

Research Article

Testosterone and the “Honor Culture” of Young Black Men

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Participants in the “honor cultures” of poor black inner cities are hypersensitive to perceived insults to their personal reputations. In theory, this vigilance raises their testosterone (T), which in turn facilitates dominance contests that usually do not but may end violently. Two prior reports, using large datasets, show inordinately high T in young black men with low education, a cohort in which honor culture participants are presumed to be concentrated. However, a third study did not find this effect. Here, using a newer and very large dataset, the combined NHANES surveys from 2013–14 and 2015–16, mean T of young black men with low education is shown to be higher than that of comparable white or Hispanic men. Higher T appears among black males by late teenage. Females do not show the same pattern.

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Introduction

The historically high rate of violence in the American South, compared to the North, has been attributed to the South’s “honor culture” wherein Southern men, when perceiving insults to themselves or their families, are expected to defend their reputations or else lose face. Southern men are characterized as inordinately sensitive to insult, reacting assertively, sometimes violently, to actions or speech that may not be considered as especially provocative elsewhere (Nisbett and Cohen 1996).

The present paper links two rarely connected bodies of research, the intention being to consider cultural differences in the light of evolutionary psychology. One body, historical and ethnological, examines honor cultures as found in the Old South and other settings where men place extremely high value on their personal and family reputations, are hypersensitive to insult, and may come to violence

over seemingly slight hints of disrespect. The other body of research, from primatology and biosocial science, relates male testosterone (T) to face-to-face status hierarchies. Among its principle claims are that heightened T encourages dominant behavior, and that anticipation of competition raises T.

Dov Cohen and his colleagues first linked honor cultures with testosterone in an experimental study at the University of Michigan. Participants were white male students who grew up in the North or South. In three experiments, subjects were insulted by a confederate who bumped into the participant and called him an “asshole.” Compared with northerners, who were relatively unaffected by the insult, southerners were more likely to think their reputation was threatened, more upset (as shown by a rise in cortisol), “more physiological primed for aggression,” as shown by a rise in T, and more likely to engage in aggressive and dominant behavior (Cohen et al. 1996).

Subcultures of inner cities, home to America’s black urban underclass, place inordinate importance on the enhancement of personal reputations and the humiliation of losing face (Anderson 1994). This atmosphere of persistent challenge theoretically produces heightened T in young black men, raising the likelihood that they will engage in dominance competition, which in turn raises the likelihood of a violent, even fatal, outcome.

Honor cultures in American inner cities

The concept of honor cultures has been applied to any subculture that is or was organized around young men who are unconstrained by traditional community agents of control, as often occurs in frontier communities, in gangs, and after breakdowns in the social fabric following wars or natural disasters. When young men place special emphasis on protecting their reputations, and they are not restrained from doing so, dominance contests become ubiquitous, a hallmark of male-to-male interaction (Thrasher 1963; Sanchez-Jankowsky 1991). This may partly account for the high incidence of violence among young black men in the U.S. In 2016, for example, when the U.S. population was 13% black, the FBI reports that 48% of murderers were known to be black (race was unknown for 11%), and 49% of victims were black (www.ucr.fbi.gov). Neither whites nor Hispanics have such disproportionate percentages of victims or perpetrators. Most known murderers and victims are males under the age of 30.

In the 1960s, the end of legal racial segregation allowed relatively affluent black inner-city residents and institutions to move into “better” neighborhoods, leaving behind those poor but heretofore stable urban slums in which they had served, formally or informally, as agents of social control (Wilson

2012). Now lacking these communal elements of order and stability, remnant black ghettos were increasingly dominated by gangs of young men, a setting that traditionally fosters honor cultures.

Elijah Anderson, preeminent student of street behavior in the inner cities of America, portrays in his ethnography *The Code of the Streets* the importance of dominance contests and their continual presence for poor young black men:

[M]ost youths have...internalized the code of the streets..., which chiefly [has] to do with interpersonal communication..., [including] facial expressions, gait, and verbal expressions – all of which are geared mainly to deterring aggression...

Even so, there are no guarantees against challenges, because there are always people looking for a fight to increase their share of respect – of “juice,” as it is sometimes called on the street. Moreover, if a person is assaulted, it is important, not only in the eyes of his opponent but in the eyes of his “running buddies,” for him to avenge himself. Otherwise, he risks being “tried” (challenged) or “moved on” by any number of others. To maintain his honor, he must show he is not someone to be “messed with” or “dissed.”

...The craving for respect that results gives people thin skins. Shows of deference by others can be highly soothing, contributing to a sense of security, comfort, self-confidence, and self-respect.... Hence one must be ever vigilant against the transgressions of others or even appearing as if transgressions will be tolerated. Among young people, whose sense of self-esteem is particularly vulnerable, there is an especially heightened concern with being disrespected. Many inner-city young men in particular crave respect to such a degree that they will risk their lives to attain and maintain it (Anderson 1994: 88-99).

Usually murder victims are relatives, friends, or at least acquainted with their killers. Fatal aggression between men is often precipitated by a trivial altercation, perhaps an insult, curse, or jostling. This is followed by an escalation of hostile verbal actions that may look no different than many nonfatal arguments (Katz 1988).

Testosterone

High T does not appear to contribute directly to violence. However, there is good evidence that high T promotes assertive and antisocial behavior among young men and encourages them to engage in “dominance contests” to determine superior rank in a group’s status hierarchy (Mazur 2005; Castro and Mehta 2019; Geniole and Carré 2019). Face-to-face dominance contests are normally nonviolent, even friendly or conducted jokingly. However, violence may occur when dominance contests escalate beyond their usually bounds. The likelihood of escalation to violence is increased by the influence of alcohol and the cost of losing status in front of an audience. Whether such violent encounters turn out to be fatal or merely injurious is largely a matter of chance and extenuating circumstances like the ready availability of medical care or having weapons at hand (Katz 1988).

Discussion of T’s influence on men often centers on dominant and antisocial behavior, but more basically the hormone appears to enhance behaviors involved in obtaining and maintaining high social status in primary groups. These status-enhancing behaviors can be prosocial or antisocial, depending on which is relevant for increasing status. Dreher et al. (2016) demonstrated this by administering T vs. placebo to forty young men who played the Ultimatum Game, a popular laboratory task used to measure competition. In a traditional version of the game, T increased men’s status by punishing (monetarily) the other player. When the game was restructured so that prosocial behavior enhanced status, men who received T acted more generously toward the other player.

Two claims of the biosocial model of status are relevant here: (1) T is associated with assertive, leader-like behavior, encouraging young men to engage in dominance contests to determine superior rank in a group’s status hierarchy. (2) Anticipation of competition raises T, as if in preparation for a coming contest (e.g., Mazur, Booth and Dabbs 1992).

There has been over the past three decades a growing number of studies testing these ideas. Despite some null results, successively updated reviews of this literature sustain the underlying T effects, sometimes with the mediation of a third variable measuring personality or context (Archer 2006; Carré et al. 2011; Mehta and Prasad 2015; Carré and Olmstead 2015; Hamilton et al. 2015; Geniole et al. 2017; Castro and Mehta 2019; Geniole and Carré 2019).

Prior Results from Large Surveys

Possibly this theory explains the high violence rates among young black men in inner cities. Do these young men have inordinately high T levels? We have no direct measures of T in young men who are known participants in such honor cultures, as described by Elijah Anderson. The question has been addressed indirectly in three large epidemiological studies, on the presumption that honor culture participants are disproportionately concentrated in an identifiable cohort of young black men who are poorly educated. “Low” education was operationally defined as below median schooling, specifically having a high school degree or less education. Men with some college were placed in the “high” education category and assumed less likely to be enmeshed in an honor culture.

The first large study to address this question, based on 4,462 male U.S. Army veterans, showed that younger black men with low education did as a group have high T. Among older men or well-educated young men, race made no difference in hormone levels (Mazur 1995). However, a second study by the same researcher, using a different sample of 1,637 men drawn from the U.S. population, failed to replicate, showing that T of young black men was unexceptional (Mazur 2009).

A third study, on 9,338 respondents in the National Health and Nutrition Examination Survey (NHANES) for 2011–2012, again showed young poorly-educated black men with exceptionally high mean T (Mazur 2016). As before, race was unrelated to T among older men, or among highly educated men of all ages. Figure 1 of that report is reproduced as Figure 1 here. This T pattern was not found in women, or respondents of either gender under age 20 years.

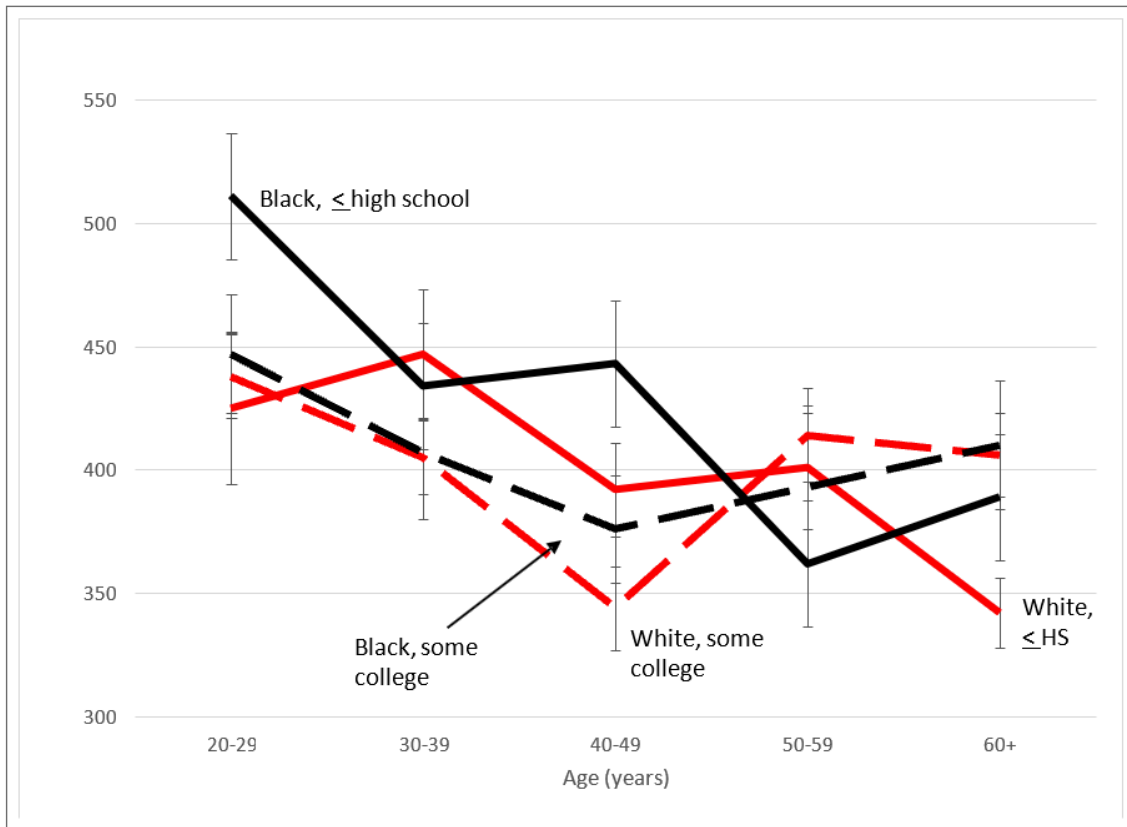


Figure 1. Men’s testosterone by age, race, and education, reproduced here for comparison with more recent data reported below

Source: Mazur (2016), based on data from NHANES 2011–12. Error bars show SEMs.

The present study uses newer T measurements from a bigger dataset, combining NHANES cross-sectional surveys of 2013–14 and 2015–16. We ask if the pattern in Figure 1 is replicated among men in this newer dataset. Also, Hispanics are analyzed as a separate ethnic group.

Materials and Methods

Data

The National Health and Nutrition Examination Survey (NHANES), a continuous program under the US Centers for Disease Control, is designed to assess the health and nutritional status of American children and adults, combining interviews, physical examinations, and laboratory tests. Testosterone measurements have been regularly included since the 2011–2012 survey, the basis for Figure 1, above.

T values have been among the last data from each two-year survey to become publically available, so results from the 2017–2018 survey are not expected soon. The present study combines recently-available T values from the 2013–14 and 2015–2016 surveys.

Methods for these two surveys are nearly identical. Certain groups including blacks, Hispanics, and older adults were oversampled, requiring weighting to be representative of the nation. Here observations are used without weighting.

In 2013–2014, 9,813 persons selected from 30 study locations completed the interview and examination; the 2015–2016 survey had 9,971 persons completing. This analysis is limited to respondents whose serum T was measured, numbering 7,559 in 2013–2014, and 7,207 in 2015–2016, about equally divided by gender, spanning ages from six to over 80 years old.

Numbers of the racial/ethnic respondents used here are 5,157 non-Hispanic whites (35%), 3,081 non-Hispanic blacks (21%), and 4,342 Hispanics (29%, combining Mexican-American and Latino). The racial/ethnic distribution, hereafter called “ethnicity,” is similar in the two surveys. Primary analysis is on men (age > 20 years): 1,971 whites, 999 blacks, and 1,266 Hispanics.

Demographic variables include sex, ethnicity, age, and level of education. Education is coded differently for “children” (under age 20) and adults, so they are analyzed separately. No variable indicates respondents’ residence as urban or rural. Here, the presumption is again made that black inner-city residents are concentrated among NHANES’s poorly-educated blacks, with education again dichotomized as < high school degree vs. some college.

Men’s T drops after marriage and rises after divorce (Mazur and Michalek 1998). Given the low marriage rate among young black men, marital status is included as a potentially important control variable.

Testosterone

Time of blood collection is unspecified, a source of error since men’s T has a diurnal pattern, higher in the morning. Serum total T was assayed by isotope dilution liquid chromatography tandem mass spectrometry (ID-LC-MS/MS), using stable isotope-labeled internal standards and calibrators, based on the National Institute for Standards and Technology’s reference method. Coefficients of variation are given as <3.5%.

T values for five men were dropped as implausibly high and discontinuous with the range for other men. These outliers, likely errors, ranged from 1,550 to 2,000 ng/dL. The five men were of diverse ethnicity and relatively old, from 32 to 80 years. This left 4,994 men for analysis, their T ranging from 1.4 to 1,480 ng/dL ($M = 416$, $sd = 186$). The men's distribution has little skew ($= 1.1$) so raw values are used in the analysis.

For women, three outliers were dropped: 583, 573, and 444 ng/dL. Two of the women were Hispanic, one white, their ages from 24 to 50 years old. This left 5,426 women for analysis, their T ranging from 0.5 to 342 ng/dL ($M = 24$, $sd = 22$). The women's distribution is highly skewed ($= 5.8$) and is transformed by natural logarithms for analysis, reducing skew to -0.04 .

Results

Is Testosterone High in Young Black Men?

Figure 2 attempts to replicate previously published Figure 1, above, adding additional trend lines for Hispanic men, permitted by the large NHANES 2013-16 dataset. The two Hispanic trend lines (i.e., by high and low education) essentially overlap the white trend lines. Poorly-educated black men in their 20s have significantly higher T than white or Hispanic men in their 20s. For older men, there is no consistent difference among ethnicities. Thus, the black-white pattern in Figure 2 nearly replicates that in Figure 1, with one difference: In Figure 2, T levels of young black men do not differ much by education as they did in Figure 1.

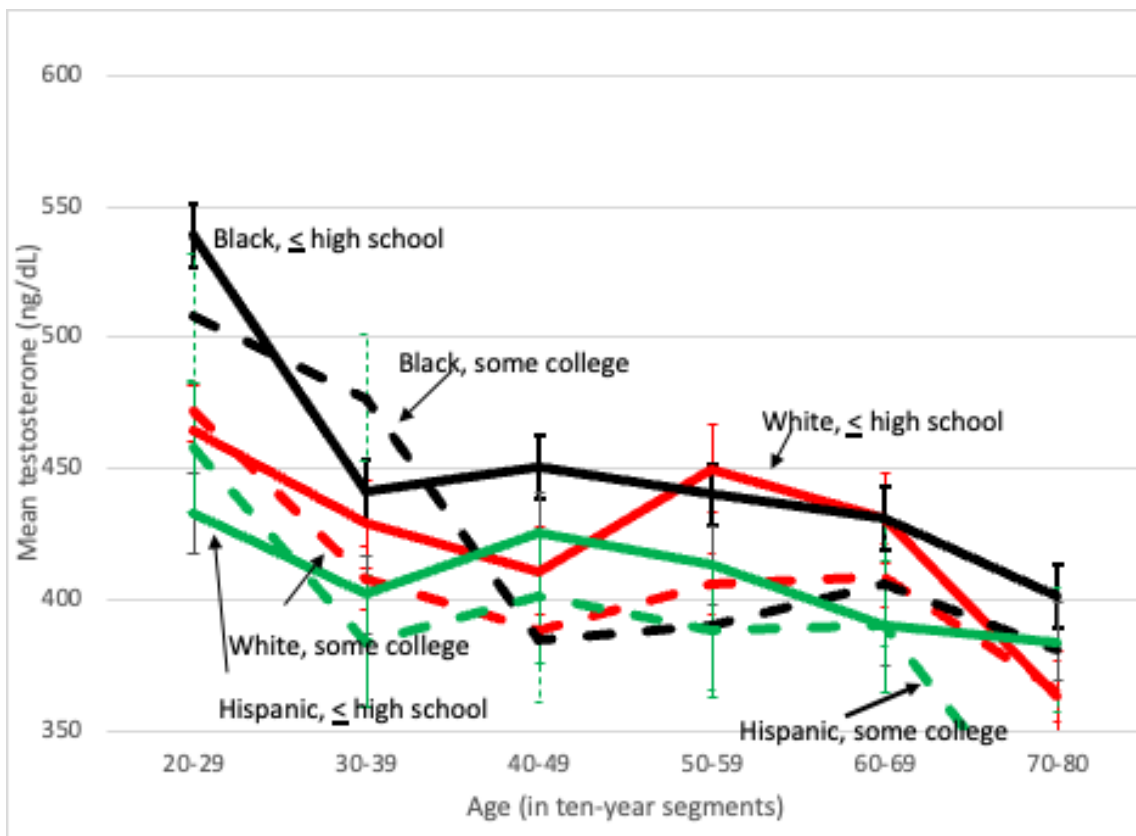


Figure 2. Men's testosterone by age, ethnicity, and education, data from NHANES 2013-16

Ns for data points range from 46 to 294. Error bars indicate SEMs.

The cohort of young black men with low education may be operationalized as a three-way interaction term coded 1 if a respondent is young (20-29 years) AND black AND poorly educated (< high school degree); otherwise 0. Conventionally, an ANOVA test of a three-way interaction, $a*b*c$, includes as control variables the corresponding two-way interaction terms ($a*b$, $b*c$, and $a*c$). Beside interaction terms, independent variables in this case would include age (in years), education level (measured as a 5-value ordinal variable: < 9th grade, 9-11 grade, high school graduate, some college, college graduate), and ethnicity, here represented by two dummy variables: BLACK (coded 1 if black, 0 otherwise) and HISPANIC (coded 1 if Hispanic, 0 otherwise). The dummy MARITAL is also included as a control (coded 1 if married, 0 otherwise) because of its known effect on male T.

Unfortunately, conventional ANOVA is not suitable here because of high correlations among the two- and three-way interaction terms, up to $r = 0.70$. This renders their coefficients uninterpretable and

redundant, eliminating any significant effects on T. Schechter succinctly discusses this problem, to which there is no consensually “good” solution (<https://www.statalist.org/forums/forum/general-stata-discussion/general/1359532-is-multicollinearity-between-interaction-terms-a-problem>).

To skirt this problem, I have excluded two-way interactions in regression Models 1 and 2. Though departing from the conventional ANOVA format, these models are still informative. With so large a sample, both are highly significant, but their adjusted R^2 is low (.05), in part because of the volatility of T, which reaches the bloodstream in pulses, and its pronounced diurnal variation.

The critical independent variable in Model 1 is the three-way interaction term, indicating young black men of low education. Its coefficient is significant and weighty, adding nearly 50 ng/dL of T. Most other coefficients of Model 1 are as expected (Table 1). There is a small yearly decrease with age, accompanied by some decrease with level of education. The known effect of marriage on T is replicated, with married men averaging 48 ng/dL lower T than unmarried men. Being black per se has no significant effect. Being Hispanic is associated with a slight decrease in T, about 13 ng/dL lower than non-Hispanic men.

Model 2 is ad hoc, based on observation of Figure 2, which shows that among young black men, T is less affected by education level (cut at high school graduate) than was seen in Figure 1, thus not exactly replicating the earlier result. Having no direct measure of participation in an honor culture, we cannot settle here whether moving the cutting point between low and high education is justifiable to better concentrate participants. In any case, Model 2 tests whether a *two-way* interaction (ignoring education), coded 1 for blacks between ages 20–29 years, and 0 otherwise, works as well as the three-way interaction of Model 1. Thus, Model 2 differs from Model 1 only in replacing the three-way term with a two-way term. Comparison of results for these two models shows them virtually the same (Table 1). In summary, Models 1 and 2 show that T levels of young black men are relatively high whether or not one differentiates on having a high school degree.

Independent variables	Model 1	Model 2
	Includes 3-way interaction (n = 4,992)	Includes 2-way interaction (n = 4,992)
Age (in years)	-1.2 (p < 0.0001)	-1.2 (p < 0.0001)
Education (5 levels of schooling)	-5.7 (p = 0.009)	-6.2 (p = 0.004)
Married (yes = 1, no = 0)	-48.2 (p < 0.0001)	-47.8 (p < 0.0001)
Black (yes = 1, no = 0)	12.6 (n.s.)	8.6 (n.s.)
Hispanic (yes = 1, no = 0)	-13.6 (p = 0.04)	-14.0 (p = 0.03)
Ethnicity*education*age (black, < HS, 20-29 yr=1, else = 0)	49.9 (p = 0.016)	---
Ethnicity*age (black, age 20-29 =1, else = 0)	---	46.7 (p = 0.003)
Adjusted R ²	.05 (p < 0.0001)	.05 (p < 0.0001)

Table 1. Regression coefficients for men’s testosterone (ng/dL) as dependent variable, two models

N.s. = p > 0.05

Do Ethnic Differences in Testosterone Appear in Adolescent Males?

The previously published analysis of NHANES 2010-11 asked if heightened T among young black men began before age 20 but did not detect any difference, perhaps because that dataset had insufficient power (Mazur 2016). The question is addressed again here, using the NHANES 2012-15 dataset with twice the respondents, now including Hispanics as a separate group.

Figure 3 shows mean T by age for subadult males, ages 6-19 year, divided by ethnicity. We see the well-known result that T is very low in young boys and rises sharply during adolescence. Trend lines for the three ethnicities overlap until ages 17 to 19 when black T becomes discernibly higher and by age

19 is significantly higher ($p < .05$). Ethnic levels by age 19 are nearly at the level seen among young men in Figure 2. The divergence during late teenage may coincide with the involvement of some black teenagers in inner city subcultures, becoming hypersensitive about challenges to their personal reputations, thereby elevating T. Available data do not allow a direct test of this surmise.

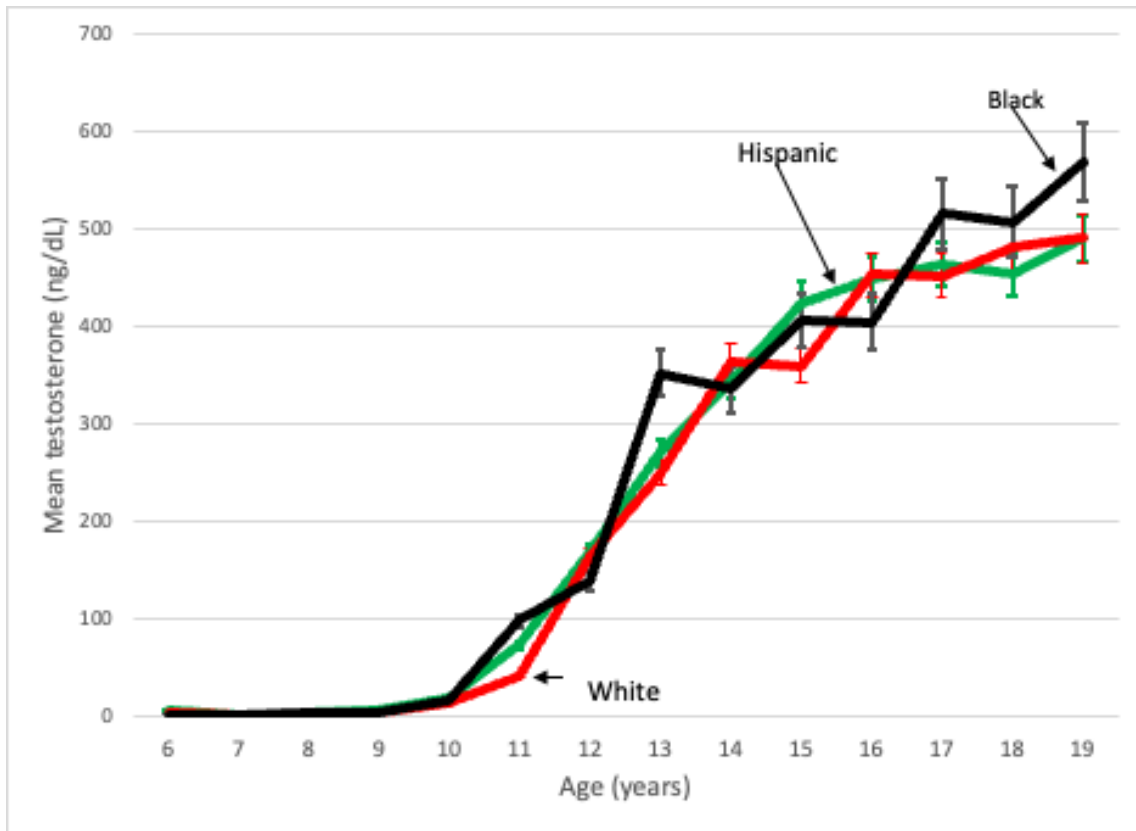


Figure 3. Boys' mean testosterone by age and ethnicity, using data from NHANES 2013-16

Ns for data points range from 26 to 66. Error bars indicate SEMs as a percentage of means.

Females

Theoretical and empirical work on the relationship between T and dominance primarily focus on males, however some investigators include females (e.g., Edwards and Castro 2013; Geniole et al. 2017). Given the abundance of female respondents in the combined NHANES 2013-15 dataset ($Ns = 5,436$ women, and 2,122 girls ages 6-19), this analysis follows suit. Since women's T distribution is highly skewed, graphs were run using both T and $\ln(T)$ as dependent variables, producing similar results. $\ln(T)$ was used for statistical models.

Subadult females in all three ethnic groups follow the same pattern, without significant differences. As expected, the youngest girls have very low T, similar to levels in the youngest boys. The rise in girls' T begins around age nine or ten, a bit earlier than in boys. Girls reach peak T levels in mid to late teenage, whereas boys, having by then developed much higher T levels, continue to rise into their twenties.

In adulthood, female T declines with age, the three ethnic groups showing similar trends with the exceptions that black women in their twenties and seventies have significantly higher T than white or Hispanic women of those ages. This difference is unexpected and has no obvious explanation.

Applying regression Models 1 and 2 to women produces highly significant models, a consequence of the large sample, but minimal explanatory power with adjusted R^2 of 0.01. The three-way interaction coefficient, which was significant and substantial in men, is insignificant in women. However, the two-way interaction of Model 2 is significant for women ($p = 0.005$), accounting for about six ng/dL higher T. In both models, the control variable married/not married is highly significant ($p < 0.0001$).

Exploratory Analysis

The foregoing attempt at replication strictly follows Mazur (2016) in defining low education as < high school degree. High or low education level, thus defined, significantly differentiated T levels of young black men (Figure 1). However, the distinction was not so clear in Figure 2, based on the newer, larger NHANES 2013-16 dataset. To avoid biasing this attempt at replication, I was loath to fiddle with this cutting point. Now, as an exploratory matter, it is worth considering the effect of a slight redefinition. Promoting high school graduates from the "low" education category to the "high" category, pushes mean T of poorly-educated black men in their 20s upward, from 539 ng/dL, shown in Figure 2, to 648 ng/dL.

With this redefinition, the three-way interaction term, presumed to concentrate participants in an honor culture, would be coded 1 if a respondent is young (20-29 years) AND black AND *has not obtained a high school degree*; otherwise 0. Thus redefined, the three-way term can be tested in a conventional ANOVA format because the highest correlations among interaction terms are reduced to $r = 0.4$. This is Model 3, its coefficients in Table 2.

Independent variable	Model 3 HS degree = high education (n = 4,992)
Age (years)	-1.2 (p < 0.0001)
Education	-4.5 (n.s.)
Married (yes = 1, no = 0)	-47.4 (p < 0.0001)
Black (yes = 1, no = 0)	4.6 (n.s.)
Hispanic (yes = 1, no = 0)	-12.2 (n.s.)
Black*Low Education (black, <HS = 1, else = 0)	20.0 (n.s.)
Black*Young (black, age 20-29 = 1, else = 0)	30.3 (n.s.)
Low Education*Young (< HS, age 20-29 = 1, else = 0)	-0.8 (n.s.)
Black* Low education*Young (black, <HS, age 20-29 =1, else = 0)	116.7 (p = 0.008)
Adjusted R ²	.05 (p < 0.0001)

Table 2. Regression coefficients for men’s testosterone (ng/dL) as dependent variable, with high school degree counted as “high education”

N.s. = $p > 0.05$

As expected, aging and marriage significantly lower men’s T. Being black or Hispanic per se does not significantly affect T. No two-way interaction term is significant; however, the three-way interaction is. Young black men who have not finished high school have on average 116.7 ng/dl higher T than other men.

Discussion

The theory goes that in honor cultures, young men's hypersensitivity to challenge produces heightened T. This, in turn, encourages the escalation of minor tiffs into serious confrontations, sometimes becoming violent, sometimes murderous, even in the absence of any initial intent to cause this outcome.

This paper focuses on one point: replicating prior reports that T is inordinately high among young black men with low education. The replication is mostly successful. An unexpected difference here, from earlier publications, is that among young black men, T is not as importantly different between those with "low" versus "high" education. Possibly there has been some recent cultural change so that hypersensitivity about personal reputation, as described by Anderson (1994), is not as well bounded by education level, at least as operationally dichotomized here. Departing from strict replication, I explored the impact of treating a high school degree as "high" education. With this redefinition, an ANOVA test of the three-way interaction term sustained the essential point that T is inordinately high among young black men with "low" education.

There will be newly available NHANES samples every two years, so the interaction can be continually tested. Future NHANES surveys might report the time of blood draw so that diurnal variation in T can be accounted for. Also, future NHANES may include items such as urban vs. rural residence that more explicitly identify respondents living in inner-city neighborhoods.

The replication reported here is only one test of the larger theory, which still has many vulnerabilities. For one, we have no direct measure of participation in an honor culture, therefore only inferential evidence that participants have high T. Also, the biosocial model linking T to dominance contests, while supported empirically, is not rock solid and requires further validation (Mazur 2018).

If high T does mediate the high violence rate among young black men, there would a troubling policy question of what, if anything, to do about it. Any notion of a medical or pharmaceutical fix, rather like prescribing Ritalin for hyperactivity, would reek of race-based chemical castration and should be regarded as outside the pale. However, social interventions might be workable and ethnically acceptable. Certainly there would be a cogent argument to break down the segregated inner-city neighborhoods that foster honor subcultures. Providing economic and educational pathways of upward mobility could raise the likelihood of marriage among young black men. Marriage reliably lowers male T. Estimating from the coefficients in Table 2, marriage reduces T by nearly half the

increase associated with the three-way interaction, i.e., presumptively from participating in an honor culture.

Though not of central interest here, a noteworthy finding from Models 1 and 2, applied to women, is that the control variable married/not married has a highly significant effect on female T. It has long been known that marriage lowers T in men, but no such effect has been reported or suspected in women. Here married women average 3 ng/dL less T than unmarried women. An amount so small may be substantively meaningless, but as a percentage reduction from mean levels, about ten percent, it is comparable to the T reduction in married men.

Human Subjects

This study is a secondary analysis of NHANES data that is publicly available and requires no IRB approval.

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