Ethnicity-Related Variation in Sexual Promiscuity, Relationship Status, and Testosterone Levels in Men

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The purpose of this study was to investigate potential ethnicity-related variation in men’s relationship status, sexual promiscuity, and testosterone levels. Data from two ethnically diverse subject populations were used. The first dataset included 302 male graduate students (age range: 23–36 years; \( M = 28 \)); the second dataset consisted of 77 male undergraduate and graduate students (age range: 18–38 years; \( M = 23 \)). For both, we collected information on ethnicity (European American, African American, Hispanic, or Asian American), relationship status (single, in a short-term or long-term relationship, or married), and sexual promiscuity (number of lifetime sexual partners, number of one-night stands, extrapair sexual activity), in addition to measuring salivary testosterone concentrations. In both datasets testosterone levels were significantly higher in single men than in men in relationships but this difference was reversed in men of Asian American ethnicity. Asian American men had the lowest number of sexual partners, one-night stands, and extrapair sexual activity across ethnic groups. Moreover, among Asian Americans, men in relationships had a higher average number of sexual partners than single men. Our results indicate that to understand the association between relationship status and testosterone levels in men, ethnicity-related variation in sexual activity in single men and men in relationships must be taken into consideration.

Keywords: relationship status, testosterone, ethnicity, sexual behavior

In humans and many other animal species, testosterone plays a key role in male mating-related competition for status and resources and in male courtship and sexual behavior (e.g., Nelson, 2011). In particular, because testosterone is expected to be elevated when males engage in competition with other males as well as during courtship and mating, but low when males are monogamously paired and engaged in parental behavior (e.g., Wingfield, Hegner, Dufty, & Ball, 1990), understanding interindividual and intraindividual variation in male testosterone levels can provide insight into male mating and parenting effort, which are key aspects of male life history (e.g., Bribiescas, 2006).

A growing number of human studies have investigated variation in testosterone levels in relation to relationship/marital status and mating and parenting effort. Two of the most consistent findings that have emerged from this body of research are that single men have higher testosterone levels than men in relationships, and that testosterone levels are particularly low in married men with young children (e.g., Booth & Dabbs, 1993; Burnham et al., 2003; Gray et al., 2004; van Anders, Hamilton, & Watson, 2007; van Anders & Watson, 2006; see Gray & Campbell, 2009, for a review). These correlations between testosterone levels and relationship, marital, and parental status, however, are open to different interpretations. First, it is possible that there is no direct causal relationship between testosterone levels and relationship status but that these variables are independently correlated with a third variable (e.g., a personality trait). Second, it is possible that a causal relationship exists such that high testosterone induces males to remain single and low testosterone induces males to form monogamous repro-
Productive relationships and to invest in children. Third, it is possible that being single raises a male’s level of testosterone while being in a monogamous relationship and investing in children lowers testosterone. Clearly, understanding if and how relationship status and testosterone are causally related is crucial for understanding human male social and reproductive strategies, and more generally the evolution of male life history traits.

So far, most evidence seems to support the hypothesis that a causal association exists and that relationship status affects testosterone levels rather than the other way around. Some of this evidence comes from longitudinal studies reporting a decrease in men’s testosterone with the transition to fatherhood (e.g., Berg & Wynne-Edwards, 2001; Gettler, McDade, Feranil, & Kuzawa, 2011; Hirschenhauser et al., 2002; Kuzawa, Gettler, Muller, McDade, & Feranil, 2009; Perini, Ditzen, Fischbacher, & Ehler, 2012; Storey, Walsh, Quinton, & Wynne-Edwards, 2000); the mechanisms responsible for the reduction in testosterone could be reduced frequency of sexual intercourse (e.g., Gettler, McDade, Agustin, Feranil, & Kuzawa, 2013), exposure to frequent infant cries (Fleming, Corter, Stallings, & Steiner, 2002; Muller, Marlowe, Bugumba, & Ellison, 2009; van Anders, Tolman, & Volling, 2012), extended bodily contact with infants through cosleeping (Gettler, McKenna, McDade, Agustin, & Kuzawa, 2012), or simply significant involvement in caregiving (e.g., Jasienska, Jasienski, & Ellison, 2012).

One possible explanation for high testosterone levels in single men is that they are, on average, more involved in courtship of multiple potential sexual partners than men in stable monogamous relationships; in turn, interaction with multiple (potential) sexual partners or simply the desire for a high variety of sexual partners is known to raise a man’s testosterone (e.g., van Anders, Hamilton, & Watson, 2007; van Anders & Goldey, 2010; Roney, Mahler, & Maestripieri, 2003; Roney, Lukaszewski, & Simmons, 2007). For example, polygynously married Kenyan Swahili men exhibit higher testosterone levels than monogamously married men (Gray, 2003), polyamorous North American men have higher testosterone levels than partnered and even single men (van Anders et al., 2007), and testosterone levels are higher in monogamous men who engage in frequent extrapair sexual fantasies and encounters than in those who do not (McIntyre et al., 2006).

In this study, we further investigated the association between relationship status, sexual promiscuity (defined as desire for or interaction with multiple sexual partners), and male testosterone levels. To this end, we investigated not only differences between single men and men in relationships but also variation within each group. Our working hypothesis was that, just as the category of paired men is heterogeneous and includes both men who desire or engage in extramarital sexual activities and those who don’t, the single men category is probably heterogeneous as well and includes both highly sexually active men (e.g., men who are single by choice in order to maximize their opportunities to engage in promiscuous sex) and less sexually active men (e.g., men who are single by choice to avoid sexual relationships altogether and focus on other aspects of their lives as well as men who are single by constraint, because they are unable to find a partner).

One source of variation in attitudes about being single and sexually promiscuous or in a faithful/unfaithful monogamous relationship is cultural norms concerning men’s sexual restraint and relationship models in different ethnic groups or societies (Gray & Campbell, 2009). For example, studies comparing different ethnic groups in North America have indicated that Asian American males exhibit greater sexual conservatism and less sexual experience than men in other ethnic groups (Meston, Tprnell, & Gorzalka, 1996; Okazaki, 2002).

In this study, we tested the hypothesis that ethnicity-related variation in sexual promiscuity could potentially affect both the magnitude and the direction of the relationship between testosterone and relationship status: specifically, we predicted that Asian American males should be less sexually promiscuous than males in other ethnic groups, and that the previously reported difference in testosterone between single and paired men should not occur among Asian Americans or be significantly smaller in this group than in other ethnic groups. To test our hypotheses, we first investigated the relationship between ethnicity, relationship status, and testosterone in a historical database established in 2008. Then we investigated the potential role of sexual promiscuity in a new study conducted
in 2013, which involved a smaller sample size but more detailed measures of sexual promiscuity. To our knowledge, this study is the first investigation of the role of ethnicity in the association between men’s relationship status, sexual behavior, and testosterone levels. The study of human mating strategies has increasingly incorporated physiological, social, and cultural variables and examined not only between-sex but also within-sex variation. Therefore, this study enhances our knowledge of the social and cultural context for within-sex variation in male mating strategies as well as our knowledge of the relationship between mating effort and testosterone in male life histories.

Method

2008 Dataset

Study participants were 325 male MBA students in a private midwestern university. These individuals were part of a larger dataset that included a total of 348 males and 153 females. Data from females were not considered in this study. Data from 23 male subjects were not included because information about some of the variables of interest in this study (see below) was incomplete or missing. These individuals were recruited in 2008 to participate in a study of financial risk-taking and stress reactivity (Maestripieri, Baran, Sapienza, & Zingales, 2010; Sapienza, Zingales, & Maestripieri, 2009). Participation in the study was a course requirement therefore it was mandatory for the entire 2008 cohort of MBA students. Students, however, were paid $20 or more for their participation. The use of human subjects was approved by the IRB and all students were asked for informed written consent for their participation in the study.

Study participants filled out a questionnaire in which they provided information about their age, ethnicity (participants were given a list of ethnicities and asked to choose the one with which they identified; individuals with multiple ethnicities were asked to identify a primary one), and relationship status (single or in a relationship). The survey also included questions about sexual orientation and number of lifetime sexual partners but answering these two questions was not mandatory and many participants did not answer them. The participants took a 1-hr computerized test and gave two saliva samples, one before and one after the test. All saliva samples were collected between 1:30 p.m. and 5:00 p.m. (time of sample collection did not significantly affect testosterone levels). Participants were asked not to eat any food, drink anything other than water, or smoke for at least 1 hr prior to the study. Saliva samples were assayed for testosterone concentrations (see Maestripieri et al., 2010; Sapienza et al., 2009; for details on sample collection and hormonal assays). The means of the testosterone concentrations of the two samples were used for data analyses.

Mean age (± SE) of the 325 study participants was 28.75 (± 0.12) years; age range was 23–36 years. Ethnicity and relationship status were distributed as follows: 160 European American (the terms European American and Caucasian are used interchangeably in this article; single = 100; in relationship = 60); 25 African American (for brevity, referred to as African; single = 20; in relationship = 5); 30 Hispanic American (for brevity, referred to as Hispanic; single = 12; in relationship = 18); 50 Far East Asian American (for brevity, referred to as FE Asian; single = 26; in relationship = 24); 60 Indian American (for brevity, referred to as Indian; single = 30; in relationship = 30). Each ethnic group included both people born in foreign countries and people born in the U.S.A. (e.g., the FE Asian category included both men born in China and Japan and Chinese American and Japanese American men born in the U.S.A.). Indians included both people born in India or Bangladesh and people born in the U.S.A., with family origins in India or Bangladesh. There were no significant differences in age or relationship status among the five ethnic groups.

2013 Dataset

Study participants were 77 male young adults. Approximately 80% of the study participants were undergraduate or graduate students (but there were no MBA students among them) at the same university where the 2008 study was conducted, and most of the others were employed by this university under various capacities (e.g., research or administrative staff). Participants were part of a larger study that also included 75 female participants but female data were not considered in this study. Study partic-
participants were recruited in 2013 through fliers posted on campus, mailing lists, or a human subject recruitment web site (Sona System). All study participants completed a written informed consent form before participating in the study and were paid $20 after completion of the procedures. The use of human subjects was approved by the IRB.

Study participants were asked to provide a saliva sample and to complete a series of questionnaires online or on paper. Saliva samples were collected and stored in ice using the same procedures used for the 2008 study (e.g., all samples were collected in the early afternoon and time of sample collection did not affect testosterone levels). Samples were later shipped to the Hominoid Reproductive Ecology Laboratory at the University of New Mexico, where they were assayed for testosterone, using the Salimetrics salivary testosterone ELISA (Catalog 1–2402, Salimetrics, LLC, State College, PA). The sensitivity of this assay is approximately 1 pg/ml. The antibody has significant cross-reactivities with dihydrotestosterone (36%) and 19-nortestosterone (21%), neither of which is expected in appreciable quantities in the saliva of healthy adults. All other cross-reactivities are <2%. Interassay coefficients of variation (N = 6) were 5% for a high sample and 14% for a low sample. Intraassay CV (mean CV of duplicates) was 3%. Testosterone data were available for only 62 of the 77 study participants.

An initial demographic survey asked information about participants’ age, ethnicity (assessed with the same procedure used for the 2008 dataset), sexual orientation, and relationship status (single or in a relationship; for some data analyses, the relationship category was divided into subgroups; see below). The other questionnaires asked questions about personality characteristics and romantic and sexual experience and preferences. For the purposes of this study, four questionnaire items were used: (a) the total number of partners with whom study participants had engaged in vaginal, anal, or oral sex over the lifetime; (b) the total number of one-night stands the study participants had had in their lifetime; (c) the total number of partners with whom they had had extrapair sex in their lifetime; and (d) the frequency of fantasizing about having extrapair sex (on a scale from 1 = Never, to 8 = at least once a day).

Data for items (c) and (d) were analyzed only for participants who were in a relationship at the time the study was conducted.

Mean age (± SE) of the 77 participants was 23.17 (± 0.50) years; age range was 18–38 years. Ethnicity and relationship status were distributed as follows: 42 European American (i.e., Caucasian; single = 8; in relationship = 34); eight African (single = 4; in relationship = 4); 14 Hispanic (single = 6; in relationship = 8); 13 Asian (single = 6; in relationship = 7; this category included eight East Asian and five Indian men; data analyses provided similar results whether the five Indian men were included in the Asian group or excluded; therefore they were included to increase sample size). As was the case for the 2008 database, each ethnic group included both people born in foreign countries and people born in the U.S.A. There were no significant differences in age or relationship status among the four ethnic groups. Sixty-eight participants self-described their sexual orientation as heterosexual or mainly heterosexual, seven as homosexual or mainly homosexual, and two as bisexual.

Results

2008 Dataset

A two-way ANOVA examining the effects of ethnic group and relationship status on testosterone concentrations revealed both a main effect of relationship status, F(1, 315) = 4.16, (p < .05), with single men having higher testosterone than men in relationships, and a significant interaction between relationship status and ethnicity, F(4, 315) = 2.40, (p = .05). As Figure 1a illustrates, among Caucasians, Africans, and Hispanics, single men had significantly higher testosterone than men in relationships (all p < .05). Among Indians this difference was much smaller and nonsignificant, and Far East Asians showed a significant difference in the opposite direction: single men had lower testosterone than men in relationships (p < .05). There was no significant main effect of ethnicity on testosterone concentrations.

2013 Dataset

Figure 1b depicts testosterone concentrations in Caucasian, African, Hispanic, and Asian men.
Figure 1. (a). Mean (+ SE) testosterone levels in single men and men in relationships in five different ethnic groups. Data are from the 2008 dataset. Sample sizes were as follows: 160 Caucasian (single = 100; in relationship = 60); 25 African (single = 20; in relationship = 5); 30 Hispanic (single = 12; in relationship = 18); 50 Far East Asian (single = 26; in relationship = 24); 60 Indian (single = 30; in relationship = 30). (b). Mean (+ SE) testosterone levels in single men and men in relationships in four different ethnic groups (for brevity, European American is labeled Caucasian, African American is African, Hispanic American is Hispanic, and Asian American is Asian). Data are from the 2013 dataset. Sample sizes were as follows: 34 Caucasian (single = 4; in a relationship = 30); eight African (single = 2; in a relationship = 6); 10 Hispanic (single = 5; in a relationship = 5); 10 Asian (single = 5; in a relationship = 5).
who were single or in a relationship. A two-way ANOVA revealed a significant interaction between relationship status and ethnicity, $F(3, 54) = 4.84$, ($p = .004$). The pattern was similar to that observed in the 2008 dataset: among Caucasians, Africans and Hispanics, single men had higher testosterone than men in relationships. The opposite was true among Asians. The differences were statistically significant for Caucasians ($t = -3.2; df = 32; p < .01$), Hispanics ($t = -3.11; df = 8; p = .01$), and Asians ($t = -3.02; df = 8; p < .05$) but not for Africans ($t = -0.7; df = 6; NS$), probably because of the small sample size (only two African men were single).

Figure 1b shows that Asian single men had, on average, the lowest testosterone levels among all single men, and Asian men in relationships had, on average, the highest testosterone levels of all men in relationships. Variation in testosterone among the single men in the four ethnic groups was statistically significant, $F(2, 15) = 4.91$, ($p = .01$). Post hoc tests indicated that Asian single men had significantly lower testosterone than both Caucasian ($p < .05$) and Hispanic single men ($p < .05$). Asian men had lower testosterone than African single men ($n = 2$) as well but the difference was not significant, probably due to the small sample size for this comparison. Variation in testosterone levels among the men in relationships in the four ethnic groups was not statistically significant, $F(3, 45) = 1.55; NS$.

Figure 2a depicts the number of lifetime sexual partners for Asian men who were single and in relationships and for men who were single and in relationships in the other ethnic groups (Caucasian, African, and Hispanic) combined. Asian men, regardless of relationship status, had a significantly lower number of sexual partners than the other men, $F(1, 72) = 6.19$, ($p = .01$). Among Asians, men in relationships had a higher average number of sexual partners than single men, whereas the opposite was true for men in the other ethnic groups. The statistical interaction between ethnic group and relationship status, however, was not significant. Figure 2b shows the total number of one-night stands in Asian men and men from the other ethnic groups, separately for single men and men in relationships. Asian men had significantly fewer one-night stands than other men, regardless of relationship status, $F(1, 72) = 4.86$, ($p = .03$).

Of the men who were in relationships, Asian men reported that they had never had extrapair sex in their lifetime, and the others reported that they had had on average approximately one episode ($0.81 + 0.33$) of extrapair sex in their lifetime. Asian men in relationships also fantasized about extrapair sex, on average, less frequently ($3.33 + 1.2$) than other men in relationships ($4.47 + 0.29$). Neither the difference in extrapair sex nor the difference in extrapair sex fantasy, however, was statistically significant (Extrapair sex: $t = -0.87; df = 52; NS$; Extrapat sex fantasy: $t = -1.25; df = 48; NS$).

Testosterone was not significantly correlated with lifetime number of sexual partners ($r = .07; n = 61; NS$), lifetime number of one-night stands ($r = .03; n = 61; NS$), lifetime number of extrapair sex events ($r = .06; n = 45; NS$), or frequency of extrapair sex fantasies ($r = .02; n = 41; NS$).

In the next set of analyses, testosterone data for Caucasians, Africans, and Hispanics were pooled together and men in relationships were subdivided into three categories depending on whether they were in short-term (less than 6 months) relationships, in long-term (more than 6 months) relationships, or married. Figure 3 illustrates the testosterone data for men in these relationship categories along with data for single men. A one-way ANOVA revealed a significant difference in testosterone concentrations among the four groups, $F(3, 51) = 10.54$, ($p < .0001$). Bonferroni-Dunn post hoc tests indicated that single men had higher testosterone than men in the other three groups (all $p < .05$), married men had lower concentrations than men in the other three groups (all $p < .05$), and men in short-term relationships had higher concentrations than men in long-term relationships ($p < .05$).

Figure 4a illustrates the lifetime number of sexual partners for Caucasian, African, and Hispanic men who were single and in short-term relationships, long-term relationships, or married. Although men who were single and in short-term relationships had a higher average number of sexual partners than men in long-term relationships or married, the overall difference among the four groups was not statistically significant, $F(3, 63) = 1.85; NS$. Figure 4b shows the lifetime number of one-night stands for Caucasian, African, and Hispanic men who were single and men who were in short-term relationships.
relationships, long-term relationships, or married. Again, single men and men in short-term relationships had, on average, more one-night stands than men who were in long-term relationships or married but the overall difference among the groups was not statistically significant, $F(3, 63) = 1.46; \text{NS}$. When, however, data from the long-term relationship and married groups were pooled together, both scored significantly lower than single men and men in

Figure 2. (a). Mean (+ SE) number of lifetime sexual partners for Asian men (one homosexual Indian man who had 40 different sexual partners was a population outlier and excluded from data analyses) who were single and in relationships and for men who were single and in relationships in the other ethnic groups (Caucasian, African, and Hispanic) combined. (b) Mean (+ SE) number of lifetime one-night-stands for Asian men who were single and in relationships and for men who were single and in relationships in the other ethnic groups (Caucasian, African, and Hispanic) combined.
short-term relationships on both the lifetime number of sexual partners (long-term = 5.51 ± 0.81; others = 9.81 ± 1.81; t = 2.21; df = 62; p < .05) and the lifetime number of one-night stands (long-term = 1.51 ± 0.49; others = 3.22 ± 0.82; t = 2.01; df = 62; p < .05).

Data for Asian men were insufficient for statistical comparisons of testosterone levels, number of lifetime sexual partners, and number of one-night stands across different relationship categories. Moreover, there were no married Asian men in the subject population. Nevertheless, for the purposes of qualitative comparisons, means and standard errors for the three variables for Asian men who were single, in short-term relationships and in long-term relationships are presented in Table 1. Similar to what was shown for the men in the other three ethnic groups (but with some differences in the absolute values), Asian men in short-term relationships scored higher than those in long-term relationships in all three variables. Unlike the other ethnic groups, however, Asian single men scored relatively low in all three variables, and especially in testosterone levels.

**Discussion**

The results of our study shed new light on the association between relationship status, sexual promiscuity, and testosterone levels in men. Specifically, they showed that single men have higher testosterone levels than men in relationships only in so far as single men are more sexually promiscuous than men in relationships. If single men show low levels of sexual promiscuity, the difference in testosterone can be reversed, with single men having lower testosterone than men in relationships. Therefore, testosterone levels are not affected by relationship status in itself (e.g., through some psychological condition associated with being single or having a partner) but by differences in sexual promiscuity that are generally correlated with differences in relationship status. Therefore, a man’s testosterone specifically tracks his mating effort rather than his social life or psychological state.

In our study, we used ethnicity as a tool with which to investigate potential variation in testosterone within and across relationship status categories. First, using a larger, historical database consisting of male MBA students, we confirmed the previously reported finding (see beginning of article for references) that among Western college students of predominantly European American (i.e., Caucasian) ethnicity, single men have, on average, higher testosterone levels than men in relationships. Then, we showed that this testosterone difference was driven by Caucasian, Hispanic, and African men. Among men of Indian origin, single men

![Figure 3](image-url)
and men in relationships had similar testosterone levels, although among men of East Asian origin (e.g., Japan, China, and Taiwan) the difference was significant but reversed: single men had lower testosterone than men in relationships. The same pattern was replicated in another ethnically diverse, but smaller sample of mainly students at the same academic institution. Here again, Asian men (which included mostly East Asians) who were single had significantly lower testosterone than men in relationships. Asian single men had the lowest testosterone levels among single men of all ethnic groups, and ethnic variation in testosterone lev-
els among men in relationships was not statistically significant.

In our study, Asian American men, regardless of their relationship status, reported a lower number of lifetime sexual partners and a lower number of lifetime one-night stands than European American, African American, and Hispanic American men. The Asian American men in our study also reported that they had never had extrapair sex in their lifetime and a slightly lower frequency of extrapair sex fantasies when compared with the other men. These results are consistent with those of previous studies showing that male Asian American college students are more sexually conservative and less sexually experienced than men of other ethnic groups (Meston et al., 1996; Okazaki, 2002). In these previous studies, differences in sexuality between Asian American and non-Asian American students were attributed to cultural norms. For example, Meston et al. (1996) reported that the more acculturated Asian-Canadians were to Canadian culture the less conservative their sexual attitudes. Although it should not be assumed that there are no differences in sexual norms among college students of European American, African American, and Hispanic American ethnicity, previous studies that have specifically compared these three ethnic groups with Asian Americans have reported that differences in sexual conservatism among European American, African American, and Hispanic American youths are relatively minor when compared with those between these three groups and Asian Americans (e.g., East, 1998; Feldman, Turner, & Araujo, 1999).

In our study none of our four measures of sexual promiscuity was significantly correlated with testosterone levels across men of all ethnicities but it is worth noting that Asian American single men had the lowest scores on the number of lifetime sexual partners and the number of one-night stands (data on extrapair sex events and extrapair sex fantasies were analyzed only for men in relationships) and the lowest testosterone levels of all men in our subject population, including Asian American men in relationships. It is very likely that the testosterone levels of single Asian American men are linked to their sexuality in a meaningful way although our data do not demonstrate clear directional causality between testosterone and sexual promiscuity. The small sample size for analyzing relationships between ethnicity, sexual promiscuity and testosterone is one of the limitations of this study. It is possible that a stronger association between these variables would have emerged if a larger dataset had been available (e.g., see Bogaert & Fisher, 1995). Until some of our findings are replicated with a larger dataset, they should be interpreted with caution. The association between ethnicity, relationship status, and testosterone, however, appeared to be robust and was replicated in two different datasets.

It is highly unlikely that our reported ethnic differences in the relationship between male testosterone levels and relationship status reflect any ethnicity-related genetic differences in testosterone or in sexualitv (e.g., Rohrmann et al., 2007; but see Ellis & Nyborg, 1992). Our tentative explanation of our findings, instead, has to do with the heterogeneity of the “singles” category. As already mentioned in the beginning of this article, in subject populations that mainly consist of college students, it is likely that among single males there are both highly sexually active individuals and individuals with low levels of sexual activity. It is possible that among male college students of Caucasian, Hispanic, and African ethnicity, highly sexually active individuals represent the majority of single individuals and less sexually active singles are relatively rare. The high testosterone levels of many sexually active singles may be responsible for the higher testosterone levels of singles

Table 1  
Testosterone and Sexual Experience in Asian Men in Relation to Relationship Status

<table>
<thead>
<tr>
<th></th>
<th>Single (n)</th>
<th>Short-Term (n)</th>
<th>Long-Term (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testosterone</td>
<td>66.32 + 10.88 (5)</td>
<td>139.28 + 78.50 (2)</td>
<td>86.78 + 21.41 (3)</td>
</tr>
<tr>
<td>Number of sexual partners</td>
<td>1.33 + 0.33 (6)</td>
<td>4.00 + 3.00 (2)</td>
<td>0.33 + 0.33 (3)</td>
</tr>
<tr>
<td>Number of one-night stands</td>
<td>0.33 + 0.21 (6)</td>
<td>0.50 + 0.50 (2)</td>
<td>0 (3)</td>
</tr>
</tbody>
</table>
compared with men in relationships. Conversely, it is possible that less sexually active individuals may have been the majority of Asian single men in our study. If less sexually active individuals have relatively low testosterone, this may explain why single Asian men had low testosterone and particularly lower testosterone than Asian men in relationships. Why there may be lower sexual activity among Asian single men than among other single men remains unclear: it may be the result of choice or constraints, both of which may be due to cultural or experiential factors.

Consistent with the above explanation, in the Caucasian, Hispanic, and African ethnic groups, single men scored higher, on average, than men in relationships on measures of lifetime sexual partners and lifetime number of one-night-stands. In these ethnic groups, married men and unmarried men in long-term relationships scored lower on these sexuality measures than single men and men in short-term relationships. Variation in testosterone levels appeared to track relationship length, as men in short-term relationships had the second-highest levels of testosterone after single men, followed by men in long-term relationships, who in turn had higher testosterone than married men. Similarly, among Asian men in relationships, unmarried men in long-term relationships scored lower than men in short-term relationships in measures of testosterone, number of lifetime sexual partners, and lifetime number of one-night-stands. Again, the small sample sizes for the analyses of testosterone levels and relationship status in different ethnic groups are among the methodological limitations of this study. Our findings, however, are consistent with those of previous studies showing a negative effect of relationship length and marriage on male testosterone levels (see beginning of the article for references). The lack of married men among Asian men in relationships may have contributed to the relatively high average testosterone observed in this group of study participants and to the magnitude of the difference in testosterone between single men and men in relationship in the 2013 dataset.

Although the Asian and non-Asian ethnic groups showed an opposite difference in testosterone between single men and men in relationships, several lines of evidence suggest that variation in male testosterone levels across all ethnic groups tracks variation in sexual activity and sexual experience. It is likely that both psychological and physiological aspects of sexual activity (e.g., both thinking about sex and ejaculating) are directly involved in regulation of testosterone production. Other psychological aspects of relationship status that are not strictly related to sexuality, such as romantic commitment to a partner, stress, or social support, are unlikely to account for the association between relationship status and testosterone. Similarly, the possible cultural and experiential factors that affect ethnic variation in sexual conservatism or sexual activity are likely to be linked to variation in testosterone through their effects on sexual activity, rather than directly or through other variables. Other relatively stable characteristics such as personality could also affect variation in testosterone through their effects on sexual activity.

As for the specific aspects of sexual behavior that are most directly linked to testosterone, our measures of lifetime sexual experience (number of partners and number of one-night-stands) as well as of extrapair sex were measures of sexual promiscuity rather than of overall frequency of sexual activity. Thus, our data indicated that among Caucasian, Hispanic, and African men, single men, and to a lesser extent also men in short-term relationships, were more sexually promiscuous but did not necessarily engage in more frequent sexual activity than men in long-term relationships or married men. Differences in testosterone matched these differences in sexual promiscuity.

Previous studies have shown that a man’s testosterone increases following exposure to a potential sexual partner and that this increase is proportional to the intensity of his courtship effort (Roney et al., 2003; 2007; van der Meij, Buunk, van de Sande, & Salvador, 2008). In contrast, engaging in sexual interactions with the same partner in the context of a stable monogamous relationship does not seem to affect testosterone. Differences in testosterone between individuals or changes in a man’s testosterone levels over time provide a reliable indicator of variation in mating effort, which in men mainly consists of an effort to mate with an increasing number of partners. Measuring testosterone, therefore, is an indispensable tool for understanding variation in male mating strate-
gies as well as the life history trade-offs between mating and survival or parenting efforts.

References


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