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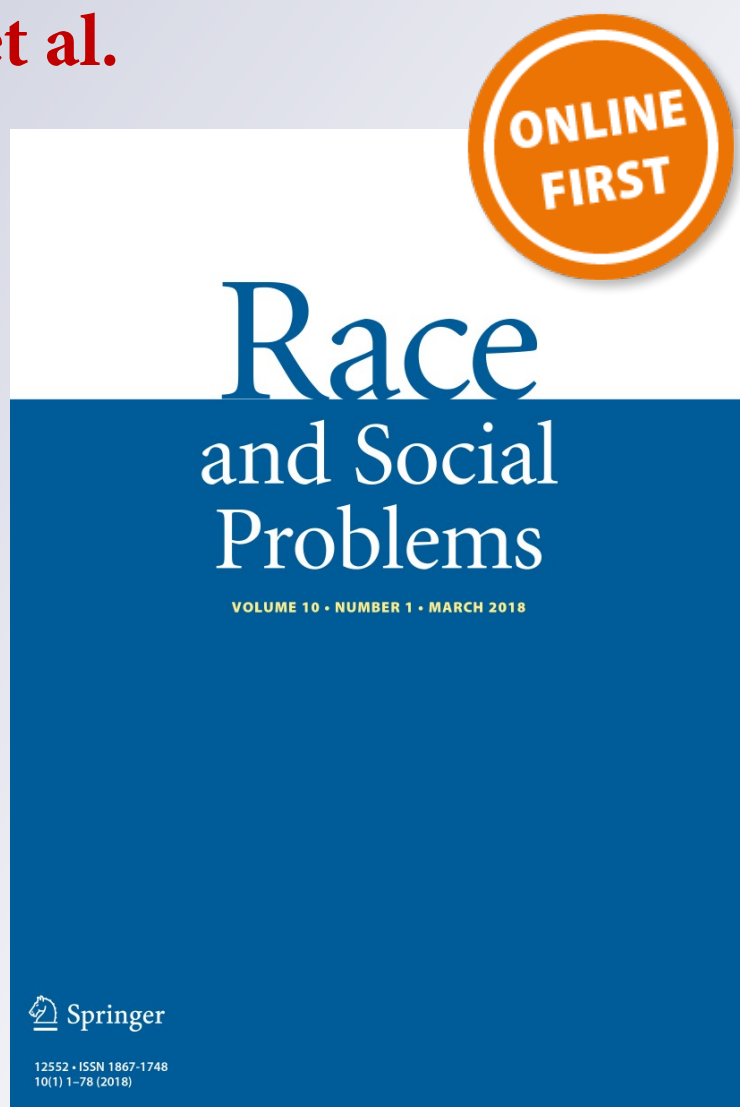
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# Genes, Race, and Causation: US Public Perspectives About Racial Difference

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## Abstract

Concerns have been raised that the increase in popular interest in genetics may herald a new era within which racial inequities are seen as “natural” or immutable. In the following study, we provide data from a nationally representative survey on how the US population perceives general ability, athleticism, and intellect being determined by race and/or genetics and whether they believe racial health inequities to be primarily the product of genetic or social factors. We find that self-described race is of primary importance in attributing general ability to race, increasing age is a significant factor in attributing athleticism and intellect to genes and race, and education is a significant factor in decreasing such racially and genetically deterministic views. Beliefs about the meaning of race are statistically significantly associated with respect to the perception of athletic abilities and marginally associated with the perception of racial health inequalities being either socially or genetically derived. Race, education, socioeconomic status, and concepts of race were frequently found to be multiplicative in their statistical effects. The persistent acceptance of a genetically and racially deterministic view of athleticism among the White and older population group is discussed with respect to its social impact, as is the high level of agreement that general abilities are determined by race among non-White respondents and those of lower socioeconomic status. We argue that these findings highlight that both biological and non-biological forms of understanding race continue to play a role into the politics of race and social difference within contemporary US society.

**Keywords** Race · Genetics · Causality · Health · Determinism · Inequity

## Introduction

The following study is grounded in questions and concerns about the reification of race as if it were a marker of genetic and/or biological difference. More than this, our objective is to explore—through the collection of empirical data—whether different sectors of the US population think differently about race and genetics as they pertain to generalizable abilities, athleticism, intellect, and differences in health. While concerns abound regarding the impact of popular thinking about genetics upon concepts of race and racialized thinking, empirical data are by no means plentiful (see Condit and Bates 2005; Jayaratne et al. 2006 for similar arguments regarding the lack of empirical data on how genetics might impact upon public

understandings of race). In light of the continued use of race within popular and scientific discourse, and the continued association between race and genetics in the media and across multiple public platforms, it is an important time to re-assess what the general public believes to be axiomatic about race and genetics.

Fundamental to the question of how race is perceived is the degree to which people believe races to be genetically and biologically distinct. Lewontin's (1972) experiment utilizing protein electrophoresis examined this question for humans and found that the genetic diversity within purported human racial groups was greater than that between them (Lewontin 1972). This result has been consistently repeated by a number of researchers utilizing ever improving technologies (e.g., restriction fragment length polymorphisms, microsatellites, and whole genome sequencing; Barbujani and Colonna 2010; Graves 2015a; Molnar 2015; Nei and Roychoudhury 1974; Fujimura and Rajagopalan 2011; Fujimura et al. 2014; Jorde and Wooding 2004). This result

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means that there is no unambiguous way to apportion human populations into biological races (Templeton 2013; Graves 2015a, b). However, despite these studies there has been a renewed interest in the *minority* of genetic variation that is associated with supposed racial difference. As Byrd and Ray (2015) recount, “as ‘racial essentialism’ (the belief that certain biological traits and social behaviors were linked and constitute the ‘essence’ of a certain racial group) was laid to rest, it was simultaneously reborn in the quest to identify genetic differences based on socially constructed categories.” As a result, genetics and genomics have once more become intimately tied to notions of race (Bliss 2015; Reardon 2009; Williams 2016). More broadly, the general public has widely differing views concerning the degree to which genetic variation is shared or differentiated between racial groups, views that may well impact upon their social interactions with other racial groups (Plaks et al. 2012; Kang et al. 2015; Williams and Eberhardt 2008).

The rise in popular interest in genetics and its potential implications for popular and expert understandings of race has been well documented (Bliss 2015; Duster 2003, 2015; Koenig et al. 2008; Reardon 2009; Wailoo et al. 2012; Whitmarsh and Jones 2010). As part of the continuing effort to educate the media and general public about the dangers of viewing race as a biological (genetic) construct or category, historians and critics of race as a biological category have pointed out that the concept race pre-dates what we would now call biology, emerging as it did in written form in the seventeenth century. This concept was further developed in the eighteenth century beginning with Linneaus’s classification of humans into four varieties, *Homo sapiens europeaus*, *H. sapiens asiaticus*, *H. sapiens americanus*, and *H. sapiens afer*. While Linneaus felt that these varieties could be arranged hierarchically with *europeaus* at the pinnacle and *afer* in the abyss, there was no general agreement among naturalists with respect to race until the nineteenth century. Throughout this process, naturalists highlighted the intimate ties between race and social inequities. This became part and parcel of their justification for the colonization and exploitation of the so-called inferior races (Brace 2005; Gould 1994; Graves 2015a; Marks 2001, 2003; Montague 2001; Reynolds 1992; Smedley 1999; Smedley and Smedley 2005). Furthermore, scientific race and scientific racism (the search for biological rationale for why some people must be seen as inferior) became integral to the justification of colonialism, enslavement, national dominance, and class domination (Brace 2005; Gould 1994, 1996; Graves 2004). Even with the ending of slavery in the USA and the UK, some scientists continued to attempt to prove the inferiority of non-Whites (and the “lower classes”) in ways that would justify discriminatory practices as not only excusable but in accordance with nature (Alland 2002; Gould 1994, 1996; Jackson and Weidman 2004). As such, not only is the question of

how the public comes to understand race an issue concerned with knowledge—knowledge about the history of race and knowledge of human genetic variation in particular—it is also an issue of political expediency. To what degree do people perceive racial difference to be in accordance with their existing worldviews and experiences, and how do these differences in perception play out in maintaining or resisting the dominant social order?

## Data and Methods

### Survey Measures

Survey development was a collaborative effort among investigators at Duke University, Carolina Survey Research Laboratory (CSRL) at the University of North Carolina, Chapel Hill, and the Department of Anthropology at the University of Oklahoma. The survey comprised nine parts, totaling 90 questions: (1) Awareness of and familiarity with genetic ancestry testing; (2) Race, ethnicity, and ancestry; (3) Degree of genetic relativism; (4) Relationships between race and genetics; (5) Knowledge of biological ancestry; (6) Interest in genetic ancestry testing; (7) Perspectives about genetic ancestry testing; (8) Ethnic identity; and (9) Demographics.

### Survey Pilot

The CSRL conducted a pilot test ( $n = 57$ ) of the proposed survey instrument between July 22 and August 22, 2013. We oversampled Black and Hispanic populations to increase “racial” and ethnic diversity and sampled from the US Eastern seaboard. The pilot was used to assess the robustness of the computer-assisted telephone interviewing (CATI) programming, the reliability of proposed scales, as well as the ability of individual items to discriminate. Adults 21 years of age or older were randomly selected within households to participate. Behavioral coding was conducted during the pilot survey to identify potential problems with survey items as well as to document other administration barriers (Lessler and Forsyth 1996). Revisions were made to the survey to minimize redundancy, clarify intention of questions, and reduce length. In addition, scale items were reduced until they loaded satisfactorily on the constructs being measured and they performed consistently (Cronbach’s  $\alpha \geq 0.70$ ) (DeVellis 2016).

### Sampling Methods

For the national survey, two independent and non-overlapping telephone frames were used within the continental USA. Half of the sample came from a random-digit-dial

(RDD) frame to include broad coverage of all US households. The other half came from electronic white pages (EWP) listings to target Black households. Both frames were stratified by census region to ensure proportionate representation nationwide and were supplied by a reputable sampling vendor (Marketing Systems Group, Horsham, PA). After low response rates from Hispanics in the pilot, the decision was made to not oversample or translate the survey into Spanish as a cost-reduction measure. To be considered eligible, a telephone number needed to reach a household with an English-speaking resident 21 years old or older. If more than one eligible adult resided in the household, one was randomly selected. Though the total number of outright refusals (NR) was not high in the pilot ( $N = 40$ ), the number of “unknown” or unclassifiable responses was unexpectedly high ( $n = 353$ ) given that the eligibility criterion was quite relaxed (i.e., anyone over the age of 21 who spoke English could respond). Even though we could not establish eligibility for any of these households (i.e., they hung up on us or otherwise refused to cooperate with the interviewer), we did record as many reasons for non-participation as possible. The vast majority of the refusals were lack of interest in the survey topic ( $n = 156$ /approx. 42.9%), while the number of persons recorded as non-participating due to language reasons was just 4 (approx. 1.1%) meaning that language bias seems unlikely to be key problematic in the study sample.

### Data Collection

The national telephone survey was conducted between March 18 and September 3, 2014. Calls were made Monday through Thursday between 9 am and midnight (EST), Saturday 9:30 am to 3:30 pm, and Sunday 2 pm to midnight. Blaise CATI software was used to both manage the sample and collect the data (Blaise 2007). No numbers were removed from calling until a minimum of 10 unsuccessful call attempts were made and at least 1 weekend, evening, and daytime call attempts were made. The sample resulted in 1655 interviews and achieved a weighted response rate of 45 percent (The American Association for Public Opinion Research, 2016). The remaining sample consisted of ineligible numbers (35,628), refusals from eligible households (1260), or numbers of indeterminable eligibility status (16,300). Interviewers completed general and project-specific training before conducting the surveys and signed certificates of confidentiality. For quality control, interviewers were monitored twice fortnightly. The study was approved by the Institutional Review Boards of Duke University and the University of North Carolina, Chapel Hill.

### Weights and Adjustment

A three-step sample weighting procedure was followed in producing sample weights (Kalsbeek and Agans 2008). The base weights were computed using the sampling rate for telephone numbers in each stratum, adjusting for the number of eligible respondents and landline telephone numbers in the household (Step 1). The base weights were then adjusted for differential household-level non-response among sampling strata using the inverse of the stratum-specific household-level response rate as the adjustment factor and trimmed following the procedures recommended by Potter (1988) (Step 2). The non-response-adjusted household sample weight was then calibrated to population counts as estimated from the American Community Survey (US Census 2015) sample by cross-tabulating on race (White vs. non-White), education (associates degree or less vs. college degree), and age (21–50 vs. 51–60 vs. > 60). Final weights were normalized to the total sample size so as not to artificially inflate the degrees of freedom in our analyses (Flores-Cervantes and Kalton 2008).

### Choice of Questions

Survey respondents were asked whether they *agreed* (strongly or somewhat) or *disagreed* (strongly or somewhat) with the following three statements:

- (a) The abilities a person is born with depend on what race they are.
- (b) People of one race may be better athletes than people of another race because of genetics.
- (c) People of one race may be smarter than people of another race because of genetics.

In addition, they were asked the following single question regarding racial health inequalities and genetics:

- (d) Research shows that on average, Blacks have worse health than Whites. In your opinion, is this mostly because of *genetic factors* or mostly because of *social factors*?

Responses were analyzed according to the following independent variables:

1. Self-described racial identity (according to OMB categories as found on the census)
2. College and above college education vs no college education (as a measure of education status)
3. Renting vs ownership of home, or “other” residential status (as a measure of socioeconomic status)
4. Age (grouped into three 21–50, 51–60, over 60).

5. Concept of race as biological vs not biological (respondents were asked if they thought “Race is biological. You are born a certain race and it is based on science” or “Race is not biological. It is something society has made up.”)

In developing these questions, we employed the literature on the following topics: popular understandings of race, genetics, and biology in ascribing essential qualities (Chao et al. 2013; Condit et al. 2004; Condit and Bates 2005; Dar-Nimrod and Heine 2011; Glasgow et al. 2009; Haslam and Whelan 2008; Jayaratne et al. 2006, 2009; Shulman and Glasgow 2010; Yzerbyt et al. 2001); cultural differences in attitudes to genetic science (Dye et al. 2016; Furr 2002); popular perceptions of Black sporting success (Hoberman 1997; Hughey and Goss 2015; Rasmussen et al. 2005); race and intelligence (Alland 2002; Gould 1996; Kaplan 2015); the growing market for racialized medicine (Duster 2015; Kahn 2013; Krupar and Ehlers 2017); and the continued use of race within the context of genetic and biomedical research (Lorusso and Bacchini 2015; Yudell et al. 2016). These four bodies of knowledge were utilized with respect to interpreting questions concerning abilities, athletic ability, intelligence, and whether the public believes racial health inequalities to be the product of social or genetic factors.

### Statistical Analysis

A number of standard logistic regressions were employed to identify the associations with agreement to certain statements while controlling for other variables as appropriate. It should be noted that we performed list-wise deletion before performing the regression, i.e., we excluded observations missing on any one of the control variables. This led to a reduction in sample size of between 4 and 11%, depending on the outcome examined. In the Results section associations are reported as odds ratios using weighted frequencies. We provide McFadden's pseudo-R-squared (calculated as one minus the fraction of the residual deviance by the null deviance). This term provides a rough estimate of the variance in the outcome explained by the control variables.

## Results

### Sample Characteristics

As seen in Table 1, the respondents in our sample tended to be older and more educated than the general population, but the sampling weights redistributed these imbalances. As a check on our weighting process, we compared our sample estimate of current adult smokers, defined by smoking on all or some days as well as 100 cigarettes in entire lifetime,

against the National Health Interview Survey (NHIS) estimate ( $17.8 \pm 0.6$ ;  $n = 34,557$ ). We found that our weighted estimate closely approached the NHIS smoking estimate, suggesting that our weights appropriately adjusted our sample to the general population.

Table 2 reports odds ratios with respect to agreement with the statements A-C while controlling for other variables. The findings are reported in odds ratios, which can be interpreted as a percent increase or decrease in the probability of agreeing with each statement ( $\text{odds ratio} - 1$ ) \* 100 = percent increase or decrease).

### Agreement with the Statement Regarding General Abilities

From Table 2, it can be seen that agreement with statement A that “the abilities a person is born with depend on what race they are” is strongly associated with self-identified race and education and has a marginally statistically significant relationship to housing status. Self-identification as American Indian or Alaska, Asian, Black or African-American, Native Hawaiian or Other, Pacific Islander, or Other Race approximately doubles (203% increase) the probability of agreement with the statement. Home renters are 54.5% ( $(1.545 - 1) * 100$ ) more likely than home owners to agree that abilities depend on race although this association is statistically marginal). By way of contrast, respondents with a college degree are 50% ( $(0.500 - 1) * 100$ ) less likely than those without a college degree to agree that abilities depend on race.

Education and rental status had multiplicative effects upon our initial finding of racial differences in perception of abilities. When we stratified our results, we found that the association between renting (indicative of lower socioeconomic status) and greater agreement with statement “the abilities a person is born with depend on what race they are” was maintained within each racial/ethnic group.

As seen in Fig. 1, non-White renters with no college have the highest predicted probability of agreeing that general abilities depend on race at approximately and White homeowners with a college degree have the lowest predicted probability of agreement. The pattern described in Fig. 1 is robust to different modeling assumptions.

Concepts of race as biological or not biological do not appear to influence agreement with the statement in any statistically significant manner (see Table 2).

### Agreement with the Statement on Athletic Abilities

Agreement with the statement B that “People of one race may be better athletes than people of another race because of genetics” is statistically associated with race, age, and

**Table 1** Demographic characteristics of respondents

Characteristic	Frequency	Weighted frequency	Weighted percentages (%)	SE of percentage*
<i>Race* (n = 1655)</i>				
American Indian or Alaska Native	69	81.647	5.029	0.752
Asian	17	13.806	0.850	0.248
Black or African-American	338	283.065	17.436	1.033
Native Hawaiian or Other Pacific Islander	3	4.181	0.258	0.159
White	1149	1180.000	72.653	1.310
Other race	42	48.387	2.980	0.552
Refusal	10	12.887	0.794	0.307
Total	1628	1623	100	
<i>Education (n = 1655)</i>				
Some college or associate degree or less	937	1196	72.278	1.205
College degree	718	458.807	27.723	1.205
Total	1655	1655	100	
<i>Age (n = 1655)</i>				
21–50	461	937.337	56.637	1.472
51–60	395	307.823	18.600	0.996
>60	799	409.840	24.764	1.033
Total	1655	1655	100	
<i>Home ownership</i>				
Own	1226	1130	69.579	1.537
Rent	317	379.229	23.359	1.412
Other	78	108.885	6.707	0.905
Refusal	6	5.451	0.336	0.165
Don't know	1	0.318	0.020	0.020
Total	1628	1623	100	

\*SE standard error

beliefs about whether race is a biological construct (as reported in Table 2).

Self-identifying as Black or other non-White race/ethnicity decreases the likelihood of agreement by 48.7%  $((0.513 - 1) * 100)$ . Testing for interaction effects with race indicates the results are robust across differing levels of education and home ownership. Beliefs about whether race is a biologically determined outcome are important for this outcome, with those who believe race is a not biological construct being 43.1%  $((1 - 0.569) * 100)$  less likely to agree that athletic abilities depend on race.

Age is also an important factor in agreement. Being over 61 increases the likelihood of agreement by 79.6%  $((1.796 - 1) * 100)$  compared to the reference population of 21–50. Middle-aged individuals are about just over 25% more likely than the youngest to agree with Statement B, though this odds ratio is not statistically significant. This suggests the existence of an age-specific gradient in agreement with the idea that athletic abilities depend on race.

Beliefs about the meaning of race are multiplicative with racial identification and age. In summary, concepts of race

alone do not account for the differences in agreement with this proposition across race and age.

### Agreement with the Statement on Intellectual Abilities

Agreement with statement C that “People of one race may be smarter than people of another race because of genetics” has statistically significant associations with education and age (as reported in Table 2). Specifically, having a college degree (as opposed to not reaching college education level) reduces the likelihood of agreeing with the statement by approximately 45%  $((0.550 - 1) * 100)$ . Respondents aged 61 and older are 79% more likely to agree with this statement.

Age and education are both independently correlated with the outcome, but they are also multiplicative effects that work together. Education operates the same across all ages with respect to perception of intelligence differentials according to race.

Belief that race is not a biological category does not appear to impact upon agreement with Statement C.

**Table 2** Odds ratios from logistic regressions

	Agreement with statement					
	A	SE	B	SE	C	SE
(Intercept)	0.181***	(0.039)	0.819	(0.131)	0.227***	(0.043)
Race (non-White) <sup>a</sup>	2.032**	(0.421)	0.513***	(0.087)	0.891	(0.187)
Education (college degree) <sup>b</sup>	0.500***	(0.093)	0.888	(0.119)	0.550***	(0.093)
Housing (renting) <sup>c</sup>	1.545 <sup>+</sup>	(0.346)	1.307	(0.247)	1.519 <sup>+</sup>	(0.338)
Age 51–60 <sup>d</sup>	0.801	(0.178)	1.264	(0.206)	1.324	(0.273)
Age over 60 <sup>d</sup>	1.144	(0.218)	1.796***	(0.260)	1.790**	(0.320)
Race is not biological <sup>e</sup>	0.797	(0.155)	0.569***	(0.084)	0.808	(0.149)
<i>n</i>	1536		1529		1530	
Pseudo-R-squared	0.051		0.042		0.027	

+  $p < 0.1$  \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . SE standard error; model weighted to adjust for complex survey design

<sup>a</sup>Reference category for race is White (odds ratio shown is for all non-White groups in comparison with White population)

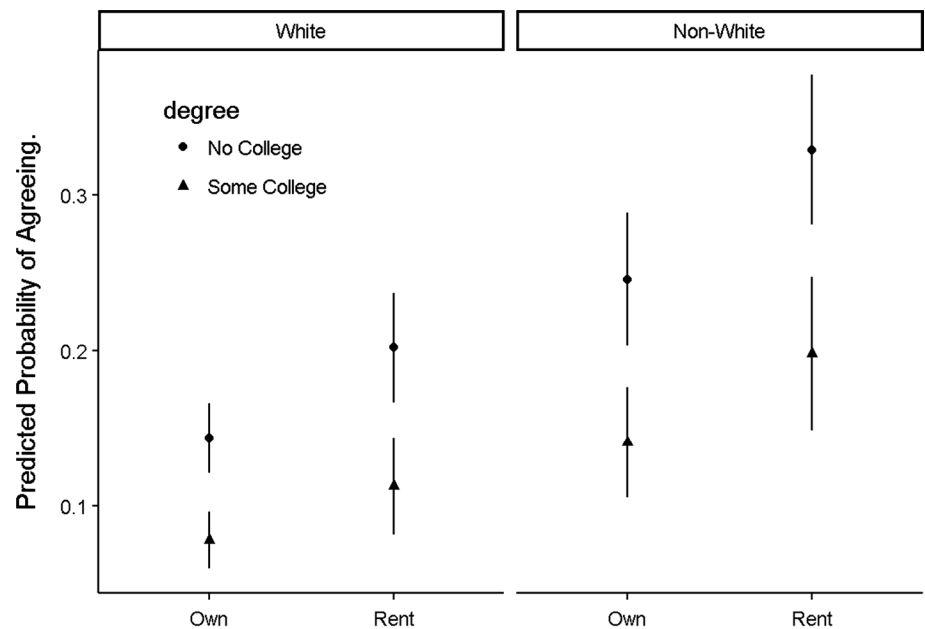
<sup>b</sup>Reference categories for education is no college degree (odds ratio shown is for college degree or above)

<sup>c</sup>Reference category for housing is home ownership (odds ratio shown is for renting); results for “Other” omitted

<sup>d</sup>Reference category for age is 21–50 (odds ratio shown is for age 51–60 and over 60 years old)

<sup>e</sup>Reference category for concept of race is that race is a biological category (odds ratio shown is for race is viewed as not a biological category)

**Fig. 1** Probability of agreeing that abilities depend on race. Note that this figure presents 84% confidence intervals because this level is recommended for picturing bivariate differences. Intervals which do not overlap generally indicate statistically significant differences at the  $p < 0.05$  level (Goldstein and Healy 1995)



Adjusted for Survey Design.  
84% Confidence Intervals.

### Genetic Versus Social Interpretations of Racial Health Differentials

Table 3 reports odds ratios with respect to whether people felt that health inequalities were largely the product of social—rather than genetic—factors. As previously, odds

ratios are reported for each variable while controlling for other variables (As above, results can be interpreted as a percent increase or decrease in the probability of agreeing with each statement (odds ratio-1) \* 100 = percent increase or decrease.)



Table 3 shows that education has by far the most significant association with attributing racial health inequalities to social factors, with college education or above increasing the likelihood of attributing racial health inequalities to social factors by over 300%. Self-identification of race/ethnicity, home ownership, and age do not show statistically significant associations with this statement at traditional levels of significance, though they reach marginal levels of statistical significance ( $p < 0.11$ ) when education is excluded from the model. Without education, the proportion of variance explained as measured by the pseudo-R-squared is only 0.7%; adding education moves the proportion explained to 4.2%.

Holding a view of race as not a biological concept increased the percentage of people attributing racial health inequalities to social factors by 44.6% but the finding was only marginally statistically associated ( $p < 0.1$ ). Racial concepts are multiplicative with education with respect to this finding; however, education is statistically significantly associated with beliefs about racial health inequalities, independent of whether race is viewed as a biological construct.

### Summary Regarding Correlates

Race is associated with education, housing, and age status. Additional data analysis indicated that the White population group is more likely to have a college education (or above), own property, and be older than other population groups.

Additional research conducted by the research team indicates that across all racial/ethnic population groups in the USA, a majority of people believe race to be a combination of social and biological elements. However, *of those presuming race to be either a biological or a social concept*, Whites were more likely to take a biological position with respect to the meaning of race. Conversely, *of those presuming race to be either a biological or a social concept* Black and American Indian populations were more likely to reject the biological concept of race and subscribe to a notion of race as a social category.

With the exception of beliefs about athletic abilities, education generally displays the most consistent, and often the strongest association with agreement or disagreement with various statements provided and with respect to believing that social factors are more significant than genetic factors in determining racial differences in health.

### Limitations

We used weights to make the data nationally representative, but notably, racial self-identification was one of (but not the only) attributes used to conduct oversampling. For

**Table 3** Odds ratios from logistic: agreement with racial inequalities mostly due to social factors?

	Odds ratios	SE
(Intercept)	2.682***	(0.519)
Race (non-White) <sup>a</sup>	1.005	(0.202)
Education (college degree) <sup>b</sup>	3.306***	(0.601)
Housing (renting) <sup>c</sup>	0.809	(0.178)
Age 51–60 <sup>d</sup>	0.743	(0.150)
Age over 61 <sup>e</sup>	0.857	(0.157)
Race is not biological <sup>f</sup>	1.446+	(0.272)
<i>N</i>	1473	
Pseudo-R-squared	0.047	

+  $p < 0.1$  \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . *SE* standard error; model weighted to adjust for complex survey design

<sup>a</sup>Reference category for race is White (odds ratio shown is for all non-White groups in comparison with White population)

<sup>b</sup>Reference categories for education is no college degree (odds ratio shown is for college degree or above)

<sup>c</sup>Reference category for housing is home ownership (odds ratio shown is for renting); “Other” category omitted

<sup>d</sup>Reference category for age is 21–50 (odds ratio shown is for age 51–60 and over 60 years old)

<sup>e</sup>Reference category for concept of race is that race is a biological category (odds ratio shown is for race viewed as not a biological category)

multiple regression, inclusion of racial identification is necessary to test our hypotheses, but this also introduces complex issues related to the appropriate weighting of analysis and may affect standard errors and tests of statistical significance (Winship and Radbill 1994). These concerns are partially ameliorated because analyses with unweighted data produce similar results (particularly with variables that have large effect sizes, like education). However, there are some important differences. Analyses using unweighted frequencies suggest stronger associations between renting (as a measure of socioeconomic status) and agreement with Statement A (abilities) and unweighted frequencies also show a statistically significant association between higher rates of education and disagreement with Statement B (athleticism). Analysis using unweighted figures also increases the significance (lower  $p$  value) of having a non-biological view of health with respect to disagreeing with Statement C (intelligence) and believing racial health inequalities to be derived from social factors (Statement D). In combination, these differences highlight the need to be aware of the differences between weighted and unweighted data in interpreting the findings.

Inevitably limitations to the numbers of questions that could be asked and the need to focus upon particular

research topics led to limitations as to the information that was collected. Geographical location was not recorded. It is possible that the findings might also be conditional on region of residence, which might add a further layer of understanding, especially when comparing the US Deep South to other regions. We note that the housing status is not necessarily the only form of socioeconomic marker available, but it has been shown as a robust marker of socioeconomic status in a number of studies (Grundy and Holt 2001; Filakti and Fox 1995; Laaksonen et al. 2005). We also note that concepts of race are complex—we cannot answer what people specifically mean by rejecting or affirming of race as biological, we can only make a broad distinction between biological and social concepts of race (see Morning 2007, 2009 for further discussion of race as a social concept). A further limitation is that while anonymity was ensured, questions about race are frequently sensitive. It may be the case these sensitivities influence peoples' answers, especially as the survey was conducted over the phone. Despite these limitations, it remains the case that various patterns emerge; in short, responses do differ according to group dynamics and these differences appear to reflect racial, socioeconomic, education, and age, along with concepts of race).

## Discussion

### Main Findings

Overall our findings are indicative of four important patterns. Firstly, that race and associated indicators of racially derived social advantage and disadvantage are significant factors in the perception that abilities are determined by race. In short, persons who might be identified as likely to have the greatest advantages in life (as indicated by being self-identified as White, house owners, and having higher levels of access to education) are the least likely to ascribe to a view that abilities are something determined by race (see Fig. 1). Secondly, that being older increases the likelihood of someone believing that athletic ability and intellectual ability are determined by race and genetics. Being White and older is a particularly strong indicator of agreement with Statement B—that athletic ability is determined through race and genetics. Conversely, higher levels of education militate against such biologically essentialized views of athletic (Statement B) and intellectual ability (Statement C). Thirdly, that higher levels of education and holding concepts of race that rejects race as a biological category are the most important factors in ascribing racial health inequalities to social, rather than genetic, factors. The two components—a non-biological (social) view of race and higher levels of education are multifactorial in effect. Notably self-identified

race, housing (as a measure of socioeconomic status), and age are not statistically associated with perceptions about health differences.

### Implications of the Findings

From an education standpoint, our data suggest that the educational message that races are not biological categories has had some popular impact. Higher levels of education and concepts of race as non-biological were seen as multiplicative in reducing the biologically essentialist statements concerning mental abilities and was also seen to be the dominant factor with respect to ascribing racial health inequalities to social, rather than genetic factors (see Morning 2007, 2009; Wagner et al. 2017 for discussions of the status of race within academia).

The persistence of the belief that race and genetics provide an explanation for sporting achievement—especially among White respondents—may in part be accounted for by a tendency to ascribe a genetic causality to physical rather than mental abilities. As Parrott et al. (2003) states “where people are forced to choose one over the other, there are fairly clear patterns assigning genes a larger role in physical traits and a smaller role in traits perceived to be cognitively based.” However, it also suggests a continuance of an historical construct in which non-Whites (especially Blacks) have come to be seen as innately suited to sports and, perhaps more significantly, are seen as unsuited to success in other contexts (Hayes and Sugden 1999; Hoberman 1997; Hughey and Goss 2015). Although to the best of our knowledge no other survey-based study has directly compared White and other population groups with respect to perceptions of athletic ability, empirical data supporting the claim that Black athleticism is frequently seen as natural or innate can be found in the work of Morning (2007) whose data suggest that nearly three-quarters of respondents presented with an example of unequal sporting success in the NFL suggested that differences in sports representation were due to Blacks' natural physical superiority vis-à-vis Whites. Similarly, Hayes and Sugden's (1999) study of scholastic coaching concludes that Black students are often seen as innately good at sport, and at the same time expectations for non-sporting academic success are reduced. A similar set of expectations were found among the general public within the work of Sheldon et al. (2007) who conclude that White Americans' expectations of African-American success in sport operate as a “backhanded compliment and likely serve to help perpetuate prejudice and negative racial stereotypes.” In short, it appears that in the sports and athletics context it remains socially acceptable among the White population to employ long-standing stereotypes about Black brawn over brains.

Finally, we saw that people who are more likely to be economically and socially disadvantaged were statistically more likely than other populations to agree to Statement A (general abilities). This was especially true with respect to racial identification—a 94.6% increase in agreement with the statement that “the abilities a person is born with depend on what race they are” among non-Whites (using unweighted data suggests an additional association with low socioeconomic status and agreement with this statement). There are several possible explanations for this finding. The first is that non-Whites are more likely to hold biologically essentialist views about race in general. This seems unlikely given that our study does not indicate similar findings for Statements B and C concerning athletic and intellectual abilities being determined by race and genetics. The second explanation is that the question is interpreted as one concerned with lifetime opportunities being limited. As Singer et al. (2007) also found—somewhat paradoxically—Black respondents appeared to give more genetically deterministic responses in their study using vignette questions. In turn, rather than concluding that Blacks are more likely to subscribe generally to deterministic thinking, Singer et al. suggested “the tendency of Black respondents to endorse more genetic ratings appears to be due, in part, to their lack of confidence that they can control their own fate.” Finally, it is also possible that rather than being solely indicative of a form of fatalism that this finding may also be a form of tacit resistance to the insistence that failure to be economically successful is to be blamed on the individual rather than endemic socioeconomic barriers to economic success. At the very least the finding indicates a non-acceptance of the notion that the USA has moved past endemic racial barriers and that everyone is truly equal at birth (see Bobo and Charles 2009; Bonilla-Silva 2006; El-Haj 2007 for discussion of neo-liberal color-blind racism). Either way, it suggests that notions of innate difference by birth into a particular race are understood differently due to the distinct lived experiences of different racial groups in the USA.

## Conclusion

Political expediency, as evidenced by the transformation of race from a folk belief about type and difference to a politically valuable social and scientific tool for justifying exploitation and subjugation, lies at the core of understanding the role of race in society. It should come as no surprise that in an age when genetics, race, and social activism have combined in myriad different forms that race is being pulled in multiple directions as it continues to be fought over as proof of the natural order of things

or proof that society is structured in ways that facilitate or restrict opportunities based upon race and its associated correlates. While education appears to have spearheaded the shift away from essentialized perspectives that see physical and mental ability as intimately tied to racial, biological, and genetic difference and thus away from the crude biological racism of the twentieth century, social perspectives of race are by no means unequivocally free from racial intolerance. Confronting twenty-first century forms of racial discrimination—based upon the notion that racism no longer exists and that all people have unlimited opportunity—presents a new challenge. It is arguable that those populations who have suffered most from biological views of race are now voicing their concerns that racial barriers still exist even in the supposedly post-racial context of contemporary US society. In the future, it is essential to regularly survey the impact of informal and formal education and engagement efforts in improving the public’s knowledge about the relationship between race and genetics and the role of both in interpreting and addressing all forms of social and health disparity in US society.

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