

# Sex, drugs and moral goals: reproductive strategies and views about recreational drugs

Robert Kurzban<sup>1,\*</sup>, Amber Dukes<sup>3</sup> and Jason Weeden<sup>2</sup>

<sup>1</sup>Department of Psychology, and <sup>2</sup>Pennsylvania Laboratory for Experimental Evolutionary Psychology, University of Pennsylvania, Philadelphia, PA 19104, USA

<sup>3</sup>University of Central Florida, Orlando, FL, USA

Humans, unlike most other species, show intense interest in the activities of conspecifics, even when the activities in question pose no obvious fitness threat or opportunity. Here, we investigate one content domain in which people show substantial interest, the use of drugs for non-medical purposes. Drawing from two subject populations—one undergraduate and one Internet-based—we look at the relationships among (i) abstract political commitments; (ii) attitudes about sexuality; and (iii) views surrounding recreational drugs. Whereas some theories suggest that drug views are best understood as the result of abstract political ideology, we suggest that these views can be better understood in the context of reproductive strategy. We show that, as predicted by a strategic construal, drug attitudes are best predicted by sexual items rather than abstract political commitments and, further, that the relationship between factors such as political ideology and drugs, while positive, are reduced to zero or nearly zero when items assessing sexuality are controlled for. We conclude that considering morality from the standpoint of strategic interests is a potentially useful way to understand why humans care about third party behaviour.

**Keywords:** reproductive strategies; humans; mortality; drugs

## 1. INTRODUCTION

A zoologically peculiar feature of humans is that people not only monitor conspecifics' activities across a wide array of domains, but also express a desire that costs be imposed on third parties for a wide variety of behaviours (DeScioli & Kurzban 2009a). Humans do this even in circumstances in which they typically do not consciously perceive—and indeed often expressly deny—that they themselves (or their relatives) are harmed by the behaviour in question.

Our present interest is in one such category of activity, namely, the use of recreational drugs. Why do some people think that *other people* should be prevented from using certain drugs—various chemical substances with psychoactive properties that are smoked, injected or otherwise consumed for recreational or other non-medical reasons—and punished if they do so? The studies reported here explore the moral intuitions that give rise to opposition to the use of these substances by others.

Unlike some categories of moral behaviour—for example, those involving unprovoked physical harm, theft and breach of contract, in which there is considerable agreement regarding moral wrongness (Robinson *et al.* 2008)—there is substantial variation in opposition to the sale and use of recreational drugs (Robinson & Kurzban 2007). For example, a Gallup Poll from 2009 found that 44 per cent of Americans favoured marijuana legalization, while 54 per cent opposed it, which showed substantial movement from the same item asked in 1969, when only

12 per cent of Americans favoured marijuana legalization, while 84 per cent opposed it (Saad 2009).

Our primary purpose here is to investigate the sources of the large amount of variation in views about recreational drugs. In addressing this puzzle, we shed light as well on the related puzzle of why anyone at all ever morally condemns the use of recreational drugs.

### (a) *Candidate models*

Most work surrounding the evolved function of morality focuses on *conscience*, putative mechanisms designed to guide individuals' own behaviour (de Waal 1996; Haidt & Joseph 2004, 2007; Krebs & Janicki 2004). These models focus on adaptive problems such as gathering the benefits of cooperation, avoiding pathogens and avoiding incest (Lieberman *et al.* 2003; Haidt & Joseph 2004).

Such models, however, have the potential to explain the *condemnation* of others only obliquely. For example, the fitness costs of incest explain why people—and other organisms—have mechanisms designed to avoid having sex with closely related individuals (Lieberman *et al.* 2003, 2007; Fessler & Navarrete 2004). This explanation for incest-avoidance mechanisms does not, however, in itself, explain why people want *others* to be punished for committing incest.

That is not to say that such an explanation is not possible. Lieberman (2007), for example, suggests that incest-condemnation systems might be designed to guide one's kin away from this fitness-reducing behaviour. Condemnation, on this view, benefits the individual's genes through the distal disincentivizing effects on related others. More generally, one might argue that if

\* Author for correspondence (kurzban@psych.upenn.edu).

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moralization is applied to nearby individuals, and these individuals are differentially likely to be friends, kin and allies, condemnation can be explained.

A similar argument could be made regarding what might be the most intuitive potential explanation regarding moralization of drugs, that they are harmful. Perhaps, people oppose the use of drugs as a means of generating benefits to others, particularly kin and allies. By imposing costs on using drugs, people reduce the chance that others will use harmful drugs, and so lead to net (indirect) benefits. On this view, condemnation is an altruism device. Related arguments could be made that the foundations of opposition to recreational drugs lie in individuals' desire to protect others from addiction or criminal activities associated with drug use.

These explanations seem unlikely for at least two reasons. First, people do not moralize a very large number of activities that are dangerous. People do not have the intuition that horseback riding, skiing, boxing, skydiving and many other hazardous activities are wrong, to say nothing about riding in cars or working at construction sites or in coal mines. An explanation located in harm requires an account of why using recreational drugs, but not other sorts of potentially harmful modern activities, elicits condemnation.

Second, unlike moral intuitions regarding many other domains (like unprovoked assault, theft, etc.), views on recreational drugs are highly variable. Even if one were to think that perceptions of the harmfulness of recreational drugs ultimately drive views on the morality and preferred legality of recreational drugs, one is still left in need of an explanation of the tremendous variability in views.

## (b) *Variability*

### (i) *Abstract political commitments as causes*

The predominant model regarding the origin of variation in political and moral views, including views surrounding recreational drugs, suggests that the source of individuals' opinions are their more basic commitments to higher level liberal-conservative ideology, political party affiliation, values, religious views and related 'symbolic' items. Drawing largely on the Standard Social Science Model's (Tooby & Cosmides 1992) view of culture and domain-general learning, this view suggests that people develop emotional attachments to these relatively abstract factors through social learning (Jacoby 2002; Janda *et al.* 2002; Bardes & Oldendick 2003; Sears & Levy 2003; Erikson & Tedin 2005). Views on recreational drugs, along with many other kinds of issues, are seen as downstream effects of these abstract political commitments.

Haidt and colleagues have expanded the standard political models with their account of the five 'foundations' of morality (Graham *et al.* 2009). This view begins with the idea that there are individual differences, including important aspects of personality, as measured by the Big Five inventories, and other kinds of variation, such as disgust sensitivity. These differences give rise to different weights to the five key areas of morality, which Haidt & Joseph (2007) identify as harm, fairness, purity, ingroup loyalty and hierarchy.

On Haidt and colleagues' account, variations in ideological commitments are driven by underlying variations

in personality variables and moral foundations, with political liberals placing weight on only harm and fairness, and political conservatives valuing all five moral foundations (Haidt & Kesebir 2010). Haidt and colleagues do not argue with the primary claims of standard political models insofar as both view individual issue opinions as derived from more basic ideological and other abstract items.

One of the fundamental claims flowing from the standard political model is that self-interest is rarely a strong factor in accounting for political attitudes. The claim has been most forcefully advanced by defenders of the 'symbolic politics' approach (e.g. Sears & Funk 1990) and has become an often-repeated truism in political science (e.g. Kinder 1998; Caplan 2007; Graham *et al.* 2009), though we give some reasons below to doubt the stronger versions of the claim.

The view of abstract political commitments as causes makes a number of familiar predictions. Specifically, this view implies that self-interest is likely to be of little relevance. Instead, more abstract political differences will matter. In particular, compared with those people who do not oppose the use of recreational drugs, those who do will be more conservative, more religious and, following the framework of Haidt and colleagues' work, more driven by the moral salience of ingroup loyalty, hierarchy and perhaps, most importantly, purity, as well as, at a deeper level, higher disgust sensitivity, less openness to experience and related personality dimensions.

### (ii) *Reproductive strategies as causes*

Our model of individual differences differs from these approaches and is closely linked to the idea that the central phenomenon to be explained in the context of morality is condemnation, rather than conscience. If moral rules are construed as specifying classes of activities or behaviours that, when someone engages in them, lead to punishment without the possibility of subsequent reprisal (P. DeScioli 2008, unpublished PhD thesis; DeScioli & Kurzban 2009a), then moral rules are like economic institutions, the rules that govern transactions (Kurzban *in press*). Also, like economic institutions, the contents of these rules have important consequences that, crucially, differ from one individual to the next. Just as institutions affect outcomes depending on one's position in an economy—for example, import duties help domestic producers of particular goods by increasing prices, and harm consumers of those goods for the same reason—the content of moral rules has different effects on individuals' outcomes depending on the details of the strategy one is implementing in the context of the social world.

The idea that strategic interests matter in affecting opinions has been demonstrated in political science. Evidence in favour of this view comes from widely cited facts that socioeconomic status is often a major predictor of views on governmental redistribution of wealth through social welfare programmes (Janda *et al.* 2002; Erikson & Tedin 2005). That is, people who disproportionately benefit from redistribution programmes—the poor—tend to support them, while people who disproportionately pay for such programmes—the rich—tend to oppose them. Similarly, race is often a major predictor

of views on the desirability of public and private preferences in favour of racial minorities (Flanigan & Zingale 2002; Erikson & Tedin 2005).

To these often-cited axes of societal conflict, we add another dimension driven by evolutionary analysis. This axis is the conflict between those who pursue a committed reproductive strategy with high levels of investment by fathers in their children, and others who pursue a more promiscuous reproductive strategy involving males who devote substantially more of their time and resources to obtaining additional mates rather than raising children. Humans, like other species (e.g. Shuster 2010), deploy different reproductive strategies depending on variation in individual and ecological variables (Buss & Schmitt 1993; Gangestad & Simpson 2000). These differences give rise to strategic conflict.

The primary point of conflict rests with the general level of promiscuous sexual activity in a given social group (see J. Weeden, 2003, unpublished PhD thesis; Weeden *et al.* 2008). The interests of those pursuing a more committed strategy are threatened by high levels of promiscuity. Committed husbands stand to lose more from cuckoldry because they invest more heavily in their (putative) offspring. Committed wives incur higher costs upon mate-abandonment, particularly when they have larger numbers of young children combined with reduced education and work-place participation. The interests of committed strategists are advanced to the extent they can impose larger social costs on promiscuous strategists. Promiscuous strategists, by contrast, find their interests advanced by minimizing these social costs and increasing their number of potential mates.

Different people, then, depending on their own properties and opportunities, stand to lose or gain by virtue of the moral institutions that govern sexual behaviour. This pattern of gains and losses might have constituted a selective pressure giving rise to a contingent psychology that is designed to adopt—and attempt to cause others to adopt—moral rules that facilitate one's own competitive reproductive strategy.

Note that these ideas begin to explain why there is relative homogeneity in some areas of moral condemnation. In some cases, moral rules are more or less what we might call Rawlsian (Rawls 1971), benefitting the large majority of people. For instance, rules that specify punishment for intentional physical harm—and therefore disincentivize intentional harm—benefit almost all people because everyone is vulnerable to being harmed. Some rules, however, more clearly help some and hurt others. This generates an incentive for individuals to adopt, and try to cause others to adopt, rules that work in favour of their interests.

A key context for moralistic conflicts over sexual matters in developed societies is found with respect to religious commitments. Political discussions often mention religiosity as a major predictor of social or cultural issues (like premarital sex, abortion or pornography) (e.g. Corbett & Corbett 1999; Flanigan & Zingale 2002; Erikson & Tedin 2005). It is usually assumed that differences in socialization lead to adult differences in religiosity, which themselves lead to different issue opinions. However, Weeden *et al.* (2008) tested the model that claims causality running from religiosity to sexual and family attitudes and behaviours against an evolutionarily

motivated model that reversed the usual causal assumption, viewing differences in reproductive strategy as a key determinant of individuals' decisions to increase or reduce affiliation with religious groups. They found, consistent with the evolutionary model, that differences in reproductive strategies almost fully mediated well-known relationships between religiosity on the one hand and gender, age, cohort and Big five personality variables on the other hand, suggesting strongly that the causal arrow runs at least in substantial part from reproductive lifestyles to religiosity.

Taken together, these ideas suggest that one component of evolved moral psychology is designed to increase or decrease the chances that particular moral regimes operate in one's social environment, involving centrally one's own adoption or rejection of a given moral view. We propose that there are mechanisms designed to make inferences about the costs and benefits to oneself of different rule regimes, and endorse those rules that benefit oneself.

Why should recreational drugs elicit such differences in views about wrongness? Our answer is that it is linked to promiscuity. Among young Americans, for example, the substantial link between promiscuous sexual behaviour and recreational drug usage is well established (e.g. Lammers *et al.* 2000; Whitaker *et al.* 2000; Weeden & Sabini 2007). In our view, efforts to limit recreational drug usage flow in large part from attempts by committed reproductive strategists to reduce levels of sexual promiscuity because promiscuity interferes with committed strategies. Thus, we expect the relationship between attitudes towards recreational drugs and attitudes towards promiscuity to be very large, and to dominate other correlates of opinions on recreational drugs, including more abstract items like religiosity and political ideology.

### (iii) *Predictions of the models*

These two models make different predictions regarding the relationships among individuals': (i) abstract political views and commitments, (ii) attitudes and behaviours surrounding sexuality and (iii) attitudes toward drugs.

Suppose that abstract political views are the causal antecedents of views toward various sociopolitical realms, including those associated with both sexual behaviour and drug use. If this were the correct causal account, then the variation in views surrounding sexuality would have similar causal antecedents to the variation in views surrounding recreational drug use. There should be strong relationships between abstract political views and both attitudes surrounding sex and attitudes towards drugs. We should also expect strong relationships between attitudes toward sex and attitudes toward drugs, since they have similar causal antecedents. In addition, and crucially, if this is the correct causal account, if we look at the relationship between sexual attitudes and drug use attitudes, *controlling for abstract political commitments*, then the relationship between sexual attitudes and drug use attitudes should be reduced to a substantial degree (see the first model in figure 1).

Compare this prediction to the counterintuitive prediction one would make if attitudes about recreational drugs are driven by sexual strategies. If this view is correct, then

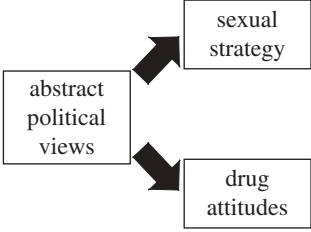
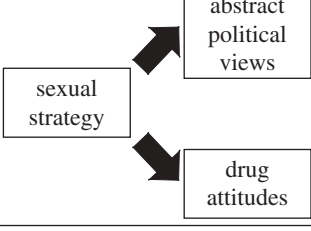
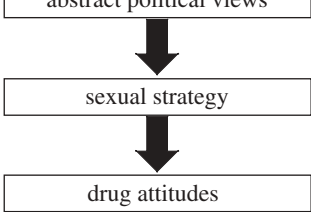
graphical representation	predictions
	<p>when controlling for abstract political views, partial correlations between sexual strategy and drug attitudes <i>will</i> be substantially diminished.</p> <p>when controlling for sexual strategy, partial correlations between abstract political views and drug attitudes <i>will not</i> be substantially diminished.</p>
	<p>when controlling for abstract political views, partial correlations between sexual strategy and drug attitudes <i>will not</i> be substantially diminished.</p> <p>when controlling for sexual strategy, partial correlations between abstract political views and drug attitudes <i>will</i> be substantially diminished.</p>
	<p>same as above for sexual strategy as causal.</p>

Figure 1. Graphical representations of three different causal pathways that might give rise to variation in people's views regarding recreational drugs. Boxes correspond to categories of cognitive representations (e.g. beliefs and attitudes), and arrows correspond to causal processes that give rise to other categories of representation. One possibility (top) is that abstract political views (e.g. conservatism) are causal, giving rise to particular views about sexuality and drugs. A second possibility (middle) is that representations associated with sexuality are causal, giving rise to abstract political views and views surrounding drugs. A third possibility (bottom) is that sexual attitudes are mediators, such that abstract political views strongly influence sexual strategy and sexual strategy strongly influences drug attitudes, with no direct causal link between abstract political views and drug attitudes. Empirical predictions of each causal pathway are indicated. These models are not intended to be exhaustive.

there will be relationships between political views (e.g. liberalism) and drugs, but this relationship will be driven by the fact that they share a common underlying cause, located in sociosexuality. This leads to the prediction that the relationship between sexual attitudes and drug-related views *will not* be substantially diminished when one controls for abstract political commitments. In addition, this view predicts that the relationship between opinions on recreational drug use and abstract political commitments *will* be substantially reduced when one controls for sexual attitudes. That is, if sexual attitudes are the common causal antecedent of both abstract political views and drug attitudes, controlling for sexual attitudes should strongly attenuate this relationship (see the second model in figure 1).

This view cannot be distinguished in our study from the view that abstract commitments causally influence attitudes towards promiscuity, which in turn causally influence attitudes towards drugs (see the third model in figure 1). However, this model and our model both share the fundamental premise that sociosexual differences largely drive differences in moral opinions regarding recreational drug usage, with little direct influence from abstract commitments to recreational drug attitudes.

In summary, our hypothesis is that the intuition that recreational drug use should be prohibited derives primarily (though, we are careful to note, not exclusively) from the relationship between these drugs and sexual promiscuity. People's moral intuitions are (in part)

designed to control and constrain others' sexual activity in accordance with one's own reproductive strategy. Because recreational drug usage is strongly associated with greater promiscuity, people oppose recreational drugs as one part in a larger effort to control others' sexual activity. Therefore, we predict that moral attitudes toward drugs will closely relate to variables such as liberalism/conservatism, religiosity, and so on, but that these relationships will be strongest with respect to items that measure correlates of one's sexual strategy. Further, controlling for promiscuity attitudes, we predict that other relationships between views about drugs and abstract variables will be substantially diminished, or even disappear entirely.

## 2. METHOD

### (a) Undergraduate sample

We analysed data from two samples. The first was an undergraduate sample consisting of students from a large university in the southeastern United States. Responses were collected from 516 undergraduate students. The average age was 19.5 (s.d. = 2.16) and the sample was 69 per cent female. The sample contained 70 per cent European Americans, 13 per cent Latino Americans, 9 per cent African Americans, 5 per cent Asian Americans and 3 per cent other. All students were enrolled in at least one undergraduate psychology course. Participants received extra credit for participating in the study.

**(b) Mturk sample**

Participants in the second sample were 471 individuals recruited from a web-based recruitment site, Amazon's 'Mechanical Turk', or Mturk. Mturk is a 'crowdsourcing' website that allows people to perform short tasks for small amounts of money. Anyone over 18 may use the site. The survey was restricted to residents of the United States. In other work, this site has generated results comparable to other samples (e.g. DeScioli & Kurzban 2009b). The average age was 32.9 (s.d. = 11.8) and the sample was 65 per cent female. The sample contained 81 per cent European Americans, 5 per cent African Americans, 5 per cent Asian Americans, 4 per cent Latino Americans and 5 per cent other.

**(c) Questionnaire items**

Our measure of recreational drug attitudes consisted of nine items, including attitudes towards the morality and legal status of using marijuana, cocaine and Ecstasy, as well as general attitudes towards recreational drugs. The exact items differed somewhat for the two samples and are provided in the electronic supplementary material. The recreational drug scale was coded such that opposition to recreational drugs is indicated by larger values. The scale had a Cronbach's alpha of 0.87 in the undergraduate sample and 0.88 in the Mturk sample.

We used a modified version of the Sociosexual Orientation Index (Simpson & Gangestad 1991), for which we eliminated the item regarding how many one-night stands they have had (we find that participants are confused by the wording of this item), and added an item on participants' number of non-intercourse (hook-up) partners in the past 3 years, in addition to breaking out number of past sexual partners into heterosexual and homosexual partners. The resulting scale ('Sociosexuality') had a Cronbach's alpha of 0.83 in the undergraduate sample and 0.80 in the Mturk sample.

Participants completed the Three-Domain Disgust Scale (Tybur *et al.* 2009), which produces three sub-scales involving sexual disgust ('Disgust—sexual'; Cronbach's alpha of 0.84 in the undergraduate sample and 0.86 in the Mturk sample), moral disgust ('Disgust—moral'; Cronbach's alpha of 0.86 in the undergraduate sample and 0.88 in the Mturk sample) and pathogen disgust ('Disgust—pathogen'; Cronbach's alpha of 0.80 in the undergraduate sample and 0.83 in the Mturk sample).

Participants reported their overall liberal/conservative political identification on a seven-point scale ('Politics—ideology'). Participants also rated their support/opposition (on a seven-point scale) to a number of current political issues. We broke these out into sexual issues, including restrictions against Internet pornography, comprehensive sex education in public schools, banning abortion and legalized gay marriage ('Politics—sexual items'; Cronbach's alpha of 0.64 in the undergraduate sample and 0.71 in the Mturk sample), and non-sexual issues, including allowing undocumented immigrants to stay in the United States, higher taxes for the wealthy, aggressive military response to dangerous foreign groups, unemployment payments, gun control laws, offshore drilling and subsidized healthcare for the poor ('Politics—non-sexual items'; Cronbach's alpha of 0.66 in the undergraduate sample and 0.72 in the Mturk sample). Participants also completed the 16-item Social Dominance Orientation scale (Pratto *et al.* 1994) (Cronbach's alpha of 0.94 in the undergraduate sample and 0.93 in the Mturk sample).

Participants completed the moral relevance items from Graham *et al.* (2009), which are designed to fall into five sub-scales: harm ('Moral relevance—harm'; Cronbach's alpha of 0.86 in the undergraduate sample and 0.80 in the Mturk sample); reciprocity ('Moral relevance—reciprocity'; Cronbach's alpha of 0.83 in the undergraduate sample and 0.79 in the Mturk sample); ingroup ('Moral relevance—ingroup'; Cronbach's alpha of 0.84 in the undergraduate sample and 0.86 in the Mturk sample); hierarchy ('Moral relevance—hierarchy'; Cronbach's alpha of 0.83 in the undergraduate sample and 0.79 in the Mturk sample); and purity ('Moral relevance—purity'; Cronbach's alpha of 0.87 in the undergraduate sample and 0.88 in the Mturk sample).

We measured religiosity with a five-item scale asking about level of religiosity, level of spirituality, frequency of private prayer, frequency of current church attendance and expected future frequency of church attendance ('Religiosity'; Cronbach's alpha of 0.92 in the undergraduate sample and 0.89 in the Mturk sample). We also asked a short version of the Big five personality items (Rammstedt & John 2007).

**3. RESULTS**

Tables 1 and 2 show relationships between recreational drug attitudes and other variables, with table 1 for the undergraduate sample and table 2 for the Mturk sample. Our primary prediction was that items tracking attitudes towards sexual promiscuity as a group would be larger correlates and would reduce the effects of the other variables to a greater extent than the other variables would reduce the effects of the sexual variables in partial correlations. The prediction held—the largest correlations in both samples involve sociosexuality, sexual disgust and opinions on sexual political items, and controlling for these sexual variables in partial correlations reduced the size of the relationships between recreational drug attitudes and most of the other variables substantially.

As a less formal confirmation that these correlations are largely driven by promiscuity attitudes, we also examined correlations between each individual predictor item (including sexual and non-sexual items) and recreational drug attitudes. For the undergraduate sample, the top three individual item correlates with recreational drug attitudes were the following: 'Sex without love is OK' (from the sociosexuality scale;  $r = -0.45$ ); 'Bringing someone you just met back to your room to have sex' (from the sexual disgust scale;  $r = 0.44$ ); and 'I can imagine myself being comfortable and enjoying 'casual' sex with different partners' (from the sociosexuality scale;  $r = -0.41$ ). For the Mturk sample, the top three individual item correlates with recreational drug attitudes were the following: 'Bringing someone you just met back to your room to have sex' (from the sexual disgust scale;  $r = 0.51$ ); 'Sex without love is OK' (from the sociosexuality scale;  $r = -0.50$ ); and 'Tougher restrictions against pornography on the Internet' (from the sexual politics scale;  $r = 0.47$ ).

**4. DISCUSSION**

The principle result is that we find evidence that differences in sociosexuality are central to explaining differences in attitudes toward recreational drugs. The

Table 1. Correlations and partial correlations between recreational drug attitudes and other items from undergraduate sample ( $n = 516$ ).

		correlations with recreational drug attitudes	partial correlations (controlling for non-sexual items)	partial correlations (controlling for sexual items)
sexual items	sociosexuality	-0.49**	-0.40**	—
	disgust—sexual	0.45**	0.31**	—
	politics—sexual issues	0.35**	0.23**	—
non-sexual items	moral relevance— purity	0.25**	—	0.14*
	moral relevance— hierarchy	0.10	—	0.06
	moral relevance— ingroup	0.07	—	0.04
	moral relevance— harm	0.14*	—	0.10
	moral relevance— reciprocity	0.09	—	0.08
	disgust—moral	0.27**	—	0.16**
	disgust—pathogen	0.18**	—	0.07
	religiosity	0.25**	—	0-0.02
	politics—ideology	0.19**	—	0.05
	politics—non-sexual issues	-0.01	—	-0.04
	social dominance orientation	-0.17**	—	-0.15*
	conscientiousness	0.17**	—	0.14*
	agreeableness	0.20**	—	0.07
	openness	-0.07	—	-0.03
	extraversion	0.02	—	0.09
	neuroticism	-0.08	—	-0.11

\* $p < 0.01$ .\*\* $p < 0.001$ .

best predictors of drug attitudes were not responses to abstract political items, but rather items that asked about matters relating to promiscuity. This provides evidence that views on sex and views on drugs are very closely related.

Moreover, the relationship between sex and drugs tended to mediate items that, from the perspective of canonical views in political science, might have been thought to be driving views on drugs. For instance, while it is true, as one might have expected, that people who are more religious and those who are more politically conservative tend to oppose recreational drugs, in both our samples, the predictive power of these religious and ideological items was reduced nearly to zero by controlling for items tracking attitudes toward sexual promiscuity.

These reductions are difficult to reconcile with a model in which abstract political views are the underlying causal variables driving attitudes toward drugs. They are, however, consistent with the model we propose, in which individuals' sexual strategies drive views on recreational drugs.

It is also plausible given our results that abstract commitments drive sexual attitudes and sexual attitudes drive drug attitudes. In both models, sexual attitudes directly influence drug attitudes, with the difference being that our model views sexual strategy as a major causal influence in determining abstract commitments, while the other model takes the opposite causal position, viewing

items like religiosity and ideology as major influences in determining sexual attitudes. We note that recent work with regard to religiosity shows substantial evidence that the causal arrow runs at least in significant part from sexual lifestyles and attitudes to religious commitments (McCullough *et al.* 2005; Weeden *et al.* 2008; Li *et al.* 2009). In addition, although not the preferred model, political scientists occasionally view liberal-conservative identifications not as generative ideological systems, but as post hoc descriptions of pre-existing views on a range of political items (e.g. Conover & Feldman 1981).

Of course, the present results should be treated with the usual caution. Although our results replicated with two distinct sample populations, it would be of value to determine if other samples, perhaps in a cultural milieu with different mores surrounding sex and recreational drugs, would be of use. In places in which sexual behaviour and drug use are not closely linked, we would predict that the effects we observed here would diminish.

Further, there is substantial variance left unexplained, and future work should aim to identify sources of this residual variation. One possibility is local variation in the relationship between drug use and crime. In places where this relationship is strong, people might adopt anti-drug views as a means of reducing crime. A second possibility, related to the first, is that local variation in the harmful health effects of drugs might also influence anti-drug views (for example, if there is regional variation in terms of which drugs are used). Finally, and perhaps

Table 2. Correlations and partial correlations between recreational drug attitudes and other items from Mturk sample ( $n = 471$ ).

		correlations with recreational drug attitudes	partial correlations (controlling for non-sexual items)	partial correlations (controlling for sexual items)
sexual items	sociosexuality	-0.47**	-0.32**	—
	disgust—sexual	0.53**	0.34**	—
	politics—sexual issues	0.54**	0.25**	—
non-sexual items	moral relevance— purity	0.42**	—	0.16*
	moral relevance— hierarchy	0.19**	—	0.08
	moral relevance— ingroup	0.19**	—	0.08
	moral relevance— harm	0.11	—	0.08
	moral relevance— reciprocity	0.11	—	0.04
	disgust—moral	0.31**	—	0.12
	disgust—pathogen	0.20**	—	0.06
	religiosity	0.41**	—	0.04
	politics—ideology	0.30**	—	0.02
	politics—non-sexual issues	0.16*	—	0.05
	social dominance orientation	0.04	—	-0.02
	conscientiousness	0.22**	—	0.09
	agreeableness	0.15*	—	0.08
	openness	-0.17**	—	-0.10
	extraversion	0.08	—	0.06
	neuroticism	-0.01	—	0.03

\* $p < 0.01$ .\*\* $p < 0.001$ .

slightly counter-intuitively, it could be that in places with very high drug use, opposition might be reduced because any given person in such an environment is likely to have friends and relatives involved with drug use. In such a case, stricter drug laws might have adverse effects on one's friends and relatives.

As with all correlational studies, we cannot directly infer causation from our data. We believe that the results undermine particular causal accounts, and our view resonates with other findings, but we look forward to experimental work that can address issues of causality more directly. For instance, it could be that by manipulating people's own perceptions of their mate value, their moral intuitions surrounding sexuality—but not other moral domains—could be affected.

In closing, we believe that the results presented here speak to a broad biological puzzle. Humans monitor third party behaviour, and work to have costs imposed on third parties, even when individuals' own interests are not obviously at stake (DeScioli & Kurzban 2009a). While activities such as recreational drug usage are often viewed as 'victimless' misdemeanours, our analysis implies that individuals' competing interests are nonetheless involved. The results described here imply that third-party morality in contexts like condemnation of recreational drug usage might be best understood in the context of strategic dynamics, with individuals influencing moral rules in a way that favours their own competitive reproductive strategies.

We expect, then, that this relationship between sexual strategy and moral stances will occur in other domains in which moral contents inhibit others' sexual behaviour. These would include attitudes toward prostitution, sexual education in school and abortion (J. Weeden, 2003, unpublished PhD thesis), all of which might have an influence on the degree of promiscuous sexuality.

This is not to say that sexual strategy is the only strategic dynamic that is relevant. There are many domains of life in which interests diverge, and advantage can be gained through influencing the rules that govern behaviour. As we indicated above, differences in views on economic matters, for example, might depend much more on wealth and income rather than sexual strategy. Future work might benefit from approaching moral commitments as deriving less from abstract political and religious views, and more from the perspective of strategic conflicts faced by an extremely social species.

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