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White Americans' Genetic Lay Theories of Race Differences and Sexual Orientation: Their Relationship with Prejudice toward Blacks, and Gay Men and Lesbians

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This study examined the relationship between White Americans' genetic explanations, conceptualized as genetic lay theories, for perceived racial differences and for sexual orientation, and attitudes toward Blacks, and gay men and lesbians, respectively. Considering contrasting public discourse surrounding race and sexual orientation, we predicted that genetic lay theories would be associated with greater prejudice toward Blacks, but less prejudice toward gay men and lesbians. The findings, based on a representative sample of 600 White Americans, were consistent with expectations. Results are discussed in relation to the literature on essentialism and implicit theories of the malleability of traits. The present research broadens our view of lay theories by showing how they support either prejudice or tolerance, depending on the target group.

KEYWORDS genetic explanations, lay theories, race, sexual orientation

Author's note

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RESEARCH exploring potential genetic influences on human characteristics has intensified over the past decade, accompanied by popular media coverage tending to spectacularize the human gene as a cultural icon (Nelkin & Lindee, 1995). Exposure to such coverage likely increases public receptivity to genetic theorizing when interpreting human characteristics commonly thought to be associated with different social groups (Brescoll & LaFrance, 2004). Based primarily on historical precedent and philosophical argument, concern has been raised that the use of complex genetic explanations by scientists, and subsequent use of less sophisticated genetic theories in the media and by the lay public, might reinforce prejudicial and discriminatory attitudes (Black, 2003; Gould, 1981). However, there is little empirical study of this putative effect. Given genetic theories have strong social relevance, it is surprising that they have not received more attention in social psychology, particularly in the area of intergroup relations. In this paper, we address this paucity of research by exploring White Americans' belief systems regarding genetic influences on human characteristics and their associations with attitudes toward disadvantaged social groups. Specifically, we propose that it is useful to conceptualize genetic explanations as lay theories. As such, we suggest a link between (1) genetic lay theories for perceived race differences and prejudice toward Blacks, and (2) genetic lay theories for sexual orientation and attitudes toward gay men and lesbians. We posit that the direction of these two relationships differs diametrically, due to dissimilarity in the social histories and current debates about both race and sexual orientation in popular culture.

Lay theories and group perception

Lay theories about social phenomena are knowledge structures that help people interpret and evaluate information about themselves and other individuals. As such, lay theories give meaning to events in our everyday lives and can be used to predict human behavior. Although lay theories have taken different forms (Hong,

Levy, & Chiu, 2001), much research in this area has been applied to the perception of social groups, with significant implications for intergroup behavior (e.g. discriminatory action and policy). Within the broad expanse of research in this domain, two theoretical approaches have received major attention. Research on essentialism and on implicit theories about the malleability of traits has advanced our understanding of how lay theories develop, are organized, and influence group perception. As applied to groups, essentialism is the view that social categories reflect an underlying essence; implicit theories concern the belief that group divisions, and accompanying attributes, are either stable or malleable.

The concept of essentialism is the main focus of research by Haslam and colleagues (Haslam, Rothschild, & Ernst, 2004). Their work primarily explores the structure of this belief system, differentiating a 'natural kinds' dimension (i.e. social categories represent a discrete, natural, immutable, and stable cleavage, akin to biological species) and an entitative dimension (i.e. social categories represent a classification that imparts coherence, unification, and informativeness to groups, similar to reification; Haslam, Rothschild, & Ernst, 2000). Haslam et al. (2000) found that perceptions of groups as natural kinds or entitative vary by domain (e.g. gender vs. occupational groups) and category (e.g. Asian vs. Hispanic ethnicities), and whether one sees a group as natural kinds or entitative has implications for the perception of, and interaction with, group members. Studies by Yzerbyt and colleagues also explore essentialism and entitativity, but highlight the relationship between these two constructs (Yzerbyt, Estrada, Corneille, Seron, & Demoulin, 2004). Rather than conceptualizing entitativity as a dimension of essentialism, however, their work suggests that essentialism is basic, similar to the notion of 'genotype' (a hidden, inferential attribute, except without biological relevance), while entitativity derives from essentialism and is similar to the concept of 'phenotype' (an outward appearance of an attribute).

The concept of implicit theories, introduced

by Dweck and colleagues (Dweck, Chiu, & Hong, 1995a), distinguishes between entity theorists, who see human behavior as immutable, and incremental theorists, who see behavior as more dynamic and malleable. Extensive empirical investigation confirms the significant role these theories play in group perception (e.g. Levy, Plaks, Hong, Chiu, & Dweck, 2001), particularly how they are linked to essentialism and entitativity (e.g. Plaks, Levy, Dweck, & Stroessner, 2004). Although implicit theories may vary, depending on the social and cultural context (Chiu & Hong, 1999), they are described as worldviews with broad application, thus functioning as fundamental cognitive frameworks (Dweck, Chiu & Hong, 1995b). In contrast, Haslam et al. (2000) suggest that immutability (as the central construct in implicit theories) represents one particular aspect of natural kinds essentialism.

Although these research literatures emphasize somewhat dissimilar types of lay theories, and dissimilar relationships between lay theory elements (see Yzerbyt, Judd, & Corneille, 2004 and Levy et al., 2001), what is significant for our purposes is that these approaches have specific relevance to the use of genetic factors as explanations for group differences. Just as each theory emphasizes a somewhat distinct knowledge structure that aids our understanding of how individuals perceive social groups, we propose the concept of a genetic lay theory that serves a similar function.

Genetic explanations as lay theories

We define a genetic lay theory as an organized belief structure reflecting the view that genes influence, to some degree, human traits. Rather than being an isolated causal explanation, we suggest that a genetic lay theory functions as a conceptual framework that shapes an array of social perceptions. Like all lay theories, genetic lay theories help people understand and predict human behavior (see Kruglanski, 1990). Therefore, they have important social and political meaning. However, unlike most other lay theories discussed in the psychological literature, genetic lay theories occur within an

ongoing, scientific, and public dialogue, frequently generating controversy. In this way, they are more explicit than other lay theories and represent an investigative issue that contrasts sharply with much lay theory research explored in a 'social vacuum'. Yzerbyt and Rogier (2001) note the value of the latter. While we acknowledge this value, we maintain it is also helpful to understand how lay theories function in real-world contexts (see Chiu & Hong, 1999). Additionally, because science bestows credibility on genetic discoveries (see Hegarty & Pratto, 2001), genetic lay theories may have special standing as 'valid' theories.

With regard to genetic lay theories impacting social group perception, we posit that the lay public tends to think of genetic material as an *essence* providing particular types of information about members of social groups. In current social discourse, invoking genes to explain human behavior implies these factors represent a particular internal, concrete substance influencing the outward manifestation of a characteristic, similar to Yzerbyt, Estrada et al.'s (2004) use of the term 'genotype', but here with clear reference to biology. Thus, reporting that genes account for a difference between social groups is tantamount to indicating genes *are* the essential (and biological) difference and, therefore, they can function as explanations for difference. In this way, genetic lay theories are akin to essentialist lay theories. However, given that non-biological factors (e.g. culture) can create essential social classifications (see Keller, 2005), genetic lay theories are aligned with the notion of natural kinds essentialism (Gelman, 2003). Thus, these theories exhibit what Rothbart and Taylor (1992) term *inductive potential*, in that the underlying essence (genetic make-up) can transmit a wealth of information (not necessarily veridical) about social groups.

Genetic lay theories, in their similarity to natural kind schemes, imply that social categories are discrete, immutable, and determined by natural forces (see Haslam et al., 2000). This is evinced in history, in current popular discourse, and, to a limited extent, in empirical research. For example, first, with regard to groups perceived as separate entities,

underlying antimiscegenation laws was the view that groups deemed innately inferior (in this case, Blacks) were so genetically distinguishable that they should not mix with Whites. Second, discussion in the popular media (e.g. Scott, 1993), in scholarship on the social ramifications of genetic science (e.g. Andrews, 1999), and in some policy advocacy (e.g. Rushton & Jensen, 2005) is replete with assumptions that genetic causes imply stability of traits. Moreover, Levy, Stroessner, and Dweck (1998) found that entity theorists are more likely than incremental theorists to report that certain characteristics are innate (see also Keller, 2005; Martin & Parker, 1995). Finally, genetic theories commonly invoke the 'natural' basis of social categories, exemplified in sociobiology, which characterizes genetic material as an indicator of evolutionary design (e.g. Wilson, 1975).

The social context of genetic lay theories

Much research on lay theories takes a cognitive perspective, emphasizing the enduring structure of these mental systems (Hong et al., 2001; see also Dweck et al., 1995b). Numerous scholars also demonstrate the malleability of lay theories (Plaks et al., 2004), showing they can change in both type and form. For example, work by Chiu and Hong (1999) documents a shift in implicit theories among residents of Hong Kong after it was turned over to China in 1997. Additionally, Haslam et al. (2000) found that particular dimensions of lay theories apply differently, depending on the specific domain and group. These studies illustrate the salience of social context, and the importance of exploring how lay theories function, consistent with the definition of lay theories as both structural and functional systems (Hong et al., 2001).

Although we acknowledge that those inclined toward genetic lay theories may represent individuals with particular personalities or cognitive needs (e.g. those desiring cognitive closure), we argue it is particularly valuable to conceptualize genetic lay theories in their functional role. This is due to the fact that genetic (or 'hereditary') theories have been employed,

historically, to justify social hierarchies, and to imply inferiority of certain social groups. Indeed, these theories were used by Hitler to promote hatred toward Jews and other groups deemed inferior (Lerner, 1992). They have also been used to maintain the status quo, particularly with regard to gender, race, and social class (Gould, 1981). This highlights the potentially profound social and political implications of genetic lay theories, and thus the urgent need to take into account how they may function in social reality.

Genetic lay theories of race differences and prejudice toward Blacks

Numerous studies have shown that individuals who hold essentialist or entity theories tend to report prejudicial attitudes toward social groups (e.g. see Yzerbyt, Estrada et al., 2004). For example, in research on attitudes toward Mainland Chinese citizens by residents of Hong Kong, Chow (1996; cited in Levy et al., 2001) found that entity theorists exhibited more prejudice than incremental theorists. Given the essentialist and entitative nature of genetic lay theories, this suggests the likelihood of a similar association between genetic lay theories and prejudice. One of the clearest illustrations of this link is the use of genetic factors to account for differences between ethnic groups, a practice with a long, sordid history (Black, 2003). Beginning with Galton (1892/1972), in the late nineteenth and early twentieth centuries, there have been numerous attempts to document genetic causes underlying the low social standing of some races (Gould, 1981). During the eugenics era, these views were enacted in social policies and racist practices (Kitcher, 1997). Despite studies discrediting the biological basis for race (see Anderson & Nickerson, 2005), and many questioning the scientific meaning of race (e.g. Smedley & Smedley, 2005), genetic lay theories for perceived race differences continue to surface (e.g. Entine, 2000; Rushton & Jensen, 2005), particularly with regard to differences between Whites and Blacks.

Traditionally, popular debates between supporters and opponents of racial equality tend to focus on whether inequality is socially constructed or evolutionary—often described as the ‘nature vs. nurture’ issue. Parallel to essentialist construals of social categories, racist views are bolstered by the sense that racial categories are distinct, stable, and natural. There is debate in the social sciences, however, regarding the extent to which biological thinking currently undergirds racism. Some suggest that a more modern form of racism, emphasizing Black’s violation of the work ethic has, for the most part, replaced traditional racism (e.g. Kinder & Sanders, 1996). However, little empirical research documents this shift. To the extent that genetic lay theories relate to prejudice toward Blacks, it suggests that traditional racism is alive and well.

We identified only two studies empirically examining the association between genetic explanations for perceived race difference and prejudice toward Blacks. This dearth of research is likely due to three factors: (1) the biological basis for race was considered, for some time, a major component of traditional (old-fashioned) racism (Pettigrew & Meertens, 1995), and was not measured as a separate construct; (2) as noted above, some recent scholarship holds that current racial prejudice no longer includes the belief that Blacks are innately inferior (Bobo & Smith, 1998); and (3) research on the effects of biological/genetic explanations for race differences mainly focus on Whites’ support for race-based policies, rather than prejudice, per se (Bobo & Kluegel, 1993). Although some studies have included the genetic basis for social categorization as one element within a broader array of essentialist elements linked to prejudice toward Blacks (e.g. Haslam & Levy, in press), genetic theories are rarely explored in their own right, as predictors of racial prejudice. Of the two investigations examining the relationship between genetic explanations for race and prejudice toward Blacks, one revealed a positive (but weak) association (1986 National Election study, cited in Kinder & Sanders, 1996), and the other, using measures roughly corresponding

with traditional and modern prejudice, found genetic explanations to be significantly and positively related to both (Keller, 2005).

Genetic lay theories of sexual orientation and prejudice toward gay men and lesbians.

Intensity of debate regarding the origins of sexual orientation has increased since the early 1990s, when several studies claimed a genetic association for homosexuality (e.g. Hamer, Hu, Magnuson, Hu, & Pattatucci, 1993). Media coverage of this research was extensive, with cover stories in *Newsweek* (Gelman, 1992) and *Time* (‘Born gay’, 1993). Commentary surrounding these stories, and public discourse on sexual orientation since then (focused almost exclusively on the etiology of homosexuality), has been framed primarily as an issue of choice and morality (Stein, 1999). This frame is driven by advocates who either promote tolerance and gay rights, or who condemn gay and lesbian ‘lifestyles’. Opponents of homosexuality initially argued that gay men and lesbians *choose* to violate the moral code established by religious teachings (e.g. Focus on the Family, 2004). Supporters of gay rights frequently responded to this frame by claiming a genetic basis for homosexuality (Human Rights Campaign, 2003; also see Hegarty, 2002), which they believe implied its uncontrollability—meaning that gay men and lesbians are less culpable. In a sense, this explanation is a defense in response to the charge of moral failure. Presumably, genetic lay theories, if they imply uncontrollability, *should* remove behavior from the moral domain, because morality (decisions about right or wrong), by definition, assumes individuals are free to make choices about their behaviors and have control over those choices. Controllability has played a central role in research investigating people’s reactions toward individuals with social stigmas (Weiner, 1995), showing that those who bear stigmas are viewed more negatively when they are perceived to be responsible for (i.e. in control of) their condition. Consistent with this research, several studies found that

greater belief in a genetic or inborn basis for (or uncontrollability of) homosexuality is associated with increased tolerance toward gay men and lesbians (Ernulf, Innala, & Whitam, 1989; Sakalli, 2002; Tygart, 2000). Given the apparent significance of the issue of controllability, it is noteworthy that this construct is largely absent from the lay theory literature (see Graham, 1995). Despite the commonsense appeal of this analysis, however, Hegarty (2002) challenges its simplicity, showing immutability perceptions do not necessarily reduce stigma, and noting that biological arguments can lead to the view that gay men and lesbians are genetically defective.

Genetic lay theories in dissimilar social contexts

The few studies exploring associations between genetic lay theories and prejudice confirm that such relationships are sensitive to context and their consequences can be both positive and negative (Verkuyten, 2003). In terms of race and sexual orientation, we contend that the disparate social contexts in which popular dialogue about differences between Blacks and Whites, and differences between heterosexuals and gay men and lesbians, occurs will shape the lay theories used to explain such social categorization. With regard to race, we hypothesize that genetic lay theories should be associated with prejudice toward Blacks because racial issues have been traditionally portrayed in terms of the permanent inferiority of Blacks, emphasizing the assumed immutable nature of the perceived difference. In the case of sexual orientation, public discussion tends to revolve around the etiology of homosexuality—generally framed as biology *or* choice. Here, like genetic lay theories for perceived race differences, genetic lay theories for sexual orientation imply the discreteness, stability, and naturalness of the difference between heterosexuals and gay men and lesbians. However, because they are contrasted with choice (permitting blame), such beliefs can act as a rationale for reducing hostility toward gay men and lesbians. Therefore, we expect that the

more respondents endorse genetic lay theories in explaining sexual orientation, the more they will report tolerant attitudes toward gay men and lesbians. In sum, our predictions derive from the consideration of dissimilar social contexts and suggest opposing relationships between genetic lay theories and prejudice.

Method

Respondents

As part of a larger study exploring genetic explanations among Black and White Americans, 600 White adults were interviewed by telephone, using random digit dialing selection methods and drawing from the continental United States. Although we recognize the importance of exploring genetic lay theories among Blacks, we included only White respondents in this study for two reasons. First, because our concern is the issue of prejudice toward Blacks, we conducted our analyses only among White respondents. Second, because the primary goal of this research was to contrast effects of genetic lay theories on attitudes toward Blacks, with those toward gay men and lesbians, it was important to use the same sample for both analyses.

Our sample of White respondents included 298 men and 302 women, ranging in age from 19 to 90 ($M = 42.7$, $SD = 15.7$), and representing a range of education levels (less than high school diploma = 10%, high school diploma = 24%, some college = 22%, two-year college degree = 11%, four-year college degree = 22%, master's degree = 8%, PhD or equivalent = 3%). In addition, for political orientation, 13% of the sample classified themselves as very liberal, 21% as somewhat liberal, 26% as middle-of-the-road, 23% as somewhat conservative, and 17% as very conservative. Finally, 36% of respondents indicated they were very religious, 51% somewhat religious, 8% not very religious and 5% not religious at all. To adjust for national representativeness, we created post-stratification weights for age and education within gender of the respondent, yielding a sample that approximates the US population.

Procedure

Trained, professional interviewers conducted telephone interviews averaging 40 minutes in length. Respondents were paid US\$15 for completing the survey. After obtaining a list of the number of adult men and women within each household, a respondent was selected randomly by computer. The interviewer then asked to speak with that man or woman. The race of the respondent was assessed through self-report during an initial series of screening questions. Individuals who identified as multiracial were asked for their primary racial affiliation. Only individuals who identified as White are included in this study.

Measures

Genes explain race differences We constructed this measure from four sets of questions assessing the extent to which genetic factors are believed to explain perceived race differences in four characteristics that are racially stereotyped: (a) the drive to succeed, (b) math ability, (c) tendency to act violently, and (d) intelligence. For each of the characteristics, respondents were asked if any of the difference they perceived between Blacks and Whites on the specified characteristic was due, at least in part, to genes. Respondents answering 'yes' were then asked if genes explained 'very little', 'some', 'a lot', or 'just about all' of this difference. We combined the answers to these two questions, resulting in a scale measuring the extent to which respondents believed that perceived race differences were due to genes: 0 = 'none', 1 = 'very little', 2 = 'some', 3 = 'a lot', 4 = 'just about all'. We then calculated respondents' mean scores across the four characteristics (Cronbach's $\alpha = .84$).

Genes explain sexual orientation A measure of the extent to which individuals believe sexual orientation is influenced by genes was constructed from two questions, similar to those above for perceived race differences. Unlike the race questions, that assessed beliefs about specific characteristics, here we asked how much genes influence 'differences between people who are homosexual and those who are

heterosexual'. Whereas social discourse on race differences often focuses on attributes of Whites and Blacks, sexual orientation is seen primarily as an issue of the heterosexual vs. homosexual 'lifestyle', without emphasis on specific, associated behaviors. Parallel to questions about race differences, this measure ranged from 0 (genes explain 'none' of the difference) to 4 ('just about all' of the difference is genetic). The exact wording of the genetic explanation questions is shown in the appendix.

Attitudes toward Blacks We included two measures of attitudes toward Blacks. The first measure, Traditional Racial Prejudice, asked respondents (hypothetically) 'How bothered would you be if your son or daughter dated a Black person?' and 'How bothered would you be if your son or daughter married a Black person?' Responses ranged from 'not bothered at all' (1) to 'very bothered' (7). A mean score was calculated from the two items ($r = .93$).

The second measure focused on the issue of modern racial prejudice. This construct is distinguished from traditional prejudice, in that it is aimed at holding Blacks responsible for their lower status (Kinder & Sanders, 1996). The scale was constructed from three items assessing the extent to which respondents agreed with the following statements: 'Blacks are too dependent on government help for getting ahead'; 'Many groups of Americans overcame discrimination and made it on their own; Blacks should do the same'; 'If Blacks don't do well in life, they have only themselves to blame' (items modified from McConahay & Hough, 1976). Response options were 'strongly disagree' (1), 'somewhat disagree' (2), 'neither agree nor disagree' (3) (volunteered), 'somewhat agree' (4), and 'strongly agree' (5). A mean score on these items was obtained (Cronbach's $\alpha = .67$), with higher values reflecting greater prejudice toward Blacks.

Attitudes toward gay men and lesbians We assessed prejudicial attitudes toward gay men and lesbians in two ways. The first measure, Gay/Lesbian Prejudice, consisted of a single

item asking respondents (hypothetically), 'How bothered would you be if your son or daughter told you he or she is homosexual?' Responses ranged from 'not bothered at all' (1) to 'very bothered' (7).

A second measure, Gay/Lesbian Discrimination, assessed the extent to which respondents agreed with three statements: 'Homosexual couples should not be allowed to adopt children'; 'Marriage between homosexuals should be illegal'; 'Homosexuals should not be allowed to teach in elementary schools'. Respondents answered using the same agree/disagree scale noted above. A mean score was calculated from these items (Cronbach's alpha = .81), with higher values indicating greater endorsement of discriminatory policies.

Background characteristics To control for the effects of background factors shown to be related to prejudice (Duckitt, 1992), we included in our analyses the respondents' gender (male = 0, female = 1), age (in years), education level (ranging from 1 = less than high school diploma to 7 = advanced degree), self-reported political orientation (ranging from 'very liberal' = 1 to 'very conservative' = 4), self-reported religiosity (ranging from 1 = 'not religious at all' to 4 = 'very religious', and a measure that categorized respondents by whether they resided in the south (1) or elsewhere (0).

Analysis design

We conducted hierarchical regression analyses, predicting the prejudice and discrimination measures, by entering the set of background variables in Step 1 and then including the measure of genetic explanation about either perceived race differences or sexual orientation in Step 2. A zero-order correlation matrix of all measures in the analysis is shown in Table 1. A significant, but low, correlation (.37, $p < .01$) between the two measures of attitudes toward Blacks suggests they are related, but conceptually distinct. We found much higher correlation between the two measures of attitudes toward gay men and lesbians (.63, $p < .01$). However, since these constructs focus on very dissimilar

aspects of attitudes, we retained them as separate measures.

Results

Degree of endorsement of genetic lay theories

For genetic explanations for perceived race differences, a mean across four characteristics, half of the respondents reported that none of the perceived differences were due to genetic factors. For the remaining respondents, 24% had mean scores indicating 'very little' influence (0.25 to 1), 20% indicated 'some' influence (1.25 to 2), 6% reported 'a lot' of influence (2.25 to 3), and less than 1% told us that genes accounted for 'just about all' of the perceived race differences across traits (3.25 to 4). Given the skewness of this measure, we investigated (and confirmed) that the normality of the residuals was tenable and identified no points of undue influence.

On the question about genetic origins of sexual orientation, 51% of respondents reported that differences between heterosexuals and homosexuals were not at all genetic. Additionally, 8% reported 'very little' genetic influence, 23% reported 'some' genetic influence, 14% reported 'a lot' of genetic influence and 4% indicated that sexual orientation was 'just about all' due to genetic factors. Thus, for both perceived race differences and sexual orientation, a sizable minority of respondents indicated some acceptance of a genetic lay theory.

Predicting attitudes toward blacks

Traditional racial prejudice Table 2 presents the results from the hierarchical regression analysis predicting Traditional Racial Prejudice. In Step 1, the background measures explained 16% of the variance (adjusted R^2). For the full model, including Genes Explain Race Differences, this value increased to 19%, which was a significant increase ($F_{\text{change}}(1, 549) = 20.44, p < .0001$). Importantly, the results indicate that the more respondents endorsed a genetic lay theory, the more they reported being bothered if their (hypothetical) child dated or married a Black person. In addition, respondents who

Table 1. Correlations between measures ($n = 600$)

	1	2	3	4	5	6	7	8	9	10	11
1 Traditional racial prejudice	–										
2 Modern racial prejudice	.37**	–									
3 Gay/lesbian prejudice	.60**	.30**	–								
4 Gay/lesbian discrimination	.47**	.28**	.63**	–							
5 Genes explain race differences	.25**	.18**	.16**	.12**	–						
6 Genes explain sexual orientation	-.06	-.14**	-.23**	-.26**	.21**	–					
7 Gender (female)	.04	-.06	-.07	.09*	.01	.09*	–				
8 Age	.33**	.06	.17**	.29**	.24**	.15**	.09*	–			
9 Education level	-.10*	-.22**	-.13**	-.15**	-.10*	.19**	-.07	-.05	–		
10 Southern residence	.16**	.16**	.10*	.11**	-.03	-.01	-.09*	.04	.03	–	
11 Political orientation (conservative)	.20**	.20**	.31**	.37**	.10*	-.19**	.02	.13**	-.06	.03	–
12 Religiosity	.22**	.10*	.29**	.40**	.08*	-.13**	.12**	.21**	-.11**	.15**	.28**

* $p < .05$; ** $p < .01$.

Table 2. Hierarchical regression predicting attitudes toward Blacks

	Traditional Racial Prejudice (full model)			Modern Racial Prejudice (full model)		
	B	SEB	β	B	SEB	β
<i>Step 1</i>						
Gender	.069	.174	.016	-.107	.085	-.051
Age	.029	.005	.229***	-.000	.002	.000
Education	-.089	.059	-.059	-.135	.028	-.192***
Southern residence	.720	.189	.149***	.408	.092	.180***
Political orientation	.191	.081	.096*	.138	.039	.147***
Religiosity	.286	.109	.109**	.027	.053	.022
Adjusted R^2	.156	$F(6, 550) = 18.11***$.101	$F(6, 551) = 11.40***$	
<i>Step 2</i>						
Genes explain race differences	.472	.104	.180***	.169	.051	.138**
Adjusted R^2	.185	$F(7, 549) = 18.987***$.117	$F(7, 550) = 11.53***$	
N	557			558		

* $p < .05$; ** $p < .01$; *** $p < .001$.

Note: Higher values for gender and political orientation are female and conservative, respectively.

were older, more politically conservative, more religious, and who resided in the south, had higher levels of traditional prejudice toward Blacks than other respondents.

Modern racial prejudice The model predicting Modern Racial Prejudice is shown in Table 2. In Step 1, with only the set of background predictors, this model accounted for 10% of the variance. When Genes Explain Race Differences

was included in the model, there was a statistically significant increase, 12% ($F_{\text{change}}(1, 549) = 11.052, p < .001$). The results show that respondents who offered a genetic theory for perceived race differences reported greater prejudice toward Blacks than those who rejected such a theory. Moreover, higher education levels were associated with lower prejudice, but political conservatism and residence in the south were both related to greater prejudice.

Predicting attitudes toward gay men and lesbians

Gay/lesbian prejudice The hierarchical regression examining the effect of genetic lay theories for sexual orientation on prejudice toward gay men and lesbians is shown in Table 3. The model in Step 1, with only the background variables, accounted for 17% of the variance in prejudice. In Step 2, including Genes Explain Sexual Orientation in the model, 20% of the variance was explained ($F_{\text{change}}(1, 542) = 16.92, p < .0001$). The more respondents used genetic factors to account for differences in sexual orientation, the less bothered they were if their (hypothetical) son or daughter told them he or she was homosexual. Additionally, those who were older, more politically conservative, and more religious reported higher levels of prejudice than other respondents. Moreover, men had higher mean levels of prejudice than women.

Gay/lesbian discrimination Table 3 shows the effect of genetic explanations for sexual orientation on discriminatory attitudes toward gay men and lesbians. With only the background variables included in the model in Step 1, 31% of the variance was explained. With the

addition of Genes Explain Sexual Orientation, this value increased to 35% ($F_{\text{change}}(1, 542) = 31.95, p < .0001$). The results indicate that reporting of genetic explanations for sexual orientation is associated with less discriminatory attitudes toward gay men and lesbians. Men, and respondents who were older, more politically conservative and more religious also indicated greater support for discriminatory policies than women, and younger, more liberal and less religious respondents, respectively.

Discussion

Extent to which White Americans hold genetic lay theories

The results suggest that a sizable percentage of Americans endorse what we define as a genetic lay theory to explain perceived race differences and differences in sexual orientation. This is striking in light of the fact that the scientific community, itself, does not universally embrace genetic theories for social group differences (e.g. Anderson & Nickerson, 2005). Research exploring potential genetic influences on complex human traits is in its infancy, producing numerous contradictory findings (e.g. Hamer et al., 1993 versus Rice, Anderson,

Table 3. Hierarchical regression predicting attitudes toward gay men and lesbians

	Gay/Lesbian Prejudice (full model)			Gay/Lesbian Discrimination (full model)		
	B	SEB	β	B	SEB	β
<i>Step 1</i>						
Gender	-.372	.170	-.086*	-.349	.098	-.126***
Age	.015	.005	.122**	.020	.003	.254***
Education	-.084	.057	-.058	-.051	.033	-.055
Southern residence	.214	.183	.046	.156	.105	.052
Political orientation	.421	.080	.216***	.311	.046	.249***
Religiosity	.493	.109	.192***	.402	.063	.244***
Adjusted R^2	.172	$F(6, 543) = 20.02***$.31	$F(6, 545) = 42.24***$	
<i>Step 2</i>						
Genes explain sexual orientation	-.283	.069	-.169***	-.223	.040	-.209***
Adjusted R^2	.196	$F(7, 542) = 20.01***$.347	$F(7, 544) = 42.82***$	
N	550			552		

* $p < .05$; ** $p < .01$; *** $p < .001$.

Note: Higher values for gender and political orientation are female and conservative, respectively.

Risch, & Ebers, 1999). In contrast to the equivocal state of science, the media tends to portray genetic discoveries in a more positive light (Conrad, 1997). That the public has likely been exposed to this coverage may account for at least some of their use of genetic theories (Conrad & Markens, 2001). With this information in mind, our results have important implications regarding the public's understanding of science, and thus, for science education. Future research is needed to investigate not only the extent to which the public uses genetic theories, but also factors contributing to the acquisition and acceptance of these belief systems.

Although direct comparison between genetic lay theories for race and sexual orientation is difficult, given differing psychometric properties of our two measures, the data suggest individuals are slightly more amenable to genetic lay theories for sexual orientation than for perceived race differences. We speculate this discrepancy may be due, in part, to greater public sensitivity to controversies surrounding genetic issues with regard to race, compared to those for sexual orientation. Americans' current distaste for overt expressions of racism (Bonilla-Silva, 2003), implied in intense public debate following claims of inherent differences between Blacks and Whites (e.g. Entine, 2000), suggests the percentage of individuals holding genetic theories for perceived race differences may actually be higher than indicated in this study. Despite passionate discussion also surrounding possible origins of sexual orientation, public acceptance of genetic explanations for homosexuality has steadily increased (Yang, 1997).

Genetic lay theories and prejudice

The main findings presented here document the existence of links between genetic lay theories and attitudes toward socially disadvantaged groups. Greater endorsement of genetic lay theories among Whites is associated with prejudice toward Blacks, but more tolerance toward gay men and lesbians. In stark contrast to one another, these results indicate that the role genetic lay theories play in evaluation of a

group depends on the group in question. We attribute our findings to disparate historical and current social contexts in which both scientific and popular accounts of race and sexual orientation take place.

Genetic lay theories for perceived race differences and prejudice toward Blacks

Traditionally, race relations in the United States have been characterized as a power struggle, with Black individuals in a subordinate position. To the extent individuals wish to maintain this inequality, they will likely support ideologies upholding this group distinction (Sidanius & Pratto, 1999). Genetic theories may serve this function, as legitimizing ideologies. Genetic explanations for problematic behaviors (e.g. violence) among socially disadvantaged racial groups can suggest their *permanent* inferiority. Genetic explanations for valued behaviors among socially advantaged racial groups (e.g. intelligence) can imply their *permanent* superiority. Genetic lay theories thus imply the essentialist nature of such belief systems, highlighting the perceived immutability of social categories, consistent with research by Dweck and colleagues (e.g. Levy et al., 2001; also see Keller, 2005). That we found genetic lay theories associated with *both* traditional and modern forms of racism speaks to the debate regarding the continuing legacy of biological explanations undergirding racist attitudes. Whites' genetic theories of race differences, which many scholars discount as a socially undesirable throwback to the era of eugenics (Bobo & Smith, 1998; Bonilla-Silva, 2003), continue serving a role in the hegemonic operation of racial stratification. Finally, we note that the construct of modern racism implies blame, which raises questions concerning the role of choice and controllability in the understanding of such attitudes, a topic for future investigation.

Genetic lay theories and prejudice toward gay men and lesbians

Reflecting a shorter and distinct social history, popular accounts surrounding sexual orientation tend to focus on its origins as either preferred or inborn (e.g.

Watson & Shapiro, 1995). Unlike debates about race, discussion about sexual orientation generally centers on issues of moral deviance—a discourse set, initially, by those intolerant of gay men and lesbians (e.g. Focus on the Family, 2004). Such intolerance, frequently emanating from religious doctrine, is often expressed as condemnation of those seen as making an immoral choice. In contrast, many supporters of gay rights have invoked biological explanations, implying gay men and lesbians have no choice, and thus cannot be morally condemned. In this way, advocates on both sides of the debate have focused on origins of homosexuality—highlighting the issue of controllability, and perpetuating this frame of choice versus biology.

Underlying these opposing views is the sense that people who break moral codes are given leniency depending on the amount of perceived premeditation involved in producing the anomalous behavior. As Weiner has shown in his work on attributions and stigmas (Weiner, 1995), persons not held responsible for their condition elicit more sympathy and liking than those believed to be in control. In this way, gay men and lesbians may be granted greater tolerance to the extent that people think homosexuality is not chosen. Our results are consistent with this analysis in that genetic lay theories are associated with tolerance toward gay men and lesbians. We point out, however, that such a relationship may differ if the target group is identified specifically as gay men *or* lesbians (see Haddock, Zanna, & Esses, 1993), a topic for further study.

According to Hegarty (2002), however, reliance on attribution theory to interpret our results is problematic. He raises an important question of whether the literature on attribution theory, itself, contributes political support for biological-essentialist views of sexual orientation by offering a theoretical grounding for the link between immutability and tolerance. Hegarty presents evidence for this argument by showing that the relationship between immutability beliefs and tolerance, among Americans, is dependent on the *perception* of this link. Thus, he sees attribution theory as a

potential device, used by some to promote biological essentialism, potentially reifying the normality of heterosexuality, supporting stereotypes, and leading to the view of genetic engineering as one way to resolve the ‘problem’ of homosexuality (see Hubbard & Wald, 1997; Sheldon, Pfeffer, Jayaratne, Feldbaum, & Petty, in press).

Hegarty’s (2002) analysis makes a significant contribution to understanding the broader context in which genetic lay theories take place. Clearly, his perspective offers a more complex and refined interpretation of the association between genetic lay theories and tolerance than we proposed. We contend, however, that attribution theory, and specifically, the role of controllability (distinguished from mutability), may cautiously serve to help us understand the ‘seemingly flawed’ viewpoints of some individuals. Such a theoretical perspective is particularly useful whenever the issue of free will versus determinism is central, as with sexual orientation. At the very least, our findings show that many Americans do indeed link immutability and/or non-controllability with tolerance. However, with the likelihood that, for some individuals, biological arguments imply more pernicious attitudes, it may be beneficial to reframe discussion about homosexuality as an issue of social justice, rather than tolerance. This approach places emphasis on equal treatment of all individuals, without concomitant focus on origins of sexualities (Hubbard & Wald, 1997).

Genetic lay theories in distinct social contexts

The most significant finding in this paper is the contrast between the effects of genetic lay theories on attitudes toward Blacks, and toward gay men and lesbians. One might expect genetic lay theories, as enduring belief structures, to act as supports for ideologies that enhance social inequality for both race and sexual orientation. An extensive literature referencing practices based on genetic theorizing during the eugenics era and the Holocaust, warns that public acceptance of genetic explanations may increase prejudice (e.g. Lerner, 1992; Nelkin & Lindee, 1995). Our findings

suggest this link may be tenuous for attitudes toward certain groups, such as gay men and lesbians. With regard to the ideology of egalitarianism, then, our results indicate genetic lay theories may act, in some situations, as enhancing myths, but in other situations as attenuating myths (see Sidanius & Pratto, 1999). In sum, this study underscores the significant role context plays in how genetic lay theories function to support social and political perspectives. Given these implications, we reiterate Collins, Green, Guttmacher, and Guyer's (2003) call for investigations of the ethical, legal, and social implications of genetic research.

Advancing the literature

There are numerous ways our research advances the literature on lay theories and on social group perception, with implications for intergroup relations. In contrast to most essentialist theories focusing on beliefs about the *general* nature of social categorization, genetic lay theories specify the exact causal mechanisms involved in determining social divisions. Genes are, for the most part, perceived as concrete entities having a direct (but not always sufficient) influence on perceived characteristics. In other words, genetic lay theories have more palpable content than lay theories which are, in contrast, more generic in application. This aspect makes the implications of these theories particularly clear, in that there have been, and continue to be, very real ways they function and impact intergroup relations. Knowing how genetic science has been used to support group inequality, our findings, along with those by Hegarty (2002) and Haslam, Rothschild, and Ernst (2002), indicate whenever genetic factors are invoked, group differences may be reified.

Unlike other belief structures, genetic lay theories are informed by a very active scientific research agenda (e.g. Human Genome Project), publicized extensively in the media and spilling over into popular culture (e.g. the movie, *Gattaca*, Niccol, 1997; Ridley, 1999). In this way, although hereditary explanations have an ancient history as folk theories, well before the concept of 'genes', in the past decade or so,

most Americans have likely encountered 'scientific' views on these issues. Given the recency and intensity of media reporting of genetic discoveries, genetic lay theories may currently be more accessible than other less explicit lay theories. Furthermore, the consistent *meaning* of genetic causes presented in popular discourse (e.g. implying essential differences) allows, to some degree, for shared cultural understanding of social implications, making them ideal as political tools, as exemplified in the case of sexual orientation. In view of this unique role of genetic lay theories, it is surprising that little research explores such belief systems as causal entities in their own right, despite numerous scholars' allusions to the importance of genetic theories—either by directly including measures of innateness in their work or by using analogies to genetic factors, as noted above.

Clearly, attention to the importance of social context in this study broadens understanding of the functional aspects of lay theories. Our work, complimenting research by Keller (2005), who interprets genetic explanation as a mechanism of system justification, illustrates how genetic lay theories can serve as legitimizing myths, in different ways in different contexts. Our findings are consistent with literature distinguishing a moral domain (framing discussions of sexual orientation) from other domains, such as competence and achievement (frequently framing debates about race; e.g. Chiu, Dweck, Tong, & Fu, 1997; Graham, 1995). In addition to these contributions, we note the majority of work on lay theories employs limited samples. In contrast, our data derive from a national probability sample, enhancing the generalizability of our findings to White Americans.

Our conceptualization of genetic lay theories offers insight into a potential relationship between lay theories and attributions. Some researchers clearly differentiate these two constructs. For example, Dweck et al. (1995a) contrast attributions and implicit theories about trait malleability. Attribution scholars, however, traditionally consider beliefs about malleability a particular dimension of

attribution judgments (Graham, 1995; Weiner, 1995). We suggest the major difference between these views is one of emphasis. In the implicit theory literature, immutability is considered central, so explanations derive from such knowledge structures. In essentialism, however, the essence is central, and thus, so is explanation. In line with this latter interpretation, Yzerbyt and Rogier (2001) argue that essentialist lay theories can serve as social attributions. Specifically with regard to genetic lay theories, we speculate that although such theories are not identical to genetic attributions, if genes are conceptualized, in lay terms, as essences (as we assert they are), then such essences may also explain the social categorization of groups. Thus, we propose the relationship between lay theories and attributions depends on the type of lay theory specified. If the lay theory is one concerning essence, then essence *functions* as an explanation. In this way, genetic lay theories may overlap more clearly with essentialist construals than with either attribution or implicit theories.

Finally, and perhaps most importantly, by offering genetic explanations as lay theories, this work can serve to integrate literatures on essentialism, entitativity, and implicit theories, and incorporate additional research on attributions and legitimizing myths. This conceptualization might imply that genetic lay theories represent a substantive lay theory core, particularly in light of numerous genetic (or biological) analogies noted in the literature on essentialism and implicit theories. However, we prefer to think of genetic lay theories as providing one possible, albeit real-world, illustration of how specific theoretical approaches overlap and can be unified in investigations of lay phenomena.

Limitations and additional suggestions for future research

One noticeable limitation of this study is the use of measures constructed from one or a few items, owing to restrictions in the length of our survey instrument. Moreover, because our measures of genetic lay theories are new, they have not been externally validated. In this

regard, it would be worthwhile to explore associations between genetic lay theories and sociopolitical attitudes, other than prejudice, with which they ought to be correlated. Additionally, inclusion of both genetic lay theories and sociopolitical attitudes in models predicting prejudice should yield a more complete understanding of the nature of prejudice. Finally, given that, in previous research, we found large differences in the extent to which individuals employed genetic lay theories for various human characteristics (Jayaratne, 2002), future research should take into consideration the value of inquiring about multiple target attributes, as we have done with race, rather than employing more global measures.

We raise one final point regarding the issue of causality. We conceptualized our research as an examination of the effects of genetic lay theories on attitudes toward socially disadvantaged groups (consistent with literature on consequences of lay theories and predictors of prejudice), and did not test alternative specifications of this relationship. It is likely, however, that there is reciprocal causality and co-constitutiveness between these constructs. For example, Whites holding certain prejudicial attitudes toward Blacks may choose to ground and justify their antipathy according to racial differences in genetic heritage—presumably because of the immutability it implies. This would also explain why those sympathetic toward gay men and lesbians often claim sexual orientation is genetically based, with politicized hope that removing individual choice will reduce heterosexism and increase tolerant attitudes. Hence, genetic lay theories may justify attitudes toward social groups. However, it is also likely that frequent media coverage of genetic discoveries (e.g. Human Genome Project), as well as the common use of genetic theories in popular culture, increases lay usage of genetic factors to explain a broad spectrum of phenomena (Brescoll & LaFrance, 2004), which then influences ideological perspectives. The fact that a recent article in a refereed journal claims a genetic cause for outrage at theories of inequality (Ellis, 1998) attests to the wide-ranging applications of genetic lay theories. In his seminal

work on prejudice, Allport (1954) recognized that people's use of their knowledge of social groups can be quite creative. At times, such knowledge serves as the basis for attitudes—the direction of causality we have emphasized. But at other times, people may hold attitudes and draw on available knowledge to justify and lend credence to their perceptions about members of certain groups. Clearly, a conceptualization that allows for both processes and directions of influence is richer, and may promote additional theorizing advancing our understanding of important social issues.

Conclusion

The focus of this paper is synchronous with the spirit of other work examining the role of lay theories in intergroup perception in that it establishes and underscores the importance of genetic lay theories as socially meaningful conceptual frameworks for explaining perceived group differences. Our findings, therefore, bring to the forefront the significance of genetic explanations as lay theories about group differences. By documenting differential effects of genetic lay theories on prejudice and discriminatory attitudes toward groups with disadvantaged social standing, this research shows how these theories (as all lay theories) do not exist in a vacuum; their form and function are intimately tied to both historical and current social discourse. Thus, they can serve to sanction ideologies in the name of science. With this potential for such powerful influence, but given the dearth of research investigating genetic lay theories, it is imperative to better understand these belief systems and their implications. We encourage future efforts to expand this field of study—particularly in light of the likelihood that genetic discoveries will continue to play a formative role in how we think about human nature, thus shaping public policies during the 21st century.

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Appendix

Genetic explanation questions

Genes explain race differences

'Now I'd like to ask about some ways that Whites might tend to differ from Blacks. People we've talked with have many different opinions on this, we just want to know what you honestly think. Some people think Whites tend to differ from Blacks in: [asked separately] their drive to succeed, how good they are in math, their tendency to act violently, intelligence. Although there are many reasons why they might differ, do you think their genes or genetic make up has anything to do with this difference?' (IF YES): 'In your opinion, how much of this difference between Whites and Blacks is due to their genes? Would you say very little, some, a lot or just about all?'

Note that we did not ask directly if the trait differed by race prior to asking about genetic influences (pretesting suggested a strong effect of social desirability), but did allow respondents to indicate there was no racial difference. Only a few suggested this option and they were deleted from analyses. We assumed that respondents who thought there was no difference, but did *not* overtly state this, would likely have answered 'no' genetic influence, which for our purposes, is conceptually similar (if there is no difference, genes are not influential).

Genes explain sexual orientation

'What about the difference between people who are homosexual and those who are heterosexual? Do you think their genes have anything to do with this difference?' (IF YES): 'How much of this difference do you think is due to their genes? Would you say very little, some, a lot or just about all?'

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