

Vive La Difference? Genetic Explanations for Perceived Gender Differences in Nurturance

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Abstract Investigated genetic explanations for perceived gender differences in nurturance, a gender intensified prescriptive trait, compared to other gendered traits. Based on a nationally representative telephone survey of Black and White Americans ($N=1200$), we found perceived gender differences in nurturance were more often attributed to genetics than perceived gender differences math ability or violence. Men were more likely than women to use genetics to explain perceived gender differences in nurturance, but not math or violence. Finally, respondents viewed perceived gender differences as more strongly genetic than

individual differences for nurturance, but not math and violence, suggesting such beliefs have ideological roots. We discuss the potential of genetic explanations to reinforce stereotypes and to justify the social hierarchy.

Keywords Gender roles · Gender differences · Genetic explanations · Nurturance · Maternal instinct

“Well I certainly think that the—the mothering instinct—is a—is an instinct. I think it’s a strong, very strong biological force I guess, for lack of a better term. I think we’re almost kind of captive to our genetics, so to speak.” —Female respondent
“In the days before there was civilization...the guys had to go out and kill the animals and stuff, and the women were the nurturers and they took care of the kids and everything and that’s basically the way it still is.” —Male respondent

As these quotations illustrate, the belief that women are uniquely endowed with the skills and inclination to care for and nurture others is a stereotype that is perceived by many to be due to evolutionary factors, and thus, genetic in origin. In this paper, we sought to understand public opinion on this issue based on a telephone survey of a nationally representative sample of Black and White Americans. Our research focused on three central questions: How do genetic explanations for nurturance compare with those for other gender stereotyped traits?; are those who benefit from genetic explanations for perceived gender differences in nurturance most likely to report such explanations?; and how do genetic explanations for perceived gender differences in nurturance compare with genetic explanations for individual differences in nurturance, that is, with beliefs that the difference in nurturance

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between any two individuals is inborn? These questions are important because beliefs in the naturalness of women's nurturance may be invoked to justify disparate treatment of women (Burgess and Borgida 1999) and to maintain the gender status hierarchy.

Many people believe that women are "naturally" nurturing and caregiving, particularly in comparison to men (Eagly 1987; Schneider 2004; Williams and Best 2000). This difference is often explained in terms of women's biological capacity to bear and nurse children. Correspondingly, many who endorse this stereotype explain women's innate or instinctive nurturance in terms of a genetically determined predisposition, ostensibly selected through evolution. The quotations above, which were offered as justifications for why perceived gender differences in nurturance are genetic, reflect this viewpoint. The existence of a "maternal instinct" has long been asserted in psychological texts (Shields 1992), childcare manuals (Hays 1996), and popular television programs (Douglas and Michaels 2004). Even recent media depictions of women and mothers still suggest that women are innately nurturant and care-giving (Zimmerman et al. 2001), that they are completed and fulfilled by nurturing children (Hays 1996), and that stay-at-home mothers are the ideal and the norm (Johnston and Swanson 2003). Recent years have also seen an outpouring of information on human genetics and behavioral genetics in the media (Conrad 2002), from primetime television programs to cover stories in popular news magazines, often presented with a positive spin and in a reductionist tone (Schouten and Looren deJong 2001). This has likely resulted in increased public awareness of and receptivity to genetic explanations for many human characteristics (see Brescoll and LaFrance 2004). At this cultural moment of popular interest in stories depicting women as naturally suited to nurturing children, combined with pervasive media reports touting the discovery of genetic causes of everything from intelligence to depression to watching television (see Nelkin and Lindee 1995), we sought to examine the public's genetic explanations for perceived gender differences in nurturance.

We investigated three questions. First, in light of the prescriptive connotations of concepts such as "maternal instinct," would nurturance be viewed as more strongly genetically influenced than other gender stereotypes? Second, given that men benefit from a social system in which women do unpaid domestic labor (Burgess and Borgida 1999; Jackman 1996), would men be more likely than women to explain perceived gender differences in nurturance in terms of genetics, thus naturalizing these arrangements? Finally, are people more likely to explain perceived differences between men and women's nurturance in terms of genetics than they are to make the same attribution about differences in nurturance between any two

individuals? This last question is of interest because this belief pattern appears to be at odds with current scientific information about how genes influence traits and thus may represent an alternative understanding of genetics and/or reflect beliefs that are primarily ideologically rooted.

Stereotypes About Women's Nurturance

Women are commonly perceived to have more communal or relational traits than men (Eagly 1987; Schneider 2004; Twenge 1999). For example, an early study (Rosenkrantz et al. 1968) found that over 75% of respondents believed women are more affectionate, friendly, kind, sensitive and warm than men. Similarly, Williams and Best (2000) discovered that traits related to positive interpersonal relations, such as affectionate, kind, warm, and understanding were associated with women more than men. Although studies vary in the specific traits they have employed to tap this communal orientation, they regularly include traits pertaining to nurturance, that is, caring for and sensitivity to the needs of others, particularly children. For example, the Bem Sex Role Inventory (Bem 1974), a commonly used measure, includes among its 20 feminine items affectionate, gentle, compassionate, eager to soothe hurt feelings, loyal, sensitive to the needs of others and loves children.

Evaluations of communal and relationally oriented traits as more desirable for women than men have remained fairly robust over time (Auster and Ohm 2000; Harris 1994; Holt and Ellis 1998). Even a study that asked participants to imagine men and women's traits and roles in 2050 showed that typically women would continue to have more feminine, or communal, traits than men (Diekmann and Eagly 2000). Why should gender differences in nurturant traits be—and be perceived to be—so stable? There are several possible reasons. First, unlike other group stereotypes, women's caring, relational traits are commonly valued by men and women alike (Eagly and Mladinic 1989), and women continue to perform more social roles associated with warmth and caring, including segregation in certain professions (e.g. nursing, elementary education) and work in the home (Valian 1998; Shelton 1992).

Second, stereotypes about women's communal traits are not only descriptive, but prescriptive: many people believe not only that women *are* caring and nurturing, but that women *should be* (Burgess and Borgida 1999). Prentice and Carranza (2002) asked respondents to rate the desirability of a list of traits for a person, a woman, and a man. These ratings were used to create a typology including gender intensified prescriptions (traits that are regarded as generally socially desirable but even more desirable for women), relaxed prescriptions (traits that are high in general desirability but less desirable for women) and

gender intensified proscriptions (traits that are generally undesirable, but especially undesirable for women). Predictably, gender intensified traits were predominantly communal, nurturing characteristics; indeed, warmth and interest in children received the highest mean ratings for social desirability for women. Relaxed prescriptions were generally agentic and included items tapping mental acuity such as intelligent and rational. Many of the intensified proscriptions focused on power or indifference to others' views or needs, such as controlling and arrogant.

Third, ironically, the traits that are most socially prescribed are also often viewed as most natural and innate. Such beliefs are often discussed in terms of psychological essentialism, that is, the doctrine that members of a category share deep, underlying properties that may not be observable in ordinary interactions (Demoulin et al. 2006; Gelman 2003; Haslam et al. 2000). Psychological essentialism is consistent with the use of genetic factors as explanations (Keller 2005). Eagly et al. (2000) argued that it is precisely this “prescriptive quality of gender roles” that “connects them to a broader ideology by which gender differentiation and inequality are viewed as the natural order of human life” (p. 134).

Comparing Nurturance to Other Gender-stereotyped Traits

We argue that gender-prescriptive stereotypes are more likely to be considered natural and thus innate or genetic in origin than those which are either proscribed or relaxed in their prescription. To test this hypothesis, we compared people's beliefs about the extent to which perceived gender differences in nurturance are genetically influenced with their views of the genetic components of perceived gender differences in math ability and tendency toward violence. According to Prentice and Carranza's (2002) findings, traits related to mental acuity are not intensified prescriptions for either gender. Although Prentice and Carranza did not include tendency to violence in their study, we classified it as proscribed for women and men because it is socially undesirable.

Like nurturance, gender stereotypes regarding math ability are fairly strong (Hyde et al. 1990; Schmader et al. 2004). These perceived gender differences have often been attributed in the media to genetic or biological causes (Eccles and Jacobs 1986). Similarly, genetic explanations for violence have received media attention (see, e.g. Angier 1995), but this coverage has also generated controversy (Williams 1994). Like nurturance and math ability, violent and aggressive behavior is gender stereotyped; because violence may be consistent with agentic goals of self-enhancement and expressing the will of the individual, it is typically considered masculine (Gerber 1991). Although popular trait measures of masculinity and femininity do not

directly ask about violent behavior, Williams and Best (2000) found participants rated men higher in the traits of “aggressive” and “cruel.” Thus, despite the fact that nurturance, math ability and the tendency toward violence are commonly gender-stereotyped, and are often portrayed in the media and popular opinion as being, at least in part, influenced by genetics, only nurturance is strongly gender prescribed. Math ability and tendency toward violence are also less important to the ideological legitimization of gender inequality. Glick and Fiske (2001) argued that one way that subordinate groups are induced to accept their position is through consensually held beliefs that although they may not have the competencies necessary for power or leadership, subordinates possess special warmth and social skills. They cite women's warmth as one example of such prescriptive and palliative beliefs. For these reasons, we hypothesize that perceived gender differences in nurturance are more likely to be viewed as genetically influenced than either math ability or the tendency toward violence.

Who Views Nurturance as Natural?

Many studies using both explicit and implicit measures have found that men and women do not differ in their propensity to gender-stereotype (see Burgess and Borgida 1999). However, men are more likely to hold traditional beliefs about gender roles (see Twenge 1997 for a meta-analysis). Burgess and Borgida (1999) argued this discrepancy corresponds to descriptive stereotypes (how men and women are) vs. prescriptive stereotypes (how men and women should be), with men more likely to endorse prescriptive stereotypes. They attributed this gender gap to men's vested interest in maintaining women's unpaid domestic labor and lower status in the workplace (see also Yzerbyt and Rogier 2001). Indeed, Jackman (1996) argued that status inequality between groups is maintained by stereotyping lower status group members as communal, prescriptively demanding their deference to high status groups' needs and desires.

One way that a dominant group might rationalize prescriptive stereotypes (and silence dissent) is by representing them as natural, which is widely believed to imply they are unchangeable, although this is not actually true (Fausto-Sterling 1985). By reinforcing the perceived stability of stereotyped roles, biological explanations for difference can be used to affirm one group's innate superiority over others (Nelkin and Lindee 1995). For example, the belief that biologically based traits render men and women fundamentally different and thus suited to separate roles in homes and workplaces legitimizes status differences between them. Such ideologies, which posit natural explanations for existing inequalities, have been termed legitimating ideologies (Ridgeway 2001, p. 258) or legiti-

mating myths (Yzerbyt and Rogier 2001, p. 105). System justification theory holds that such beliefs are accepted as true by both dominant and subordinate group members, thus placating the subordinate group's desire to resist (Jost and Burgess 2000; Yzerbyt and Rogier 2001); however, it also seems likely that those who have greater power in the existing system might invoke genetics to explain the status quo to a greater extent than do subordinates.

Therefore, we hypothesized that men will use genetic explanations for perceived gender differences in nurturance, a prescriptive trait, to a greater extent than women. By comparison, because the traits of math ability and violence are not gender prescriptive and not as important to maintaining existing gender relations, we do not expect to find perceived gender differences in the use of genetic explanations for these traits.

Genetic Explanations for Individual vs. Perceived Gender Differences

Most current genetic research focuses on understanding how genetic variation influences individual differences, that is, differences in a trait between any two individuals. Research on the potential genetic origins of group differences is less common, in part, because many genetic scientists argue that group distinctions, such as race, are social constructs and cannot be attributed to genetics (Graves 2001; Lewontin et al. 1984). We might expect, therefore, that people would offer genetic explanations for individual differences to a greater extent than for perceived group differences, if they were familiar with research in genetics.

Nevertheless, there has been extensive scholarly and popular interest in the genetic origins of perceived gender differences (e.g., Brooks 2006; Craig et al. 2004; Gorman 1992). This makes sense because the chromosomal basis for physical sex differentiation is commonly understood. However, people may generalize this knowledge to the use of genetic explanations for some perceived behavioral gender differences. Given the strong association of nurturance with women, but not men, combined with the tendency to invoke genetic explanations for perceived gender differences in general, some people may conclude that perceived gender differences in nurturance have a genetic origin. To the extent that this is true, we speculated that the public may hold genetic factors more accountable for perceived gender differences in nurturance than for individual differences in nurturance.

For comparison, we also examined genetic attributions for individual vs. perceived gender differences for math ability and violence, two less gender prescriptive traits. On one hand, if laypeople believe that genetics makes a larger contribution to perceived gender differences in nurturance than to individual differences (and if this

pattern did not hold for the non-prescriptive traits), it might suggest that genetic explanations for perceived gender differences in nurturance were based more on ideology than on familiarity with genetic science. On the other hand, if genetic explanations for perceived gender differences are consistently greater than genetic explanations for individual differences for all three traits, this would suggest that the public's use of genetic explanations for perceived behavioral gender differences is related to their understanding of the genetic basis for physical sex differences. Given these two opposing predictions about genetic explanations for individual and perceived gender differences in nurturance, we present this as an open research question.

To summarize, we put forward two hypotheses concerning the lay public's beliefs about the genetic contribution to individual and perceived differences in nurturance: people will use genetics to explain perceived gender differences in nurturance more often than perceived gender differences in math ability or violence; and compared to women, men will be more likely to report genetic explanations for perceived gender differences in nurturance. Additionally, we investigate one research question: will people be more likely to use genetics to explain perceived gender differences than individual differences in nurturance?

Method

Sample

Respondents were selected using two separate sampling methods. A main sample was obtained utilizing random digit dialing (RDD) methods, drawing from the continental United States (Whites $n=600$, Blacks $n=58$). Due to the prohibitively high costs associated with obtaining Black respondents using strict RDD methods, an oversample of Black respondents ($n=542$) was obtained, using RDD methods within targeted population areas of higher Black density from across the United States. We selected areas (telephone exchanges) for the oversample where census population data indicated a density for the Black American population of 30% or more.

All respondents were interviewed over the phone by professionally trained interviewers. Interviews averaged 40 min in length and each respondent received \$15 compensation. Within each household, respondents were randomly selected by computer within the desired gender group. Race was assessed through self-report, and only individuals identifying as primarily White, and Black or African American were invited to participate.

The sample ranged in age from 18 to 90 years, with a mean of 44.25 ($SD=16.94$) and was equally divided by gender (599

men and 601 women) and race (600 Whites and 600 Blacks). Twelve per cent of the sample had less and a 12th grade education; 26% graduated from high school or received a GED; 35% had some college or an Associate's Degree; 17% held a Bachelor's Degree; and 10% held a graduate degree. Respondents were slightly older and slightly more educated than individuals in the US population based on census data. To adjust for representation, we created post stratification weights for race and for age and education (within the race and gender of the respondent) that were used in all analyses.

Measure

Genetic Explanations for Individual Differences in Nurturance, Math Ability and Violence

As part of a larger study exploring the socio-political implications of Americans' genetic explanations, we assessed each respondent's beliefs about the extent to which genes influenced individual differences in nurturance, math ability, and the tendency toward violence. The same question format, a series of two questions, was used for each characteristic. Respondents were first asked if the difference between individuals on the characteristic (e.g., those who were nurturing versus those who weren't at all nurturing) was due, at least in part, to a person's genetic make-up. Respondents who answered "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 5-point scale for each characteristic that measured the respondent's estimate of the amount of individual difference due to genetic factors: "none," "very little," "some," "a lot," and "just about all." Because relatively few respondents fell into the "very little" and "just about all" category, we collapsed this scale into a three category version, used in all analyses: 0 = "none," 1 = "very little/some," 2 = "a lot/just about all."

Genetic Explanations for Perceived Gender Differences

In a format similar to the questions about individual differences, respondents were asked two questions regarding the extent to which perceived gender differences in each of the three traits were due to genetic factors. As with the individual difference items, we combined the answers to the two questions, and collapsed the resulting scale into a three-category measure assessing the extent to which respondents indicated that genetic factors explained perceived gender differences in each characteristic: 0 = "none," 1 = "very little/some," 2 = "a lot/just about all." The exact wording of all genetic explanation questions is shown in the [Appendix](#). Respondents who offered the quotes at the beginning of this paper were part of a small subset of individuals in our study who were targeted for a

follow-up in-depth interview in which they were asked to explain their belief that genes influence gender differences in nurturance.

Control Variables

We included measures of several demographic and background characteristics that have been associated, empirically or theoretically with genetic explanations (Keller 2005; Kluegel and Smith 1986; Nelkin 2004). We assessed respondents' *age* and *education* using standard measures. In addition, we asked respondents to rate their *religiosity* on a 4-point scale ranging from 1 = not religious at all to 4 = very religious, and to indicate their *political orientation* on a 5-point scale, ranging from 1 = very liberal to 5 = very conservative. We measured whether respondents resided in the south by coding their state of residence as 0 = non-south or 1 = south. Finally, *race of respondent* was coded as a dummy variable, with 0 = White and 1 = Black.

Analysis Design

In preliminary analyses, response frequencies were calculated to describe the varying degrees to which respondents attributed individual and perceived gender differences in nurturance, math ability and violence to genetics. We employed McNemar's test (Siegel 1956) to compare genetic explanations for perceived gender differences in nurturance with those for math ability and violence, and to compare genetic explanations for individual differences with genetic explanations for perceived gender differences for each trait. This nonparametric test is used to determine whether there is a significant difference in the distributions of two correlated, discrete measures. The McNemar test is based on a 2×2 table, comparing proportions in the two off-diagonal cells (the upper right and lower left cells which reflect a change or difference between the two variables). Although our genetic explanation measures were three category variables, we were interested in the comparison between respondents who had different scores on two genetic explanation measures ($A > B$ or $B > A$). For McNemar's test, we therefore contrasted the n for respondents who differed in one direction (e.g., higher on the first variable than the second) with the n for respondents who differed in the other direction (e.g., lower on the first variable than the second). That is, we summed the three cells in each of the off-diagonals and used those two sums to calculate the test statistic (ignoring the counts in the cells on the main diagonal, which are not relevant). A significantly different than expected frequency for these two sums, reported as a chi square (with $df=1$), indicates a significant difference in the two variables. With a small number of cases assigned missing data on each of the genetic explanation measures, the total sample size using the McNemar's tests

ranged from 1169 to 1178. To test the hypothesis that male gender increases the likelihood of believing that perceived gender differences in nurturance has a strong genetic influence, we ran a logistic regression, controlling for age, race, religiosity, political orientation, education, and southern residence.

Results

Table 1 shows the percentage of respondents in the three categories of genetic explanation for individual and perceived gender differences for each trait. It demonstrates variability across traits and between individual and perceived gender differences in the extent to which respondents employed genetic explanations. For example, 32% of respondents reported that genes explained none of the perceived gender differences in nurturance compared to 61% and 48% for math and violence, respectively.

Comparing Genetic Explanations for Perceived Gender Differences in Nurturance with Math and Violence

We anticipated that respondents would use genetic explanations for perceived gender differences in nurturance to a greater extent than similar explanations for perceived gender differences in both math ability and violence. Using McNemar's test to compare genetic explanations, we found that significantly more respondents invoked genetic explanations for perceived gender difference in nurturance than for math ability ($\chi^2=288.9$, $p<.001$). We found that 541 respondents reported that genetic factors accounted for more of the perceived gender differences in nurturance than perceived gender differences in math ability, while only 108 respondents reported that genes explained more of the gender difference in math ability than perceived gender differences in nurturance. For the comparison between genetic explanations for perceived gender differences in nurturance and violence, there was also a significant difference ($\chi^2=106.0$, $p<.001$), with more respondents offering genetic explanations for perceived gender

differences in nurturance. In this case, 437 respondents indicated that genes explained more of the perceived gender differences in nurturance than perceived gender differences in violence, but only 181 respondents indicated the opposite. For both tests, then, our predictions were supported, demonstrating that respondents were more likely to offer genetic explanations for perceived gender differences in nurturance than perceived gender differences in either math ability or violence.

Are Men More Likely than Women to Believe Nurturance is Genetically Determined?

We hypothesized that men would use genetic explanations for perceived gender differences to a greater degree than women for nurturance, but not for math ability or violence. The results of the logistic regression analysis are shown in Table 2. As we predicted, men were significantly more likely than women to offer genetic explanations for perceived gender differences in nurturance, although gender of the respondent was not related to explaining perceived gender differences in math ability and violence. Some interesting findings also emerged with regard to the control variables. First, respondents who identified as White, compared to those who identified as Black, had a higher probability of reporting a greater genetic contribution to perceived gender differences in all three traits. Second, respondents who were older, compared to those who were younger, were more likely to report genetic explanations for all three perceived gender differences. Third, respondents rating themselves as highly religious were more likely than those who were less religious to attribute perceived gender differences in nurturance to genetics. Finally, political liberalism was associated with the belief that genes influenced perceived gender differences in violence.

Individual and Perceived Gender Differences

Given alternative hypotheses with regard to the comparison of genetic explanations for individual versus perceived

Table 1 How much genetic factors are perceived to influence individual differences (ID) and perceived gender differences (PGD) in traits (percent).

	Nurturance (%)		Math ability (%)		Violence (%)	
	ID ^c	PGD ^{ad}	ID ^c	PGD ^{bf}	ID ^c	PGD ^{bf}
Not at all	51	32	36	61	36	48
A little/some	30	31	39	27	41	31
A lot/just about all	19	37	25	12	23	21
Total	100	100	100	100	100	100

Significant differences between genetic explanation measures: a > b***; c < d***; e > f***

*** $p<.001$

Table 2 Predictors of genetic explanations for perceived gender differences in nurturance, math ability and violence (logistic regression coefficients).

Predictor	Genetic explanations for perceived gender differences		
	Nurturance	Math ability	Violence
Gender ^a	-.34**	.10	-.10
Age	.01***	.02***	.01**
Race ^b	-.26*	-.49***	-.23****
Religiosity	.16*	.11	.04
Conservative political orientation	-.05	-.02	-.11*
Education	-.01	.10	.05
Southern residence ^c	.05	.12	-.16

Numbers in table are maximum likelihood estimates.

* $p < .05$

** $p < .01$

*** $p < .001$

**** $p \leq .051$

^a male=0, female=1

^b White=0, Black=1

^c Non-southern residence=0, southern residence=1.

gender differences for each trait, we opted to present two research questions. First, would respondents offer genetic explanations for perceived gender differences in nurturance to a greater extent than for individual differences in nurturance? Second, would a similar difference between genetic explanations for individual versus perceived gender differences hold for math and violence? Comparing genetic explanations for individual differences with genetic explanations for perceived gender differences in nurturance, math ability, and violence revealed significant differences for all three traits, although the direction of difference varied. First, for nurturance, we found that respondents were more likely to report genetic explanations for perceived gender differences than individual differences ($\chi^2=144.1, p < .001$). In contrast to the 470 respondents who reported that genes explained more of the perceived gender differences in nurturance than individual differences in nurturance, only 167 respondents indicated that genetic factors explained more of the individual differences in nurturance than perceived gender differences. Second, for math ability, participants used genetics to explain individual differences to a greater extent than they did for perceived gender differences ($\chi^2=182.8, p < .001$). Here, 456 respondents told us that genes made a larger contribution in explaining individual differences than perceived gender differences, compared to 129 who reported the opposite. Finally, for violence, similar to math ability, we found that respondents were more likely to report genetic explanations for individual differences than perceived gender differences ($\chi^2=29.0, p < .001$). For this trait, 351 respondents indicated that genes accounted more of the individual differences than perceived gender differences, while 222 reported a greater

genetic influence on perceived gender differences than individual differences.

Discussion

Our hypotheses concerning the lay public's beliefs about the genetic contribution to individual and perceived gender differences in nurturance were supported. A sizable majority of respondents reported that genetics explained more of the perceived gender differences in nurturance than in math ability or violence. Additionally, men were more likely than women to report genetic explanations for perceived gender differences in nurturance, but gender was unrelated to explaining perceived gender differences in math ability or violence in terms of genetics. Finally, we found that respondents were more likely to use genetics to explain perceived gender differences than individual differences in nurturance; however, the reverse pattern was found for perceived gender differences in math ability and violence. These findings suggest that respondents view nurturance, an intensified gender prescriptive trait for women, differently from less prescriptive gendered traits. The implications of each of these findings are discussed in turn below.

Comparing Genetic Explanations for Perceived Gender Differences in Nurturance with Math Ability and Violence

As predicted, results supported our hypothesis that respondents would attribute perceived gender differences in nurturance to genetics to a greater degree than perceived

gender differences in math ability and tendency toward violence. This finding is consistent with a proposal by Yzerbyt et al. (1997) that stereotypes include implicit explanations about why groups have certain characteristics, and these explanations usually serve to rationalize the existing social order. Drawing on this theory, Keller (2005) conceptualized essentialist beliefs as a kind of justifying myth that rationalizes a hierarchical social order. Beliefs about biological or genetic group differences are particularly suited for such justifications because they imply stability of differences. This reflects the strength and prescriptive nature of gender stereotypes regarding nurturance.

If gender prescriptive traits are more likely than other traits to be viewed as genetic or natural, this begs the question of why they must be prescribed. The literature on system justification suggests that when dominant groups are dependent on subordinate groups, as is particularly true in the case of men's dependence on women's childbearing and domestic labor (Rudman and Glick 2001), dominants are most likely to characterize subordinates as warm and caring, and thus deferent and unsuited to leadership (Glick and Fiske 2001). Simultaneously, this paternalistic ideology creates "a subtle and effective pressure on subordinates to conform with stereotypic prescriptions" (Glick and Fiske 2001, p. 289; Jackman 1996). Although gender stereotypes prohibiting women from behaving in an agentic, competent (i.e., masculine) manner have relaxed in the recent past (Auster and Ohm 2000; Diekmann and Eagly 2000), there are still sanctions for women who pursue their own interests at the expense of others (Spence and Buckner 2000) because it is viewed as incompatible with warmth. This is manifested in negative evaluations of women who are perceived as agentic, sometimes referred to as a backlash (Rudman and Glick 2001; Valian 1998). Viewing this system of benevolent sexism as natural, or genetically based, serves both to legitimize it and to obscure its ideological nature.

Gender Differences in the Use of Genetic Explanations

Also as hypothesized, men were more likely than women to use genetics to explain perceived gender differences in the gender-intensified prescriptive trait of nurturance. Yzerbyt et al. (1997) theorized that people with high status will be more likely than low status individuals to hold essentialist views, as a justification for their dominance. Consistent with our argument here, Keller (2005) found that men held stronger beliefs in genetic determinism than women. His results also showed a link between status and beliefs in genetic determinism, with high status students (business majors) holding stronger beliefs in genetic determinism than low status students (social science majors).

However, we point out that in the present study, men and women did not differ in the probability of using genetics to

explain perceived gender differences in math ability and violence, the two less gender-prescriptive traits. This suggests that high status groups may use essentialist beliefs about low status groups selectively to rationalize their higher status. Jackman (1996) argued that subordinate groups are viewed as more communal by dominant groups to justify their lower status (e.g., in the antebellum US, slaves were viewed as docile, eager to please, etc.). This pattern of men's use of genetic explanations for women's nurturance supports the argument that because men benefit from gender prescriptions, they are more likely to perceive them as natural, and perhaps resistant to change.

Of course, it's also worth asking why women and Blacks might be less likely to view nurturance as an essential quality of women. Some women may resist or resent social expectations that they serve others, or may view the work of motherhood as difficult or burdensome rather than "natural" (Gillespie 2003; Park 2005). Black Americans may be less likely than Whites to embrace genetic explanations for human behavior because such arguments have been central to the pseudoscience of racial inferiority (Beeson and Duster 2002). Notably, although not hypothesized in the present study, Blacks were less likely than Whites to use genetics to explain perceived gender differences in all three traits assessed.

Comparing the Use of Genetic Explanations for Individual and Perceived Gender Differences

The greater use of genetic explanations for perceived gender differences in nurturance compared to individual differences in nurturance may reflect the impact of stereotyping on public perceptions of the role of genetics as the foundation for difference. Theory and research in the area of essentialism, that is, the belief that members of social groups share an underlying essence, shed light on the present findings. Yzerbyt et al. (1997) proposed that stereotypes involve lay theories as to why differences exist between groups. Two types of lay theories were revealed by Haslam et al. (2000); they found essentialist beliefs are composed of two factors, the belief that some social categories represent "natural kinds," and the belief that groups are coherent entities, termed "reification." Interestingly, compared to other social categories, gender was rated high in "natural kinds" but relatively low in "reification." Bastian and Haslam (2006) found that participants who tend to believe that traits that have a biological or genetic basis are also more likely to believe popular stereotypes of social groups were true. These studies suggest biological or genetic explanations may play an important role in the maintenance of stereotypes. Hence, the strength of the nurturance gender-stereotype may be driving the use of genetic explanations for perceived gender differences in

nurturance, even without a corresponding belief in the genetic influence on individual differences in nurturance.

A second, but not mutually exclusive explanation for our finding that lay people attribute perceived gender differences in nurturance to genetics to a greater degree than individual differences is that this belief pattern reflects the public's relatively limited understanding of the genetic basis for complex traits. The belief that genes explain differences between groups to a greater degree than differences between individuals is somewhat perplexing given the scientific community's emphasis on genetic influences underlying individual differences and genetic similarities between groups of people (Graves 2001). Despite frequent references to genes in the popular media, few sources provide detailed scientific information about complex genetic mechanisms (see Conrad 1997; Nelkin and Lindee 1995). Moreover, there are few media presentations about the complex interactions between genetic factors, environmental influences, and personal choices that likely impact the development of many human characteristics. In fact, research shows that the public tends to hold views on genetics that generally differ from those of genetic scientists (Emslie et al. 2003; Lanie et al. 2004). However, misunderstanding and/or lack of information can't fully explain why genetic explanations were offered more often for perceived gender differences than individual differences in nurturance, but not for math ability or violence. Consequently, it remains likely that social perspectives and ideologies are, at least in part, contributing to these findings.

That respondents offered genetic explanations for perceived gender differences in nurturance to a greater extent than individual differences in nurturance is intriguing as it may appear to be logically untenable. Specifically, if a group difference was attributable to genetics, then genes would also have to account for individual differences. How can an explanation for a group difference in a trait not also explain a similar difference among individuals, since groups are made up of individuals? In the unique case of perceived gender differences (because sex as a category is genetic in origin), however, the lay public may reason that nurturance is sex-linked, specifically that there is a gene on the "female" or "X" chromosome (but not on the male or "Y" one), which gives women a nurturant predisposition. While the numeric sex chromosome complement does contribute to the development of unique physical characteristics between men and women, to date there has been no compelling scientific evidence to suggest that having only one X chromosome, as most males do, would make an individual any less nurturing, or that having two X chromosomes, as most women do, would make an individual more nurturing. Could the chromosome complement affect hormonal balance that influences nurturing

ability? Perhaps this could play a role, but again, there is currently no compelling scientific evidence that supports this theory. Thus, respondents who believe a genetic characteristic underlies a perceived gender difference in nurturing are not basing their view on the scientific literature; rather, they may be relying on other knowledge (the genetic basis for physical differences between men and women) to make sense of this perceived difference or are using this explanation as a way to rationalize their gender prescriptive view of nurturance.

Lay people's beliefs about genetics have far-reaching political and policy implications. Rapidly developing advances in the field of genetic science will certainly require many difficult decisions of the American public now and in future years. Greater scientific knowledge of genetics could help discourage essentialist and reductionistic attributions about group differences that can be used to justify inequality.

Genetic Explanations, Stereotypes and Essentialism

Genetic beliefs may reinforce existing stereotypes. Yzerbyt et al. (2001) argued that the belief that group members share an underlying essence "encourages the search for resemblances and connections within the group" (p. 141). Therefore, it seems plausible that the belief in the genetic origins of difference, one aspect of essentialism (Haslam et al. 2000; Keller 2005), may result in increased efforts to uncover similarities among group members and hence increased stereotyping. Several other studies provide further evidence for the effect of biological explanations on stereotyping. Brescoll and LaFrance (2004) asked participants to read fictional newspaper articles reporting either biological or sociological explanations for gender differences in ability to identify plants. Those who read stories with biological explanations were more likely to endorse gender stereotypes in a subsequently administered survey. Moreover, Levy et al. (1998) found that people who view human attributes as fixed rather than malleable are more likely to make stereotypical judgments. Finally, Martin and Parker (1995) discovered a correlation between biological "folk theories" and perceived gender differences. Therefore, if genetic traits are viewed as fixed, we may expect that genetic explanations will be associated with greater stereotyping. The implications of these findings are not necessarily benign: Keller (2005) found that the belief in genetic determinism was significantly associated with negative racial stereotyping and Jayaratne et al. (2006) linked genetic explanations for perceived race differences among White respondents to prejudice toward Blacks.

Our findings have important implications for the perception and treatment of women because "the explanation of group members' behavior is more likely to remain

situation insensitive whenever perceivers share the naive theory that underlying features characterize the group” (Yzerbyt et al. 1998). Furthermore, Burgess and Borgida (1999) argued that prescriptive stereotypes are used to justify discrimination against women through disparate treatment. Genetic explanations provide a seemingly scientific, and thus objective, rationale for treating women differently, either ostensibly to protect or enable women’s nurturance (e.g. providing a so-called “mommy track”) or to punish women who do not perform nurturance (because such behavior is unnatural).

Limitations and Future Research

Our study examined only one gender intensified prescriptive trait; future research should explore whether similar patterns of genetic attributions are found for other gender prescriptive traits. Furthermore, because we did not measure gender stereotyping in this study, we were unable to directly test our assumption that respondents attributing perceived gender differences in nurturance to genetics will hold stronger gender-stereotypes than those who do not hold such beliefs. This will be an important area of future research, as findings may be indicative of the potential societal impact of genetic explanations for human behaviors. Finally, in order to fully appreciate the relationship between genetic explanations and societal attitudes, it will be important to understand how public beliefs change over time, an issue we did not address in this study.

In this paper we argue that genetic explanations for perceived gender differences in gender intensified prescriptive traits can be employed as a legitimizing ideology. Future research might explore whether there is a link between such genetic explanations and other legitimizing ideologies (such as social dominance orientation or just world beliefs). The fact that we found religiosity, a proxy for a legitimizing ideology, to be associated with genetic explanations for perceived gender differences in nurturance, but not with the other gender stereotyped traits, suggests the fruitfulness of this line of research.

Another important avenue of study will be to examine whether the pattern of individual versus group genetic explanations we found is supported in other cultures. Menon et al. (1999) showed that Americans were more likely to attribute individual actions to internal and stable causes, but Chinese subjects were more likely to do so for the actions of groups. Additionally, the Chinese subjects were more likely than Americans to attribute individual, but not group, actions to situational factors. It will be interesting to test whether these cultural differences in attitudes regarding essentialism will be associated with differing views regarding genetic explanations for complex human behaviors, and if so, what implications this has for stereotyping.

A final, and most intriguing issue that deserves research attention is the public’s understanding of genetics, specifically as it is used to explain perceived gender differences in nurturance. Given the frequency that this explanation is invoked, it would be a worthwhile project to explore how lay individuals conceive of the process that links genes and such perceived differences.

Conclusions

We believe that this study is a critical first step toward understanding the public’s beliefs regarding the genetic origins of gender-stereotyped behaviors. The importance of work in this area cannot be underestimated, as lay beliefs regarding genetic influences on perceived gender differences in complex behaviors are likely associated with gender stereotyping. If genetic explanations are accepted, perceived gender differences may be presumed to be immutable. The strength of the nurturance stereotype is of special concern, as genetic attributions may be used to argue that childrearing is the “natural” role of women, and hence as justification for the current social hierarchy.

Most behavioral geneticists agree that all human behaviors and traits result from complex interactions between genes and environment (Cartmill 1999). However, our concern lies in the possibility that the public, with their limited understanding of genetic science and frequent exposure to genetic explanations in the popular media, will overestimate the influence of genes on behavior, particularly when such beliefs reinforce a “common sense” view of the world. If genes are perceived as the major determinant of perceived group differences, these differences will likely be viewed as stable and unchangeable, and social programs and efforts aimed to improve the quality of life for low status groups may be dismissed. Therefore, we must continue to explore public views regarding genetic attributions, and work to correct popular misinterpretations of genetic science.

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Appendix

Genetic Explanation Measures

Genetic Explanations for Individual Differences in Nurturance

Next, what about the difference between people who are very nurturing and caring with children and those who aren't at all nurturing? Do you think their genes have anything to do with this difference? (IF YES): "In your opinion, how much of this difference is due to their genes? Would you say very little, some, a lot or just about all?"

Genetic Explanations for Individual Differences in Math Ability/Violence

What about the difference between people who are really good in math and those who aren't at all good in math?

What about the difference between people who have a tendency to act violently and those who don't have this tendency at all?

Genetic Explanations for Perceived Gender Differences in Nurturance

Now, I'd like to ask about some ways that men might tend to differ from women. People we've talked with have many different opinions about this, so we just want to know what you honestly think. First, some people think men tend to differ from women in how nurturing or caring they are with children. 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?

Genetic Explanations for Perceived Gender Differences in Math Ability/Violence

Some people think men tend to differ from women in how good they are in math. Do you think their genes have anything to do with this difference?

Some people think men differ from women in their tendency to act violently. Do you think their genes have anything to do with this difference?

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