time 2 ($M = 4.76$, $SD = 1.22$). There was also no main effect of condition, $F(3,196) = 0.50$, $p = .68$, $\eta_p^2 = .01$, with participants assigned to the "Born This Way" ($M = 4.88$, $SD = 1.23$), Social Constructionism ($M = 4.77$, $SD = 1.22$), Hybrid Essentialism ($M = 4.61$, $SD = 1.08$), and control ($M = 4.83$, $SD = 0.98$) conditions reporting similar feelings of infrahumanization towards gay men. Since there was no interaction effect, we did not probe further by examining simple main effects.

Taken together, these findings partially support our second hypothesis. Participants randomly assigned to the Social Constructionism condition did not exhibit greater reductions in infrahumanization towards gay men than those assigned to the "Born This Way" condition as we had expected. As expected, however, participants randomly assigned to the Hybrid Essentialism condition did not exhibit greater reductions in infrahumanization towards gay men than those assigned to the control condition.

Infrahumanization Questionnaire (Bisexual Men) Results showed there was no time by condition interaction, $F(3,196) = 1.84$, $p = .14$, $\eta_p^2 = .03$. There was no main effect of time, $F(1,196) = 2.27$, $p = .13$, $\eta_p^2 = .01$, with infrahumanization towards bisexual men holding constant across Time 1 ($M = 4.80$, $SD = 1.31$) and Time 2 ($M = 4.67$, $SD = 1.24$). There was also

no main effect of condition, $F(3,196) = 0.22$, $p = .88$, $\eta_p^2 < .01$, with participants assigned to the "Born This Way" ($M = 4.87$, $SD = 1.16$), Social Constructionism ($M = 4.78$, $SD = 1.22$), Hybrid Essentialism ($M = 4.54$, $SD = 0.97$), and control ($M = 4.75$, $SD = 1.03$) conditions reporting similar feelings of infrahumanization towards bisexual men. Since there was no interaction effect, we did not probe further by examining simple main effects.

Taken together, these findings partially support our second hypothesis. Participants randomly assigned to the Social Constructionism condition did not exhibit greater reductions in infrahumanization towards bisexual men than those assigned to the "Born This Way" condition as we had expected. As expected, however, participants randomly assigned to the Hybrid Essentialism condition did not exhibit greater reductions in infrahumanization towards bisexual men than those assigned to the control condition.

CHAPTER 4

DISCUSSION

Advocates have regularly promoted essentialist beliefs about the naturalness of being a SM to support their appeals for equal rights in the U.S., and educational programing about LGB rights and other social justice advocacy efforts have regularly promoted such beliefs (Diamond & Rosky, 2016; Osmundson, 2011). However, most Americans already report that SO cannot be chosen (Washington Post-ABC News, 2014). With Grzanka et al. (2016) observed SO belief patterns in mind, Fry et al. (2020) conducted the first true experiment to investigate the impact of diverse SO beliefs (i.e., not just naturalness) on homonegative prejudice and support for gay men's and lesbian women's civil rights. Their research essay interventions targeting lay beliefs about SO as measured by the SOBS (Arseneau et al., 2013) shifted participants' SO beliefs in expected directions. Fry et al. (2020) concluded that all three of their interventions were effective in reducing homonegative prejudice, suggesting that the "born this way" argument may not be the *only* way to reduce homonegative prejudice. A post hoc analysis suggested that the two essays targeting social constructionist themes may have even been more effective than the essay targeting only naturalness beliefs. The current study was a replication and extension of Fry et al. that aimed to replicate Fry et. al. findings, improve the study's design, and extend the original study by adding new constructs and measures to explore new research questions. The current study failed to replicate Fry et al. findings, as the interventions did not shift SO beliefs in the expected directions. Surprisingly, participants assigned to the "Born This Way" condition reported significantly lower levels of homonegative prejudice towards gay men and binegativity

towards bisexual men. As expected, many of the observed changes at Time 1 were still present at Time 2.

Our results did not support our first hypothesis. We observed null findings for our analyses of the SOBS Discreteness, Homogeneity, and Informativeness dimensions (Arseneau et al., 2013). Participants randomly assigned to the Social Constructionism and Hybrid Essentialism conditions (i.e., the two conditions targeting multiple SO beliefs) did not demonstrate greater reductions in their beliefs in the discreteness, homogeneity, and informativeness of SO categories than participants assigned to the "Born This Way" and control conditions as we had expected. Therefore, we failed to replicate Fry et al. (2020) findings. This was somewhat surprising, given that both studies used the same intervention essays, which were carefully designed to target each of the SOBS dimensions (Arseneau et al., 2013). Fry et al. (2020) found robust reductions in discreteness, homogeneity, and informativeness beliefs among participants assigned to the Social Constructionism condition, none of which replicated in the current study.

While beliefs in the naturalness of SO categories were not included in our first hypothesis, the effects we observed are noteworthy. We observed a main effect of condition, with participants assigned to the "Born This Way" condition reporting higher Naturalness dimension scores than participants assigned to the Social Constructionism, Hybrid Essentialism, and control conditions. This partially replicates Fry et al. (2020) findings in that they found that participants assigned to the "Born This Way" condition reported higher SOBS Naturalness scores than participants assigned to Social Constructionism and Hybrid Essentialism at Time 2 (i.e., immediately after the delivery of the interventions). Our findings may similarly indicate

that the manipulation for the "Born This Way" condition was effective in promoting naturalness beliefs in the current study.

It is surprising that the decreases in discreteness, homogeneity, and informativeness beliefs among participants assigned to the Social Constructionism condition failed to replicate while the increases in naturalness beliefs among participants assigned to the "Born This Way" condition replicated. This finding could be explained by processing fluency and the cognitive effort that each essay may have required. The more one is exposed to a piece of information, the easier it becomes to process that information; this increased processing fluency makes it more likely that one will judge the information to be true (see Reber & Unkelbach, 2010, for a review). Much of the research participants assigned to the "Born This Way" condition read (i.e., research about genes/heredity, endocrinology, the brain/anatomy; see Appendix A) has been covered extensively by the media (LeVay, 2017; Terry, 1999; Wilcox, 2003). Even if participants had not heard of the specific research in the essay, they were almost certainly familiar with the essay's argument that SO is innate and biological through exposure to appeals for equal rights (Diamond & Rosky, 2016; Osmundson, 2011) or popular culture (Gaga, 2011; Haggerty et al., 2012). The repeated exposure to the concepts/arguments may have made the information easier to process, thereby making it more likely that participants would "buy into" the information as true. On the other hand, most of the research that participants assigned to the Social Constructionism condition read (e.g., research about SO being defined differently in different settings; see Appendix B) was unlikely covered by the media. Considering social constructionist arguments of SO is largely unknown to the lay public (Bohan, 1996), participants may have been reading most

of these arguments for the first time. Therefore, the information may have been more difficult to process, making it less likely that participants would "buy into" the information as true.

Our findings are also inconsistent with the study by Hegarty (2010). Hegarty found that college students reported decreased beliefs in the naturalness and discreteness of SO at the end of an LGBT psychology course that adopted "a more social constructionist orientation than many human sexuality courses" (p. 9), excluding biological theories entirely in favor of other research on SO (e.g., sexual fluidity). This may suggest that larger-scale interventions that expose people to research promoting social constructionist themes repeatedly over time (like a semester long course) are necessary to effectively shift SO beliefs. Since this information would likely feel new and unfamiliar for most people, research on processing fluency would say that the repeated exposure would make it more likely that people would accept the information as true (Reber & Unkelbach, 2010). Our findings suggest that while a short research essay may be an effective intervention for promoting the more familiar argument that SO is innate, a more robust, longer intervention like Hegarty's (2010) may be necessary to effectively promote social constructionist arguments of SO.

At the same time, this fails to explain how Fry et al. (2020) observed predicted shifts in SO beliefs among participants assigned to their Social Constructionism condition. In fact, we would have expected their manipulation to be weaker than ours since they did not require participants to answer reflection questions after the intervention to promote deeper cognitive processing. We suspect that the answer could lie in differences in overall effort between the two study's samples. As we discuss further in our section on limitations and future directions, we have concerns about the quality of the data our participants provided – concerns that Fry et al.

did not have. The poor quality of the written responses that many of these participants provided for their reflection questions gives us good reason to suspect that many of these individuals put forth limited effort. Since the Social Constructionism condition likely required additional effort to understand due to lower processing fluency (Reber & Unkelbach, 2010), it could be that the participants in our study were less willing to put forth that necessary effort than Fry et al. (2020) participants.

Our results did not support the first component of our second hypothesis. Participants randomly assigned to the Social Constructionism and Hybrid Essentialism conditions did not exhibit greater reductions in homonegative prejudice towards gay men and binegativity towards bisexual men than participants assigned to the "Born This Way" and control conditions as we had expected. Surprisingly, we observed the opposite; "Born This Way" participants reported lower levels of modern homonegativity towards gay men and binegativity towards bisexual men than Social Constructionism participants. While we anticipated that the "Born This Way" intervention could possibly reduce homonegative prejudice and binegativity, we did not expect it to be the *only* intervention to do so.

These findings are also inconsistent with Fry et al. (2020), who found reductions in homonegative prejudice in the "Born This Way," Social Constructionism, and Hybrid Essentialism conditions. While their post hoc analysis suggested that the Social Constructionism and Hybrid Essentialism interventions may have even been marginally more effective than the "Born This Way" intervention, our findings suggest that the interventions targeting social constructionist themes had no effect on homonegative prejudice or binegativity in the current study. Our findings are also incongruent with the SO belief patterns that Grzanka et al. (2016)

discovered through their latent profile analysis. While most participants strongly endorsed naturalness beliefs in Grzanka et al. study, they observed that those who reported the lowest levels of discreteness, homogeneity, and informativeness beliefs as measured by the SOBS (Arseneau et al., 2013) also reported the least homonegative prejudice. This would suggest that the Social Constructionism and Hybrid Essentialism interventions should have been more effective in reducing homonegative prejudice and binegativity than the "Born This Way" intervention. Furthermore, our findings are inconsistent with Hegarty's (2010) observed reductions in homonegative prejudice when he taught a human sexuality course with a stronger focus on social constructionist themes and no mention of biological theories of SO. What we observed also conflicts with a body of research suggesting that homonegative prejudice is linked to believing in the discreteness of SO categories (Haslam & Levy, 2006; Haslam et al., 2000; Haslam et al., 2002; Hegarty, 2002; Hegarty & Pratto, 2001).

At the same time, these findings add to a robust body of research suggesting that believing in the naturalness of SO is associated with lower homonegative attitudes (Haslam & Levy, 2006; Haslam et al., 2002; Hegarty, 2002; Hegarty & Pratto, 2001; Jang & Lee, 2014; Jayaratne et al., 2006; Lewis, 2009; Whitley, 1990). Based on the correlational nature of most of this research, though, some have argued that this finding does not necessarily suggest that naturalness beliefs *cause* positive attitudes as has long been assumed (Diamond & Rosky, 2016; Stein, 2011). Instead, some studies have suggested that people choose their beliefs about SO to align with their preexisting attitudes towards SMs (Falomir-Pichastor & Hegarty, 2014; Hegarty, 2002; Hegarty & Golden, 2008), while others have suggested that there may be a "third belief" that serves as the causal mechanism linking SO beliefs and attitudes (Lewis, 2009; Stein, 2011).

It is noteworthy, then, that both the Fry et al. (2020) study and the current study utilized true experimental designs that allowed for causal inferences. Therefore, we can conclude that the intervention essay promoting beliefs in the naturalness of SO may have caused the observed reductions in homonegative prejudice in Fry et al. study as well as the observed reductions in homonegative prejudice towards gay men and binegativity towards bisexual men in the current study.

Interestingly, our findings are also consistent with other research that has used the SOBS (Arseneau et al., 2013). Morandini et al. (2015) found that gay men reported less internalized homonegativity when they endorsed high naturalness beliefs. Similarly, Morandini et al. (2017) found that both lesbian and bisexual women reported less internalized stigma when they endorsed high naturalness beliefs. These findings suggest that naturalness beliefs may have the potential to both reduce homonegative prejudice and binegativity in heterosexuals and internalized homonegativity/stigma in SMs.

Our findings need to be reconciled with several scholars who have critiqued the "born this way" ideology as inaccurate, unscientific, and alienating for bisexuals and SMs who do not experience their SO as biologically determined (Bailey et al., 2016; Diamond & Rosky, 2016; Osmundson, 2011; Terry, 1999; Walters, 2014). While these scholars have argued that it is time to stop promoting naturalness beliefs about SO, our findings suggest that promoting such beliefs may, in fact, have at least some potential to reduce homonegative prejudice towards gay men and binegativity towards bisexual men. More specifically, Diamond and Rosky (2016) have argued that immutability arguments are unfair to bisexuals, who have been left out of "born this way" debates in both the scientific and legal domains. However, our study complicates this claim by

suggesting that promoting "born this way" ideology may actually have the potential to reduce heterosexual people's binegativity towards bisexual men. In this way, bisexual men may be able to benefit from immutability arguments in a different way. While our interventions containing social constructionist themes did not reduce homonegative prejudice or binegativity in this study, prior research has shown that educating heterosexuals about social constructionist arguments of SO has the potential to reduce homonegative prejudice (Fry et al., 2020; Hegarty, 2010). Our findings suggest that promoting naturalness beliefs about SO may be *one* effective strategy for reducing homonegative prejudice towards gay men and binegativity towards bisexual men, but taken with prior research, it is not the *only* option.

Our findings may also suggest that we need to think about the relationship between SO beliefs and binegativity differently than we think about the relationship between SO beliefs and homonegative prejudice. Since we could not find prior research on the impact of SO beliefs on binegativity, we based our hypothesis (i.e., that the Social Constructionism and Hybrid Essentialism conditions would be the most effective in reducing binegativity towards bisexual men) on research about homonegative prejudice. One exception in the literature was Hubbard and de Visser (2015), who found that endorsing discreteness beliefs was associated with more negative attitudes towards bisexuals. Since the Social Constructionism and Hybrid Essentialism conditions both contained research that aimed to reduce discreteness beliefs, Hubbard and de Visser's findings aligned with our hypothesis. Therefore, our finding that "Born This Way" participants reported less binegativity towards bisexual men than Social Constructionism participants was surprising. In addition to being inconsistent with Hubbard and de Visser, this finding was unexpected based on the content of the intervention essays themselves. The Social

Constructionism essay (see Appendix B) makes many references to bisexuality and normalizes the idea of people having romantic and sexual attractions and encounters with both men and women. The "Born This Way" essay (see Appendix A) does not acknowledge bisexuality at all, only referring to research on "gay men" and "lesbian women." It could be that participants assigned to the "Born This Way" condition generalized the concepts they read about to bisexuals.

Interestingly, we found that "Born This Way" participants reported lower levels of homonegativity towards gay men than Social Constructionism participants on the MHS-G but not on the Feeling Thermometer (Gay Men). Similarly, we found that "Born This Way" participants reported less binegativity towards bisexual men than Social Constructionism and control participants on the GSBS-Men but not on the Feeling Thermometer (Bisexual Men). This is surprising considering that Feeling Thermometers have the benefit of correlating with many other measures (Olson & Zabel, 2016) and have frequently been used to measure people's feelings towards LGB people (Dessel, 2010; Fritzlen et al., 2019; Haddock et al., 1993; Herek, 2002). Our findings are consistent with Fry et al. (2020), who also found null findings related to their Feeling Thermometer for gay men that were inconsistent with findings on the MHS-G. While Fry et al. used raw scores on their Feeling Thermometers, we standardized our Feeling Thermometers using Fritzlen et al. (2019) procedure in an attempt to make the scores more sensitive. Even so, these Feeling Thermometers still may not have been sensitive enough to detect the effects observed on the MHS-G and GSBS-Men.

Our results partially supported the second component of our second hypothesis. Participants randomly assigned to the Social Constructionism condition did not exhibit greater

reductions in infrahumanization towards gay and bisexual men than those assigned to the "Born This Way" condition as we had expected. However, as we had expected, participants randomly assigned to the Hybrid Essentialism condition did not exhibit greater reductions in infrahumanization towards gay and bisexual men than those assigned to the control condition.

We suggest that there could be a few potential explanations for these findings. First, it is entirely possible that SO beliefs do not affect heterosexuals' infrahumanization of gay and bisexual men. However, we find this unlikely. While there have not been other studies of heterosexuals' infrahumanization of SMs to our knowledge, research on infrahumanization of other outgroups has found that essentialist beliefs make infrahumanization more likely while social constructionist beliefs make infrahumanization less likely (Bastian & Haslam, 2008; Leyens et al., 2007). There is no reason to suspect that infrahumanization of gay and bisexual men would be an exception to this. It is possible that the Infrahumanization Questionnaire (Stathi et al., 2017) was not sensitive enough to detect effects. The Infrahumanization Questionnaire is not an empirically validated measure, so we have no way of knowing the quality of its psychometric properties. It is possible, then, that there were effects that we were unable to capture with our measure. Another possibility is that our intervention essays did not provide a strong enough manipulation to effectively shift infrahumanization. This would not be surprising, considering that the Social Constructionism essay did not appear to shift beliefs in the discreteness, homogeneity, and informativeness of SO in the intended directions in this study. While our "Born This Way" essay appeared to shift naturalness beliefs as intended, it is important to remember that naturalness beliefs are just one type of essentialist beliefs. By not targeting other types of essentialist beliefs (i.e., those pertaining to the discreteness,

homogeneity, and informativeness of SO categories), we cannot say that we fully promoted essentialist beliefs to increase the likelihood of observing infrahumanization. It may be that larger-scale interventions each targeting multidimensional beliefs would be needed to detect shifts in infrahumanization.

Our results mostly supported our third hypothesis. As predicted, the changes we observed immediately after the interventions at Time 1 were largely still present, at least to some extent, 6 to 8 days after the interventions at Time 2. For the SOBS Naturalness dimension, we observed a main effect of condition but no main effect of time and no interaction effect. This suggests that participants assigned to the "Born This Way" condition reported higher Naturalness dimension scores than participants assigned to the Social Constructionism, Hybrid Essentialism, and control conditions across time points, thereby supporting our hypothesis. For the MHS-G, we similarly observed a main effect of condition but no main effect of time and no interaction effect. This suggests that "Born This Way" participants reported lower levels of modern homonegativity towards gay men than Social Constructionism participants at both time points. Therefore, this finding also supported our hypothesis. For the GSBS-Men, we observed no main effect of time but did observe a main effect of condition and an interaction effect. As we had predicted, not all effects remained. While "Born This Way" participants reported less binegativity towards bisexual men than Social Constructionism participants at Time 1, this effect disappeared at Time 2. However, we observed a simple main effect of condition at both time points, with "Born This Way" participants reporting less binegativity towards bisexual men than control participants at both Time 1 and Time 2. Once again, our hypothesis was supported.

However, our findings for the Feeling Thermometer (Bisexual Men) may suggest some lack of support for our hypothesis. While there was an interaction effect, there was no main effect of condition, main effect of time, simple main effect of condition at Time 1, or simple main effect of condition at Time 2. However, there was a simple main effect of time for the Hybrid Essentialism condition, which indicated that feelings towards bisexual men became significantly more negative at Time 2 for these participants. It is possible, then, that if there was any effect of the intervention at Time 1, this could be evidence of the effect wearing off.

Even so, the fact that most of the changes we observed immediately after the interventions were still present a week later is not without practical significance. This suggests that the shifts in SO beliefs, homonegative prejudice towards gay men, and binegativity towards bisexual men could potentially last long-term. If this is the case, real-world interventions targeting SO beliefs might be able to produce long-lasting reductions in heterosexuals' homonegative prejudice and binegativity. While others have suggested that intensive, months-long interventions are required for long-term prejudice reduction (Cook, 1969; Laar et al., 2005), our findings build onto research suggesting that even brief, small-scale interventions may have the potential to achieve this goal (Broockman & Kalla, 2016).

Limitations and Future Directions

While our replication and extension study aimed to improve on Fry et al. (2020), there were still several limitations that should be addressed by future research. With the exception of the Feeling Thermometers that contained filler social identities, we administered measures with high face validity and did so immediately after our interventions. This may have subjected our study to demand characteristics and social desirability bias. While it is possible that demand

characteristics could explain some of the reported reductions in homonegative prejudice towards gay men and binegativity towards bisexual men observed in the "Born This Way" condition, we would assume that such demand characteristics, if present, would also influence reported homonegative prejudice and binegativity in the Social Constructionism and Hybrid Essentialism conditions. Since the effects were only found in one treatment condition, this leads us to suspect that these findings may be due to more than just demand characteristics. Even so, we suggest that future research try reducing demand characteristics by administering measures at least one week after the intervention, which may mean adding a Time 3 to the study's design. The addition of an implicit measure, like an Implicit Association Test (IAT; see Fazio & Olson, 2003), could also address these concerns.

Our study's most concerning limitation, though, may be the questionable quality of the data provided by our participants. We recruited 690 MTurk workers to obtain our final sample of 200 participants, meaning that 71% of our data needed to be removed. This left our sample slightly underpowered in the "Born This Way" condition. While some attrition is expected in a longitudinal study, most of these participants were removed for answering comprehension check questions incorrectly or failing to meet inclusion criteria by identifying themselves as a SM on their demographic questionnaire. We are hopeful that our use of multiple validation checks (i.e., comprehension check questions, attention check items embedded into each survey) were effective in screening out most of the poor data. However, the poor quality of the written responses that many participants provided for their reflection questions makes us concerned that many of these individuals did not treat their participation seriously. By not reflecting

thoughtfully on the essays, it is possible that the manipulation failed for these participants. This may explain why the current study failed to replicate many of Fry et al. (2020) findings.

These questions of data quality may seem surprising at first considering that Fry et al. (2020) recruited their MTurk-generated sample for the original study in 2018 and did not encounter these concerns. However, recent research on MTurk may be able to shed some light on what occurred. While prior research has suggested that MTurk workers provide high-quality data that is superior to data collected through college or university psychology departments (Buhrmester et al., 2011), more recent studies have suggested that the quality of MTurk data began substantially declining sometime around the summer of 2018 (Chmielewski & Kucker, 2020). As a result of the COVID-19 pandemic quarantines, MTurk saw an influx of new workers who tend to be less attentive, less reflective, and more inconsistent in their responses (Arechar & Rand, 2021). Given that we collected our data from March 2021 to September 2021 when many people were still in quarantine, this may explain many of the problems we encountered. Kan and Drummey (2018) also discovered that MTurk workers frequently misrepresent themselves to meet inclusion criteria. This likely explains why we needed to exclude nearly 100 participants who identified as a SM on the demographic questionnaire. By including a question about SO at the end of the Time 1 survey embedded in a demographic questionnaire, this may have helped us to discover people trying to misrepresent themselves.

MTurk aside, we would be remiss not to question how the timing of our data collection may have impacted the data our participants provided. Unlike Fry et al. (2020), we collected our data during the COVID-19 pandemic. We do not know what impact this historical context had on our findings or our ability to compare them to those of Fry et al. Our participants may have been

experiencing stress associated with social isolation, job loss and financial insecurity, fear of becoming infected, or grief after losing a loved one to the virus. During the time of data collection (March 2021 to September 2021), vaccines were not yet widely available, which may have increased some of these stressors. While we have no way of knowing the impact that COVID-19 had on our study, it is important to acknowledge this as a potential limitation.

Even so, we have several recommendations for future research to improve data quality. Participants could be required to complete the study in a laboratory setting where they could be monitored, but we recognize that this may not be practical. Future online studies could try utilizing another platform besides MTurk. For example, while Peer et al. (2021) found that "MTurk showed alarmingly low data quality even with data quality filters (p. 1)," this was not the case with CloudResearch and Prolific, both of which yielded high data quality. Regardless of platform, we suggest following Chmielewski and Kucker's (2020) recommendation to use multiple types of validity checks. While we used traditional attention check items in the current study, these types of validity checks may not actually be effective (Sylaska & Mayer, 2019). Instead, we recommend utilizing validity checks that have more empirical support, such as response times (Wood et al., 2017) and looking for unusual comments in open-ended responses (Chmielewski & Kucker, 2020). Researchers can also use programs that detect when participants are off task (Permut et al., 2019) or provide participants with additional incentives for providing high-quality data (Barger et al., 2011). Our incentives ($1.25 for Time 1 and $2.00 for Time 2) were considerably low for the amount of work required. It is possible that larger incentives could encourage participants to put forth more effort in the future. Finally, asking participants to read a research essay, answer comprehension check questions, write responses to reflection questions,

and then complete six measures and a demographic questionnaire may have led to participant fatigue, resulting in poorer attention and effort. By adding a Time 3, future research could deliver the interventions and administer the measures at separate time points, thereby reducing fatigue and improving the quality of the data.

While our MTurk-generated sample was certainly more representative than a sample obtained through a college or university psychology department, as is often observed when using this platform (Buhrmester et al., 2011), the sample was far from representative of all heterosexual-identified people. Approximately half of our participants identified their religious affiliation as Catholic, and the majority identified their political affiliation as Democrat. This is consistent with previous research suggesting that, while MTurk samples are fairly representative of the U.S. population in terms of gender and race (Burnham et al., 2018), they tend to be fairly unrepresentative in terms of religion (Burnham et al., 2018) and political affiliation (Berinsky et al., 2012). Most notably, nearly 85% of our sample reported having at least a bachelor's degree. While MTurk tends to yield highly educated samples (Shapiro et al., 2013), this was still surprising. Future research should aim to recruit more representative samples with a particular focus on enrolling participants without college degrees.

This brings up another potential limitation. While we did our best to write each research essay in language accessible to a lay audience, the technical nature of the scientific research we summarized may have meant that those without a college degree struggled to understand much of the content. It is possible, then, that level of educational attainment impacts the effectiveness of our interventions in some way, such that these interventions are most effective for those who hold a college degree. Had our sample not been predominately college-educated, our findings

may have been different, as the manipulation may have been less effective. We recommend that future research determine what role, if any, education plays in the effectiveness of these interventions. Future work should also find ways to develop interventions that are more accessible to audiences without college degrees.

Furthermore, our sample was not large enough to allow us to investigate how the effectiveness of our interventions may have differed by age cohort. This question may be of particular interest for the "Born This Way" intervention, which contained research findings that were covered extensively by the media in the 1990s (LeVay, 2017; Terry, 1999; Wilcox, 2003). Participants who were adults in the 1990s had likely already been exposed to this information while younger participants may have been less familiar with it. With a larger sample, future research could investigate the effectiveness of the interventions by age cohort.

While we aimed to strengthen the effects of our research essay interventions by asking participants to reflect on what they had read to encourage deeper cognitive processing, it is possible that our manipulation was still not strong enough for the Social Constructionism and Hybrid Essentialism conditions to shift SO beliefs or alter prejudicial attitudes. Future studies could find ways to expand our interventions to create large-scale educational interventions similar to Hegarty's (2010). For example, Fry et al. (2020) proposed randomly assigning different sections of college-level human sexuality classes to learn about the research contained in our intervention essays over the course of a semester.

Most of the effects that we observed at Time 1 in this study were still present (at least to an extent) a week later at Time 2. However, we did not include a Time 3 to determine how much longer the effects lasted (if they did at all). It is possible that our interventions continued to

influence our participants' SO beliefs and prejudicial attitudes after their participation in the study ended. In fact, Broockman and Kalla (2016) showed how brief interventions have the potential to reduce prejudice for three months. Future researchers should consider adding a Time 3 four weeks after the delivery of the interventions to see if any effects remain.

Finally, our study focused exclusively on gay and bisexual men. We do not know if our findings generalize to lesbian and bisexual women and other SMs. Fry et al. (2020) found a marginally significant effect on the Feeling Thermometer for Lesbians suggesting that all three intervention essays may have been effective in reducing homonegative prejudice towards lesbian women in their study. Future researchers should conduct another version of this study focusing on lesbian and bisexual women.

Strengths

Limitations aside, we conducted the first true experimental study to investigate the impact of diverse SO beliefs – not *just* naturalness beliefs – on homonegative prejudice towards gay men, binegativity towards bisexual men, and infrahumanization towards gay and bisexual men. Our use of a true experimental design with a control group and successful random assignment checks allowed us to isolate extraneous variables and reduce threats to internal validity to do what Hegarty (2010) and others could not: confidently infer true causation. This study is an important addition to a body of research that has been predominantly correlational (e.g., Haslam & Levy, 2006; Hegarty & Pratto, 2001; Jayaratne et al., 2006).

Our study's contributions to the literature on binegativity towards bisexual men are noteworthy. Bisexuals are "the most common type of sexual minority" (Diamond & Rosky, 2016, p. 381) and experience unique stressors above what lesbian women and gay men

experience (Deihl & Ochs, 2010). Yet, bisexuality has often been disregarded in psychology research (Petford, 2003), and heterosexuals' beliefs about bisexuality have largely been absent in the literature (Grzanka, 2016). Especially concerning, heterosexuals (especially heterosexual men) hold more prejudice towards bisexual men than they hold towards gay men, lesbian women, and bisexual women (Eliason, 2001; Kite & Whitley, 1996; Yost & Thomas, 2012). The current study observed a reduction in this prejudice and suggests that promoting naturalness beliefs could be a way to reduce the binegativity bisexual men face.

The current study was also the first to experimentally explore the impact of essentialist and social constructionist beliefs on heterosexuals' infrahumanization towards SMs. While research has investigated infrahumanization of racial, cultural, and nationality outgroups (Cortes et al., 2005; Leyens et al., 2007; Leyens et al., 2001), heterosexuals' infrahumanization of SMs has not been investigated at all until now. Even though our interventions failed to shift infrahumanization towards gay or bisexual men, and our "Born This Way" intervention only targeted one specific type of essentialist beliefs (i.e., naturalness), our findings are still a valuable contribution to the infrahumanization literature.

Our longitudinal design allowed us to investigate the duration of the observed effects. While knowing the potential duration of effects has important practical implications for the development of future interventions, experimental prejudice reduction interventions have consistently been criticized for very rarely taking a longitudinal approach like we did (Paluck et al., 2021). By readministering the measures one week after the intervention, we were able to learn that most of the original effects were still present, at least to some extent. These findings

are an important contribution to the literature with potential real-world implications for developing interventions to reduce prejudice.

Practical Implications and Conclusions

With additional research, our findings may inform the development of new interventions to reduce homonegative prejudice and binegativity. In the meantime, there are also several relatively cheap, easy ways to incorporate the current study's findings into interventions that already exist. While we may have found that only the "Born This Way" intervention effectively reduced homonegative prejudice towards gay men and binegativity towards bisexual men in the current study, the findings of Fry et al. (2020), Grzanka et al. (2016), and Hegarty (2010) still lead us to believe that "born this way" might not be the *only* way. Rather, we suggest that providing people with education about scientific research that targets *multiple* beliefs about SO (i.e., discreteness, homogeneity, informativeness, *and* naturalness beliefs; Arseneau et al., 2013) could reduce their prejudice towards SMs.

Part of this recommendation is based on the limited scope of our findings. While we feel that this study makes important contributions, we also want to be careful not to overstate the significance of what we found. In no way does the current study suggest that rigid essentialist reductionism is the answer to reducing homonegative prejudice and binegativity, nor does it imply that essentialism is somehow "better" than social constructionism. While a growing body of literature is showing us why we should approach essentialism from a multidimensional perspective (Grzanka et al., 2016, 2020; Tierney et al., 2021), our "Born This Way" intervention essay only targeted *one* dimension of essentialist beliefs about SO (i.e., naturalness). Our findings add to a body of literature suggesting that naturalness beliefs can have a *moderate*

impact on heterosexuals' prejudice towards SMs, moving them "in the right direction" (Fry et al., 2020; Haslam & Levy, 2006; Hegarty & Pratto, 2001; Jayaratne et al., 2006). At the same time, questions about the role of other essentialist beliefs remain, and our modest findings in no way suggest to us that social constructionism is not useful.

With all this in mind, scientific research that targets *diverse* SO beliefs could easily be incorporated into higher education in several ways. The research we discussed in our intervention essays could be included in Safe Zone trainings that teach college students and faculty how to be allies to SMs and gender minorities. This research could also be incorporated into resident assistant trainings. College psychology and human sexuality courses frequently teach about biogenetic research on SO (Altemeyer, 2002; Whitley, 1990), and we encourage them to continue to do so. At the same time, we recommend that instructors find ways to integrate scientific research that promotes social constructionist themes (such as the research studies summarized in our Social Constructionism intervention essay) into their classes in an effort to target SO beliefs beyond just naturalness beliefs. Hegarty (2010) demonstrated that this can be done with great success. We recommend that college instructors refer to his study for guidance on how to develop a social constructionist orientation in their own courses.

There may even be ways to incorporate SO beliefs into clinical practice and the workplace. Mental health professionals may consider providing their patients with psychoeducation on research about SO as a clinical intervention in psychotherapy. For example, if a patient is struggling to accept their child who just came out as gay, the therapist may be able to find ways to provide psychoeducation on scientific research about SO as a clinical intervention to help the patient move towards acceptance. Diversity trainings geared towards

medical professionals could also incorporate research like that found in our intervention essays to help these providers better develop their competencies in treating SM patients. We similarly recommend that human resources departments consider including scientific research targeting diverse SO beliefs into diversity trainings for employees in the workplace.

The current study suggests that when heterosexual individuals learn about scientific research that supports naturalness arguments of SO, their homonegative prejudice towards gay men and binegativity towards bisexual men may decrease. Furthermore, these reductions in prejudice may continue to exist for at least a week after learning about the research. This last finding may be especially promising. It could indicate that teaching heterosexuals about research on SO has the potential to produce long-lasting reductions in prejudice towards SMs. As social scientists, we already have the knowledge and skills necessary to communicate this research to the lay public. It is our responsibility to continue developing new interventions to do so.

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APPENDIX

Table 1. Pearson Correlations Between Sexual Orientation Beliefs Scale (SOBS) Dimension Mean Scores, Modern Homonegativity Scale – Gay Men (MHS-G) Total Scores, Gender-Specific Binegativity Scale – Men (GSBS-Men) Mean Scores, Infrahumanization Measure Mean Scores, and Feeling Thermometer Z-scores at Time 1 and Time 2

	Variables	*n*	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.	SOBS-D T1[a]	200	3.01	0.73	--																			
2.	SOBS-D T2[b]	200	3.08	0.78	.642**	--																		
3.	SOBS-N T1[c]	200	3.23	0.48	-.075	-.278**	--																	
4.	SOBS-N T2[d]	200	3.27	0.49	-.078	-.117	.559**	--																
5.	SOBS-H T1[e]	200	3.34	0.83	.582**	.363**	.025	.000	--															
6.	SOBS-H T2[f]	200	3.32	0.84	.540**	.490**	-.158*	-.031	.735**	--														
7.	SOBS-I T1[g]	200	3.44	0.69	.607**	.402**	.116	.060	.795**	.666**	--													
8.	SOBS-I T2[h]	200	3.46	0.74	.624**	.522**	.027	.149*	.669**	.752**	.786**	--												
9.	MHS-G T1[i]	200	37.14	9.87	.655**	.727**	-.330**	-.213**	.518**	.531**	.467**	.474**	--											
10.	MHS-G T2[j]	200	36.98	10.42	.632**	.759**	-.329**	-.224**	.445**	.554**	.428**	.503**	.921**	--										
11.	GSBS-M T1[k]	200	3.08	1.24	.585**	.570**	-.253**	-.173*	.648**	.598**	.597**	.613**	.648**	.652**	--									
12.	GSBS-M T2[l]	200	3.11	1.22	.613**	.603**	-.243**	-.158*	.610**	.582**	.604**	.645**	.643**	.677**	.913**	--								
13.	Infra-GM T1[m]	200	4.78	1.28	-.036	-.095	.137	.130	.072	.017	.061	.048	.026	-.001	-.034	-.024	--							
14.	Infra-GM T2[n]	200	4.76	1.22	.061	-.017	.172*	.175*	.116	.053	.098	.081	.065	.020	.068	.082	.601**	--						
15.	Infra-BM T1[o]	200	4.80	1.31	-.089	-.087	.127	.111	.025	-.052	.025	.011	-.010	-.030	-.025	-.013	.800**	.593**	--					
16.	Infra-BM T2[p]	200	4.67	1.24	.163*	.104	.192**	.210**	.199**	.127	.135	.119	.188**	.144*	.109	.115	.505**	.838**	.477**	--				
17.	FT-GM T1[q]	192	-0.41	0.97	-.293**	-.382**	.193**	.098	-.160*	-.262**	-.112	-.210**	-.345**	-.386**	-.384**	-.366**	.186**	.120	.209**	.026	--			
18.	FT-GM T2[r]	192	-0.48	1.00	-.282**	-.352**	.151*	.032	-.242**	-.255**	-.195**	-.231**	-.326**	-.341**	-.385**	-.376**	.191**	.177*	.175*	.066	.518**	--		
19.	FT-BM T1[s]	192	-0.21	1.00	-.224**	-.266**	.177*	.089	-.025	.002	-.016	-.100	-.234**	-.251**	-.256**	-.228**	.215**	.191**	.190**	.157*	.538**	.447**	--	
20.	FT-BM T2[t]	192	-0.30	1.05	-.108	-.193**	.211**	.063	-.013	-.043	.028	-.035	-.186**	-.189**	-.175*	-.186**	.250**	.259**	.201**	.157*	.374**	.550**	.365**	--

[a]SOBS Discreteness at Time 1. [b]SOBS Discreteness at Time 2. [c]SOBS Naturalness at Time 1. [d]SOBS Naturalness at Time 2. [e]SOBS Homogeneity at Time 1. [f]SOBS Homogeneity at Time 2. [g]SOBS Informativeness at Time 1. [h]SOBS Informativeness at Time 2. [i]MHS-G at Time 1. [j]MHS-G at Time 2. [k]GSBS-Men at Time 1. [l]GSBS-Men at Time 2. [m]Infrahumanization Measure – Gay Men at Time 1. [n]Infrahumanization Measure – Gay Men at Time 2. [o]Infrahumanization Measure – Bisexual Men at Time 1. [p]Infrahumanization Measure – Bisexual Men at Time 2. [q]Feeling Thermometer – Gay Men at Time 1. [r]Feeling Thermometer – Gay Men at Time 2. [s]Feeling Thermometer – Bisexual Men at Time 1. [t]Feeling Thermometer – Bisexual Men at Time 2.
**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

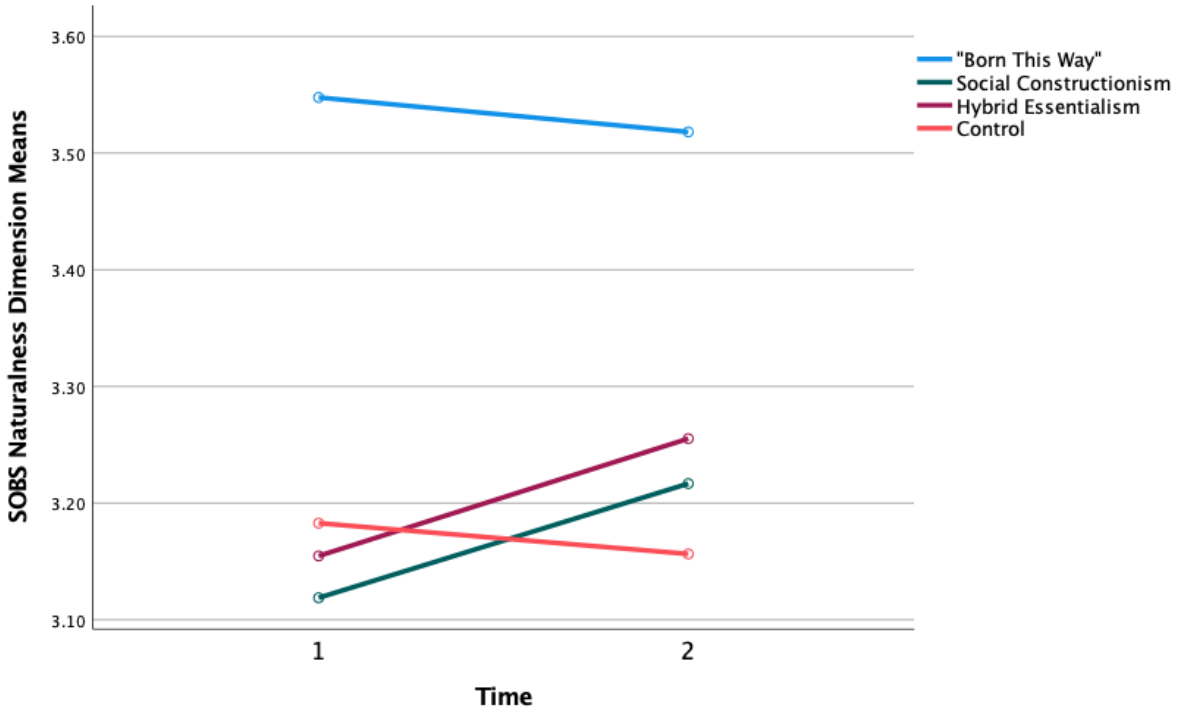

Figure 1. Sexual Orientation Beliefs Scale (SBOS) Naturalness Dimension mean scores. There was a main effect of condition with participants assigned to the "Born This Way" condition reporting higher Naturalness Dimension scores than participants assigned to the Social Constructionism, Hybrid Essentialism, and control conditions.

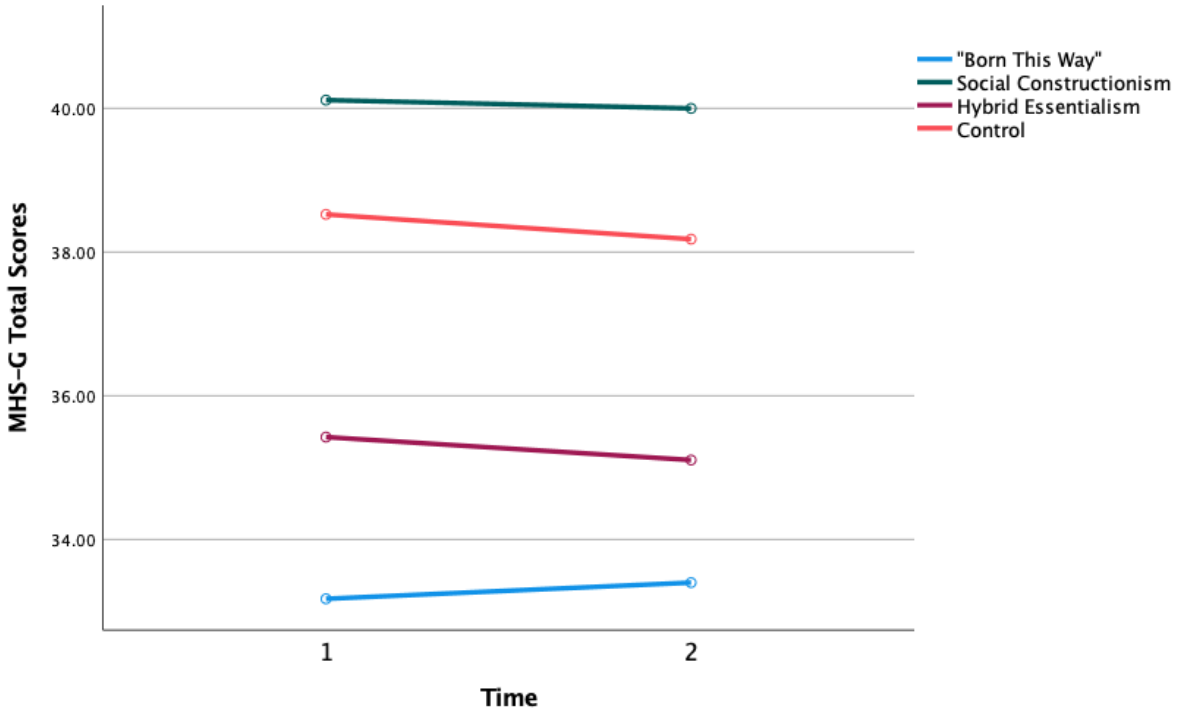

Figure 2. Modern Homonegativity Scale – Gay Men (MHS-G) total scores. There was a main effect of condition with participants assigned to the "Born This Way" condition reporting lower levels of modern homonegativity towards gay men than participants assigned to the Social Constructionism condition.

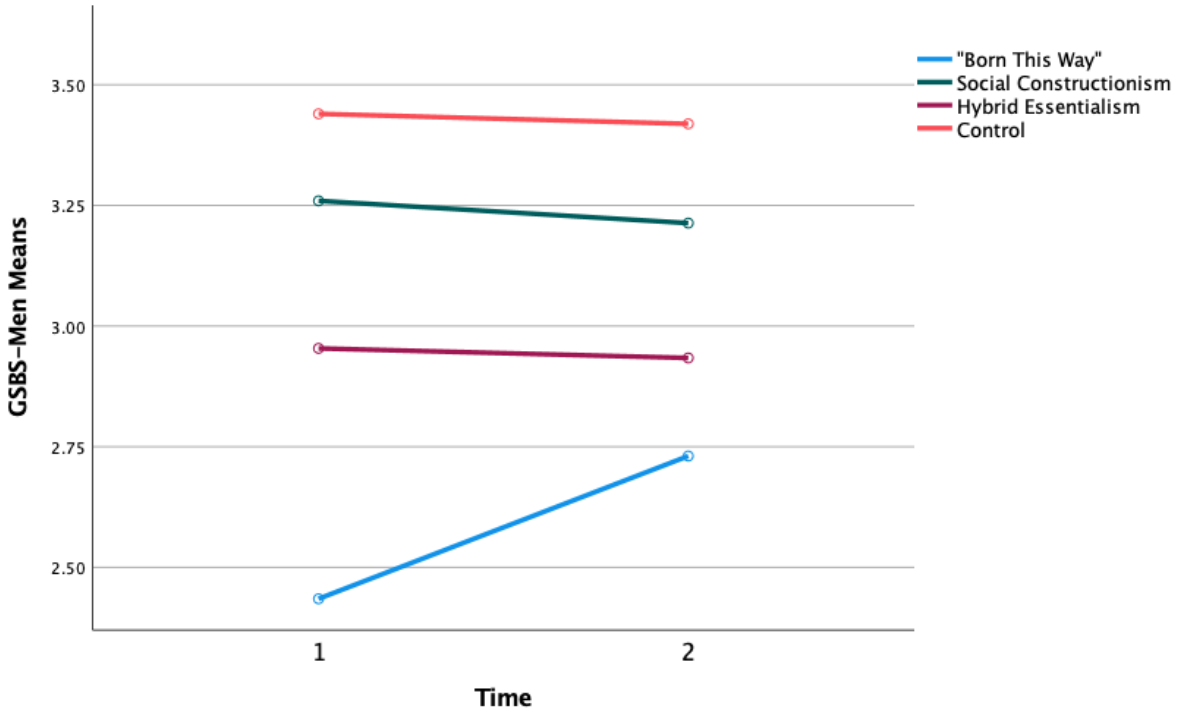

Figure 3. Gender-Specific Binegativity Scale – Men (GSBS-Men) mean scores. There was a time by condition interaction. There was also a main effect of condition with participants assigned to the "Born This Way" condition reporting less binegativity towards bisexual men than participants assigned to the control condition. There was a simple main effect of condition at Time 1 with participants assigned to the "Born This Way" condition reporting less binegativity towards bisexual men at Time 1 than participants assigned to the Social Constructionism and control conditions. There was a simple main effect of condition at Time 2 with participants assigned to the "Born This Way" condition reporting less binegativity towards bisexual men at Time 2 than participants assigned to the control condition.

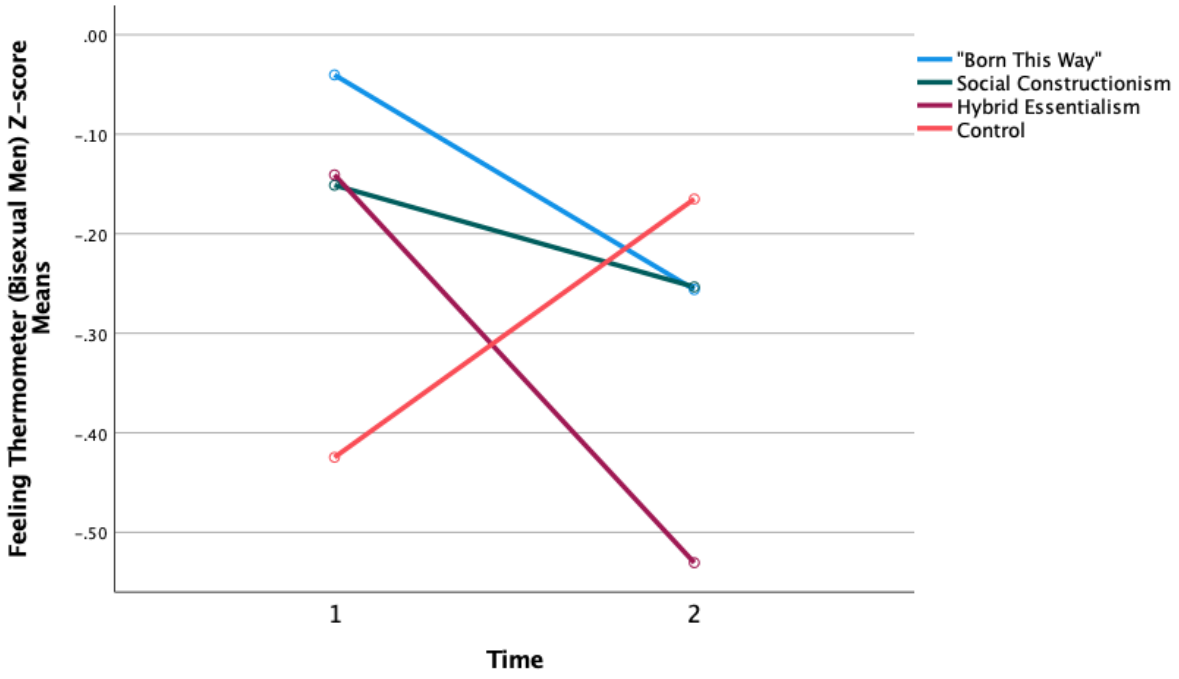

Figure 4. Feeling Thermometer (Bisexual Men) z-score means. There was a time by condition interaction. There was also a simple main effect of time for the Hybrid Essentialism condition. Feelings towards bisexual men were significantly more positive at Time 1 than at Time 2.

Appendix A

Please read the following essay carefully. Once you have finished, you will be asked to answer 3 multiple-choice reading comprehension questions based on what you have just read. When you are ready to continue to the reading comprehension questions, please click the arrows at the bottom right of your screen.

Scientific research suggests that sexual orientation is innate and biological. Evidence for this hypothesis can be seen in research on heredity, hormones, and the bodies and brains of lesbians and gay men.

In terms of heredity, a genetic study examining blood samples of almost 800 men in China found specific genetic structures related to homosexuality. They found that men who had this particular genetic structure were more likely to be gay than men who did not.[1] Similarly, scientists from three major universities examined the genetic structures of nearly 400 families with two or more gay brothers. These scientists have detected a specific chromosome contributing to male sexual orientation.[2]

Boston University biologists have found that gay men have a greater proportion of gay brothers than would be expected by chance. On average, 25% of gay men's brothers were also gay.[3] Similar research has found that lesbians are more likely to have sisters who are also lesbians, too.[4] Other research has found that when one identical twin is gay or lesbian, there is a 50% chance or more that the other identical twin will also be gay or lesbian. For gay and lesbian fraternal twins, it is less likely their sibling will be gay or lesbian, but it is still more likely than we would expect by chance.[5] Taken together, this evidence suggests that homosexuality runs in families.

There is also evidence to suggest that gay people's bodies react differently to hormones. A study published by the National Academy of Sciences found that the brains of gay men react similarly to those of heterosexual women in response to chemicals commonly found in male

sweat called pheromones. When gay men and heterosexual women smell a particular type of pheromone commonly detected in male sweat, brain scans show activation in a part of their brains called the hypothalamus. This part of the brain is involved in sexual behavior in humans. However, heterosexual men's brains do not react this way in response to smelling this pheromone.[6] Another study found that gay men's responses to the hormone estrogen were somewhere between that of heterosexual women and heterosexual men, suggesting that biological, hormonal markers for sexual orientation do indeed exist.[7]

Studies of the order a child is born in their family suggest that gay men may be exposed to levels of hormones in the womb that alter their brain development. Through a statistical analysis of 600 Canadian men's family information, psychologists discovered that having a greater number of older brothers increases the likelihood that a man will be gay. For each older brother a man has, his odds of being gay increase by 33%. However, number of older sisters does not increase the likelihood that a man will be gay.[8] The same analysis on a large database of historical sexuality data found similar results.[9] The "maternal immune hypothesis" explains why this may happen, arguing that the mother's body develops defenses against the male hormones of the fetus with each son she bears.[10] Further supporting this hypothesis, researchers from Northwestern University and their colleagues replicated the birth order effect in a sample of nearly 1,600 men; they found that younger male siblings are more likely to be gay than only children or older siblings.[11] This research has been replicated numerous times.[12]

There is also evidence of physical differences between gay and heterosexual people's bodies and brains. For example, researchers at Penn State University combined results of 21 studies measuring finger lengths of nearly 6,000 heterosexual women and men, and lesbian women and gay men. They found the ratio of index-to-ring fingers differed significantly between

lesbian and heterosexual women. The ratio of lesbian women's finger lengths was similar to the men's.[13] This "digit ratio" is thought to result from exposure to the hormone androgen in the womb, and further supports the idea that sexual orientation is biological.[14] Another study at the University of Toronto combined results of 20 studies comparing rates of left-handedness in over 23,000 people. The results showed that gay people were significantly more likely to be left-handed.[15] Since our dominant hand is determined in the womb, this again suggests sexual orientation is determined before birth.

Furthermore, the structure of gay people's brains may be different from that of heterosexuals. One scientist at the Salk Institute for Biological Studies obtained and dissected brain tissue from 41 deceased people and investigated an area of the brain called the hypothalamus, which governs sexual behavior. One area of the hypothalamus was more than twice as large in the heterosexual males' brains than the gay males' brains, suggesting a biological origin of sexual orientation.[16] Similarly, researchers at the Stockholm Brain Institute found through brain scans of 90 people that the brains of gay men and lesbian women were different from the brains of heterosexual men and heterosexual women, respectively.[17] Taken together, this research strongly suggests sexual orientation is biological.

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Appendix B

Please read the following essay carefully. Once you have finished, you will be asked to answer 3 multiple-choice reading comprehension questions based on what you have just read. When you are ready to continue to the reading comprehension questions, please click the arrows at the bottom right of your screen.

Scientists argue sexual orientation is "socially constructed," meaning the labels used to describe sexual orientations are developed by humans, and are therefore different across cultures, times, and locations. These "social constructionists" argue sexual orientation categories are not as distinct (i.e., separate) or informative as we might think. They also suggest that individuals who use the same label for their sexual orientation (e.g., gay) may be very different from one another in terms of their sexual desires and behaviors. In addition, labels people use to refer to individuals based on their sexual orientation (e.g., bisexual), may be different from how these individuals view themselves.[1]

Researchers suggest sexual orientation categories such as "gay" and "heterosexual" are not as distinct as we might believe. Kinsey's groundbreaking research showed how sexual orientation is not easily categorized into distinct categories of gay/lesbian, bisexual, or heterosexual, because humans express a wide range of sexual desires and behaviors—even when they identify as "straight" or "gay." Kinsey developed a seven-point scale of attraction to female and male sexes, which was ground-breaking in that it allowed participants more flexibility in describing their sexual orientations than previous measures of sexual orientation.[2] Asking open-ended questions about sexual orientation also gives a broader picture of sexual orientation than asking multiple choice questions with a limited number of sexual orientation options.[3]

Researchers have examined why individuals use a particular sexual orientation label to describe themselves. There may be many reasons individuals use the term "bisexual," for example, including their physical and/or emotional attractions to both women and men, their

hesitance to identify as "lesbian" or "gay," and/or their social and political beliefs. As such, the label "bisexual" means different things to different people.[4]

Research on sexual fluidity further complicates the notion that there are a limited number of distinct sexual orientation categories. For example, a psychologist found some women report having been heterosexual in the past, but now identify as lesbian. She concluded that change in sexual orientation can occur.[5] Another researcher conducted a study with lesbians and asked about their sexual behaviors and attractions over time. Of the women who initially identified as lesbian, 60% had sexual contact and 30% had been romantically involved with a man in the past 10 years.[6] Sociologists have found extensive evidence of men who do not identify as gay but nonetheless seek out and engage in sex with other straight-identified men while maintaining romantic relationships with women.[7] In another study, researchers found half their participants changed their attractions during their lifetime.[8] These findings suggest sexual attraction can fluctuate over time, meaning distinct categories may not fully capture individuals' identities or experiences.

In terms of the informativeness of sexual orientation labels (i.e., the idea these labels tell us something meaningful about an individual or group), scientists conclude that knowing a person's sexual orientation tells us relatively little about that person. For example, knowing someone identifies as straight is hardly the basis for making other judgments about them, such as how good they are at math, or if they enjoy country music. One reason is sexual orientation categories are created by people, change over time, and are not consistent across cultures and places. Psychologist Janis Bohan, for example, argued sexual orientation labels originate from particular sociohistorical contexts, and are not universal categories of human experience.[9] Sexual orientation is also defined differently across individuals. For example, one sociologist

interviewed adolescent boys who discussed their understanding of their own sexual orientations. She found they picked labels that fit them best, and chose a variety of labels.[10] In other words, two people who have the same kinds of desires can identify in very different ways.

Sexual orientation is also defined differently in different settings. For example, many men who identify as heterosexual when they enter prison have sex with men while incarcerated.[11] Sexual orientation is also defined differently across populations and cultures. For example, the term "down low" is frequently used to refer to Black men who have sex with men in private, while publicly identifying as heterosexual. Many of these men perceive themselves as straight and do not want relationships with men beyond sex.[12] Researchers find men on the "down low" are actually found across racial groups.[13] Additionally, Western sexual orientation labels do not match those in other countries. In India, for example, there is a label for those who are masculine and prefer to have sex with women and feminine men, and another for men who are more feminine and prefer to have sex with masculine men.[14] Collectively, this evidence suggests knowing a person's sexual orientation reveals little about them.

Like all groups, lesbian, gay, and bisexual (LGB) communities contain a great deal of diversity. LGB people have different races, social classes, religions, and disability statuses. For example, scientists have investigated how social class impacts LGB individuals' lives, citing evidence that being both poorer and LGB presents unique challenges.[15] Other studies show LGB people express their gender in diverse ways.[16] Research like this reminds us that it is important to remember that LGB people are not all the same.

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Appendix C

Please read the following essay carefully. Once you have finished, you will be asked to answer 3 multiple-choice reading comprehension questions based on what you have just read. When you are ready to continue to the reading comprehension questions, please click the arrows at the bottom right of your screen.

Scientists are starting to learn about the complexities of sexual orientation. Some scientists suggest sexual orientation is innate and biological. Others suggest sexual orientations can change across one's life, that sexual orientation labels are different across time and culture, and that there is a great deal of diversity *within* any sexual orientation category—such as "gay," "straight," or "bisexual"—so these labels tell us little about any given individual or group of individuals. It turns out that all of these hypotheses about sexual orientation may be true.

Evidence that sexual orientation is innate and biological can be found in research on heredity, hormones, and the bodies and brains of lesbians and gay men. Scientists have detected a chromosome contributing to male sexual orientation[1] and have found that when one identical twin is gay or lesbian, there is a 50% chance or more that the other twin will be, too.[2] This evidence suggests homosexuality is biological and runs in families. Studies of the order a child is born in their family further suggest sexual orientation is biological. Scientists have found that the number of older brothers a man has relates to being gay[3], likely because a mother's body develops defenses against the male hormones of the fetus with each son she bears, altering brain development.[4]

There is also evidence gay people's bodies react differently to hormones. A study found gay men's responses to estrogen were between those of heterosexual women and heterosexual men, suggesting biological, hormonal markers for sexual orientation exist.[5] There is also evidence of physical differences between gay and straight people's bodies and brains. Researchers found the ratio of index-to-ring fingers differs between lesbian and heterosexual

women.[6] This "digit ratio" is also thought to result from exposure to a certain hormone in the womb.[7] Another study found gay people were more likely to be left-handed.[8] Since our dominant hand is determined in the womb, this again suggests sexual orientation is determined before birth. Researchers have also found the brains of gay men and lesbian women to be different from the brains of heterosexual men and women.[9] Taken together, this research strongly suggests sexual orientation is biological.

But just because sexuality may be influenced by biology does not mean that cultural and social factors are irrelevant. In fact, many social scientists argue sexual orientation is "socially constructed." For example, the labels we use to describe sexual orientations are absolutely developed by humans, and are different across social groups, cultures, times, and locations. Definitions of these categories change with social and political climates. In addition, labels people use to refer to individuals based on their sexual orientation (for example, bisexual), may, in fact, be different from how these individuals view themselves.[10]

Researchers also suggest categories like "gay" and "heterosexual" are not as distinct as we might believe. Kinsey's groundbreaking research showed how sexual orientation may not be easily categorized into distinct categories of gay/lesbian, bisexual, or heterosexual.[11] Further complicating the notion that there are a limited number of distinct sexual orientation categories is research on sexual fluidity, which suggests individuals' sexual orientations can change throughout their lives. One researcher conducted a study with lesbians, asking them about sexual behaviors and attractions over time. Of those who initially identified as lesbian, 60% had sexual contact, and 30% had been romantically involved, with a man over the past 10 years.[12] These findings suggest sexual attraction can fluctuate over time, and that distinct categories may not fully capture individuals' experiences.

Researchers also actually assert that knowing a person's sexual orientation tells us relatively little about who that person is. One reason is that sexual orientation categories are created by people, change over time, and are not consistent across cultures and places. Psychologist Janis Bohan, for example, argued sexual orientation labels originate from particular sociohistorical contexts, and are not universal categories of human experience.[13] Sexual orientation is also defined differently across individuals. For example, one sociologist interviewed adolescent boys at a gay youth center who discussed their experiences understanding their own sexual orientations. She found they picked a variety labels that fit them best.[14]

Sexual orientation is also defined differently across settings. For example, a study conducted at a U.S. prison found some men who had sex with men while incarcerated identified as heterosexual when entering prison but as gay while incarcerated.[15] Sexual orientation is defined differently across cultures, as well. For example, the term 'down low" is frequently used to refer to Black men who have sex with men in private while publicly identifying as heterosexual.[16] Additionally, Western labels for sexual orientation differ from those in other countries.[17]

Like all groups, lesbian, gay, and bisexual (LGB) communities contain a great deal of diversity. LGB people have different races, social classes, religions, and disability statuses. For example, scientists have investigated how social class impacts LGB individuals' lives, citing evidence that being both poorer and LGB presents unique challenges.[18] Research like this reminds us that it is important to remember that LGB people are not all the same.

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VITA

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