



Sociosexuality moderates the association between testosterone and relationship status in men and women

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ABSTRACT

Single individuals typically have higher testosterone compared to those who are partnered, suggesting that individual differences in testosterone are associated with mating effort, or people's motivation to find a sexual partner. However, there is less consistent evidence for links between testosterone and sociosexuality, or people's orientation toward uncommitted sexual activity. Based on Penke and Asendorpf's (2008) conceptualization, we propose that a more nuanced measure of sociosexuality may reveal more robust associations with testosterone. In the current study, we assessed relations between three components of sociosexuality—desire, behavior, and attitudes—and endogenous testosterone levels in men and women. We found that partnered status was indeed associated with lower testosterone in both men and women, but only among those who reported more restricted sociosexuality. Partnered men who reported greater *desire* for uncommitted sexual activity had testosterone levels that were comparable to those of single men; partnered women who reported more frequent uncommitted sexual *behavior* had testosterone levels that were comparable to those of single women. These findings provide new evidence that people's orientations toward sexual relationships, in combination with their relationship status, are associated with individual differences in testosterone. The current results are also among the first to demonstrate sociosexuality–testosterone associations in both men and women, and they reveal that the nature of these associations varies by gender. Together, these findings highlight the utility of a multifaceted conceptualization of sociosexuality and the implications of this conceptualization for neuroendocrine processes.

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Introduction

Testosterone is thought to play an important role in the initiation and establishment of sexual relationships (Ellison, 2001). In humans, single individuals tend to have higher levels of testosterone compared to those who are in committed, monogamous relationships (e.g., Booth and Dabbs, 1993; Burnham et al., 2003; van Anders and Siciliano, 2010). Such findings appear to be more robust among men, but there is also evidence that single women have higher testosterone compared to those who are partnered (Kuzawa et al., 2010; van Anders and Watson, 2006b). Moreover, longitudinal research suggests that men's testosterone levels increase prior to divorce and decrease with remarriage (Mazur and Michalek, 1998), suggesting that testosterone facilitates mating effort, or an individual's effort to secure a sexual partner.

Other research suggests that, rather than relationship status per se, differences in testosterone may be associated with an individual's orientation toward relationships and/or their propensity to have sex

outside of a relationship with one primary partner (van Anders and Siciliano, 2010; van Anders et al., 2007). For instance, men with multiple partners (i.e., polyamorous or polygamous men) have higher testosterone than men with one partner and, in some cases, higher testosterone than single men (Alvergne et al., 2009; Gray et al., 2007; van Anders et al., 2007). Polyamorous women also have higher testosterone than both single and singly partnered women (van Anders et al., 2007). These findings suggest that partnered individuals who maintain interest in extra-pair sexual activity may not necessarily show lower testosterone compared to single individuals.¹

There is relatively little evidence for direct links between testosterone and measures of relationship orientation, however. In particular, several studies have examined individual differences in *sociosexuality*, or a person's orientation toward uncommitted sexual activity (Gangestad and Simpson, 1990). Pioneering work by Kinsey and colleagues revealed that there are large individual differences in

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¹ Testosterone decreases with age in both men and women (e.g., Zumoff et al., 1995), leading to the possibility that age-related differences in testosterone contribute to relationship-status effects observed in prior research. However, in studies that have statistically controlled for age, partnering remains associated with lower testosterone among both men and women (e.g., Mazur and Michalek, 1998; van Anders and Watson, 2006b).

people's attitudes toward uncommitted sexual activity and the extent to which they engage in such activity (e.g., Kinsey et al., 1948). Based in part on this work, Simpson and Gangestad (1991) developed a brief self-report measure of sociosexual orientation, the Sociosexual Orientation Inventory (SOI). The SOI assesses individual differences in sexual behavior, fantasies about uncommitted sexual activity, and attitudes toward casual sex. People who report a greater number of past and expected future sexual partners, more frequent fantasies about uncommitted sexual activity, and more permissive attitudes toward casual sex are considered to have a more *unrestricted* (vs. *restricted*) sociosexual orientation. Subsequent research using the SOI demonstrates that individual differences in sociosexuality have important implications for relationship outcomes. For example, men and women with an unrestricted sociosexual orientation engage in sexual activity more quickly, are more likely to be unfaithful in romantic relationships, and are less invested in those relationships compared to those with a more restricted sociosexual orientation (see Simpson et al., 2004, for a review).

Given that mating effort has been linked with testosterone (e.g., Wingfield et al., 1990), it is reasonable to expect that individual differences in sociosexuality would vary as a function of testosterone levels. Indeed, McIntyre et al. (2006) found that men's unrestricted sociosexuality (measured with the SOI) was positively associated with testosterone levels among partnered men; there was no association between sociosexuality and testosterone among single men. In other words, partnered men who retained interest in uncommitted sexual activity did not show lower testosterone levels compared to single men. However, other studies have not found associations between SOI scores and testosterone in men (Charles and Alexander, 2011), including as a function of partnered status (e.g., van Anders et al., 2007). In addition, although very few studies on this topic have included female participants, those that have similarly suggest that women's SOI scores are not significantly correlated with their testosterone levels (Charles and Alexander, 2011; van Anders et al., 2007).

Although extant research paints an inconsistent picture of the relation between sociosexuality and testosterone, it is important to note that the SOI, the measure used in prior studies, may not have captured the multifaceted nature of sociosexuality. Penke and Asendorpf (2008) advocate for distinguishing among sociosexual desire, behavior, and attitudes, rather than aggregating these components into a global measure of sociosexuality, as is done with the SOI. Penke and Asendorpf define sociosexual *desire* as interest in uncommitted sexual activity; sociosexual *behavior* as the extent to which an individual has engaged in or expects to engage in uncommitted sexual activity; and sociosexual *attitudes* as an individual's feelings about uncommitted sexual activity. These different components of sociosexuality generally map onto tripartite models of evaluative judgment that have been influential in the field of social psychology (e.g., Rosenberg and Hovland, 1960; Zanna and Rempel, 1988). Such models contend that people's evaluations in a particular domain can be characterized by three related, yet distinct, components: cognition (i.e., attitudes), emotion (i.e., desire), and behavior. According to this theoretical framework, different evaluative components may predominate in different contexts, and the associations among the various components can differ across individuals and domains. For instance, consistency between attitudes and behavior may be stronger for some domains and among some individuals (Kraus, 1995). These distinctions may be particularly important in the domain of sociosexuality, where there are potentially large intra-individual differences between people's desires to engage in casual sex, their beliefs about doing so, and their tendency to engage in such behavior.

In two studies, Penke and Asendorpf (2008) demonstrated that, despite moderate intercorrelations among sociosexual desire, behavior, and attitudes, each showed a different pattern of associations with sexual and relationship outcomes. For instance, longitudinal analyses

indicated that sociosexual desire was the strongest predictor of relationship dissolution and that sociosexual behavior was the strongest predictor of number of future sexual partners. Although sociosexual attitudes showed consistent associations with other personality constructs (e.g., shyness), this component of sociosexuality did not show any unique associations with sexual or relationship outcomes. Based on these findings, Penke and Asendorpf speculate that sociosexual attitudes may be more strongly influenced by self-presentational goals and perceptions of cultural norms than the other two sociosexuality components.

Penke and Asendorpf's (2008) findings also revealed important gender differences in the various components of sociosexuality, many of which may have implications for individual differences in testosterone. Specifically, men reported considerably higher levels of unrestricted sociosexual desire compared to women; gender differences in sociosexual attitudes were in the same direction but were much smaller in magnitude, and there were no significant gender differences in sociosexual behavior. These findings suggest that (on average) men's desire for uncommitted sexual activity exceeds their tendency or ability to engage in it, most likely because women are less inclined toward casual sex. Thus, for men, measures of sociosexual desire may be more closely associated than measures of sociosexual behavior to their motivation to have uncommitted sex and, by extension, to their testosterone levels. Consistent with this idea, Penke and Asendorpf found that men's sociosexual desire scores uniquely predicted their flirting behavior with a female confederate in the laboratory.

Women's sexuality, on the other hand, is thought to be more fluid than men's (Diamond, 2003), and there is evidence that sexual behavior and sexual desire are less closely associated among women than men (Baumeister, 2000). That is, women may be less likely to act on their sexual desires and/or more likely to engage in sexual behavior that is inconsistent with their desires. Baumeister (2000) also argues that sexual desire should be less stable over time for women than for men, a hypothesis that was supported by Penke and Asendorpf's (2008) data on sociosexual desire. Taken together, these findings lead to the hypothesis that measures of sociosexual behavior may be more closely associated than measures of sociosexual desire to women's motivation to have uncommitted sex and, by extension, to their testosterone levels. Along these lines, Penke and Asendorpf (2008) found that, for women, sociosexual behavior (rather than sociosexual desire) scores uniquely predicted laboratory flirting behavior. Further, van Anders and Watson (2007) and van Anders and Siciliano (2010) propose that, because of differences in fluidity, women's testosterone levels may be more sensitive to state-like cues associated with sexual behavior.

The few studies that have assessed different aspects of sexuality in relation to testosterone generally support these claims. For instance, testosterone has been associated with interest in extra-pair sexual activity among partnered men (McIntyre et al., 2006, Study 2). van Anders and Siciliano (2010) similarly found that men's (but not women's) desires to date were positively associated with their testosterone levels (van Anders and Siciliano, 2010). In another study, women's (but not men's) number of past and expected future sexual partners was positively associated with testosterone (van Anders et al., 2007; see also Cashdan, 1995). Because different aspects of sociosexuality may be associated with testosterone for men and women, as these findings suggest, important gender differences may have been obscured in prior research using global measures of sociosexuality (e.g., Charles and Alexander, 2011) or in studies that assessed only certain aspects of this multifaceted construct (e.g., van Anders et al., 2007).

To our knowledge, there has been no comprehensive investigation of links between these different components of sociosexuality and testosterone. The current study was therefore designed to examine: a) the extent to which sociosexual desire, behavior, and attitudes are

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