Individual Differences in Reproductive Strategy are Related to Views about Recreational

Drug Use in Belgium, the Netherlands and Japan

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Abstract

Individual differences in moral views are often explained as the downstream effect of ideological commitments, such as political orientation and religiosity. Recent studies in the U.S. suggest that moral views about recreational drug use are also influenced by attitudes towards sex and that this relationship cannot be explained by ideological commitments. In this study, we investigate student samples from Belgium, the Netherlands, and Japan. We find that, in all samples, sexual attitudes are strongly related to views about recreational drug use, even after controlling for various ideological variables. We discuss our results in the light of reproductive strategies as determinants of moral views.

Keywords: moral attitudes, sex, drugs, reproductive strategy, cross-cultural

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Human beings care deeply about others' behavior: In moral domains, they regularly

condemn others and they express a desire that other individuals be punished for their

activities. While certain moral issues elicit general condemnation (e.g. unprovoked harm),

other issues elicit widely different opinions among individuals and cultures. The issue of

recreational drug use is a case in point (Robinson & Kurzban, 2007).

In this study, we ask about the sources of individual differences in moral views about

recreational drug use. The most common answer to this question points to underlying

differences in ideological commitments, primarily items like political orientation and

religiosity (see below, 'Ideological theories'). These factors are seen as shaping a host of

moral opinions, including not only views about drugs, but also the extent to which one

condemns casual sex, abortion, pornography or divorce. From this perspective, to the extent

that views towards drugs and attitudes towards sex are related, the inference is that this can be

explained by one's ideological commitments.

Alternatively, recent studies suggest that, in the U.S., sexual attitudes relate to moral

views about recreational drug use. These studies find that this relationship is still substantial

and significant when controlling for nonsexual ideological variables such as religiosity and

political orientation (Kurzban, Dukes, & Weeden, 2010; Weeden, Cohen, & Kenrick, 2008).

This suggests that ideological variables cannot explain the relationship between moral views

about recreational drug use and sexual attitudes. However, these studies rely heavily on

ideological dynamics in, and data from, the U.S. We therefore extend the Kurzban et al.

(2010) study to other politico-religious contexts.

Here we show that in a wider range of contexts (Belgium, the Netherlands, and Japan),

attitudes towards sex correlate with views about recreational drug use ("drug views") in a way

that cannot be accounted for by ideological variables. We argue that the explanation for these relationships lies in the strategic advantage for sexually restricted individuals to morally condemn recreational drug use. As a consequence, sexual attitudes and drug views are multi-nationally correlated, and this cannot be explained by ideological variables. In what follows, we first provide some background about ideological theories and evolved reproductive strategies.

Ideological theories

According to ideological theories, moral views are shaped by ideological commitments. Ideological commitments include centrally one's religious and political orientations. In the U.S., more religious individuals are less likely to use substances such as alcohol, cigarettes, marijuana, and crack (Allen & Lo, 2010; Chitwood, Weiss, & Leukefeld, 2008; Gryczynski & Ward, 2011). Importantly, the suggested mechanism causing this relationship is that *moral views* are transferred from a social network to the focal individual, and these moral views then shape the individual's behavior (see also Adamczyk & Palmer, 2008). Similar proposals have been made to explain variation in sexual attitudes: In the U.S., increased church attendance and being a member of a more conservative denomination are related to morally conservative sexual views, arguably because religious social networks preach conservative sexual *views* (Adamczyk & Pitt, 2009; Ahrold, Farmer, Trapnell, & Meston, 2011; Cochran & Beeghley, 1991; Petersen & Donnenwerth, 1997). Thus, the background assumption of these studies is that religious commitment, for example if it embeds one in a religious social network, shapes moral views towards drugs and sex, which in their turn shape behavior.

Others see specific moral views (measured among American survey respondents) as the downstream effect of more general political commitments (Bardes & Oldendick, 2003; Erikson & Tedin, 2005; Jacoby, 2002; Janda, Berry, & Goldman, 2002; Sears & Levy, 2003).

This view is expanded with basic personality factors explaining individual differences in politico-moral views. According to Graham, Haidt, and Nosek (2009), one's personality traits create adult ideological commitments, which in turn influence endorsement of political and moral orientations (see also Haidt & Joseph, 2007). In line with this, in the U.S., personality factors such as openness and conscientiousness have been found to underlie political orientation (Carney, Jost, Gossling, & Potter 2008).

While such links are well-established in the United States, matters are more open in Europe, including Belgium and the Netherlands. Researchers have identified some links between increased religiosity and decreased alcohol use in Europe (Wicki, Kuntsche, & Gmel, 2010). Other researchers found a link between increased religiosity and restrictive sexual views in Belgium and the Netherlands (Hooghe, Claes, Harell, Quintelier, & Dejaeghere, 2010; Kraaykamp, 2002).

Matters are quite complicated for political orientation. The political landscapes in the Dutch (i.e. from the Netherlands) and in the Belgian (specifically, Flemish) multi-party system are multidimensional. Drug views and sexual views, together with religious conservatism, make up one of seven dimensions that situate the Dutch political parties (Kleinnijenhuis & Krouwel, 2008; Krouwel, 2011). Thus, political and religious commitments are related to specific moral opinions about drugs and sex. In Belgium (specifically, Flanders), church involvement is apparently still an important determinant of party affiliation (Abts, Swyngedouw, & Billiet, 2011). Moreover, individuals who are *both* involved with a church and ethically conservative (regarding abortion and euthanasia) are overrepresented among the electorate of one political party (i.e., CD&V) (Abts et al., 2011). Thus, ethical/religious conservatism is related to party affiliation in Belgium (Flanders) and the Netherlands. However, it is unclear what the underlying assumption is about the causal mechanism: Does the electorate's political orientation cause their specific attitudes towards sex and drugs? Thus,

in general, we do not know to what extent ideological theories are extended to Europe.

We do not know of studies clearly linking specific moral views with "religiosity" in Japan. Vaughn, Huang, and Ramirez (1995) give an overview of determinants of drug use in Japan, but they do not discuss religion as a potential determinant of drug use among the Japanese. National changes in sexual attitudes cannot plausibly be ascribed to changes in "religiosity" (Atoh, 2001). To the extent that ideological theories see moral views as being transferred from a *social* network to the focal individual, such theories might not expect religious orientation to have a strong effect on views towards drugs or sex in Japan. Japan, unlike the United States and Europe, is primarily Shinto-Buddhist rather than Christian. Japanese Shinto-Buddhism is not characterized by regular *social* gatherings (Miller, 1998) where one listens to a preacher (Roemer 2007; 2010). Instead, it consists mainly of private rituals or rare public secularized events (Roemer, 2007).

For political commitments, previous studies have shown that one's left/right orientation correlates with smoking behavior in Japan (Subramanian, Hamano, Perkins, Koyabu, & Fujisawa, 2010) but, to the best of our knowledge, there are no data about moral *views* and political orientation. Thus, in general, we do not know to what extent ideological theories apply to Japan.

Evolved reproductive strategies

Kurzban et al. (2010) predicted that individuals endorse moral views that benefit their own reproductive strategy. Here, adopting a restrictive behavioral and moral strategy towards casual sex increases condemnation of recreational drug use. Their argument consists of three steps.

First, people differ in the extent to which they follow either a short-term, promiscuous strategy where energy is allocated to mating effort, or a long-term, monogamous strategy where energy is allocated to parental effort. Second, people's other views will track their

reproductive interests and it is in the interest of short-term strategists to promote promiscuity in others, while it is in the interest of more monogamously inclined people to promote restrictive attitudes towards sex and condemn promiscuity in others. Third, recreational drug use is often associated with and facilitates promiscuity. From these points it follows that individual's attitudes towards sexual promiscuity will correlate with views about recreational drug use, at least in contexts or cultures where recreational drug use and promiscuity are related. We will now further explain each of these three steps.

During human evolution, both short-term and long-term mating strategies could at times be adaptive for both men and women (Buss & Schmitt, 1993; Gangestad & Simpson, 2000). Men could increase their reproductive success by mating with as many women as possible, thereby allocating less energy in parental effort. However, paternal effort increased the survival chances or reproductive success of their offspring (Geary, 1998). Therefore fathers could also increase their fitness by following a long-term strategy instead of a short-term strategy, allocating their energy in parental effort while foregoing other mating opportunities. Women could increase their fitness by enhancing the survival of their children. They would therefore prefer a partner who was likely to be an investing father. However, women also stand to benefit from mating with men with "good genes" (Little, Connely, Feinberg, Jones & Roberts, 2011; Scheib, 2001). There is evidence of a trade-off between good genes and parental investment in men: Men with "good genes", on average, invest less in their offspring (Alvergne, Faurie, & Raymond, 2009; Booth & Dabbs 1993). Hence, "good genes" partners are less likely to be investing fathers, and women might have to choose between either a short-term encounter with a "good genes" partner or a long-term relationship with an investing partner. Because the optimal strategy depends, among other things, on personal factors (such as being endowed with "good genes" indicators for men, or fertility and

reproductive value for women), we can expect to find diversity in reproductive strategy within cultures.

There are ample data that moral views are aligned with one's strategic interests in other domains: Socioeconomic status is consistently related to political preferences for redistributive policies (e.g., Edlund & Pande, 2002; Gelman, Shor, Bafumi, & Park, 2007) and race is related to preferences for policies that benefit racial minorities (Erikson & Tedin, 2005). Analogously, we can expect that individuals will endorse moral views that benefit their own reproductive strategy. People in a long-term relationship, who invest time and energy in their children, benefit when others are sexually restricted, because this reduces the risk of cuckoldry, seduction, mate-poaching or investing in children that are not their own. They would therefore condemn *others'* short-term sexual encounters, as well as behavior that promotes others' short-term sexual encounters.

Recreational drug use is such a promiscuity-enhancing behavior. Individuals are more likely to have risky, promiscuous or short term sexual encounters when under the influence of recreational party drugs. This has been found in American (Lammers, Ireland, Resnick, & Blum, 2000; Weeden & Sabini, 2007) as well as European (Madkour, Farhat, Halpern, Godeau, & Gabhainn, 2010) and Japanese study groups (Nemoto, Iwamoto, Morris, Yokota, & Wada, 2007; Nagata-Kobayashi, Maeno, Yoshizu, & Shimbo, 2009; Takakura, Nagayama, Sakihara, & Willcox, 2001). If individuals perceive recreational drug use as conducive to sexual encounters, attitudes towards sexuality are therefore likely to track views towards recreational drug use. This is the main prediction of the reproductive interests theory (cf. Weeden, 2003): in Europe and Japan, as in the U.S. (Kurzban et al. 2010), sexual (moral and behavioral) attitudes will correlate with views towards recreational drug use, irrespective of nonsexual ideological variables.

This study

The main purpose of our study is to put the *reproductive strategy theory* to additional test by investigating the relationships among views towards recreational drug use and sexual variables among university students in Belgium, the Netherlands, and Japan. The questions investigated here are the following: First, in Belgium, the Netherlands, and Japan, do sexual variables correlate with views towards recreational drug use? Second, if there is a relationship between sexual variables and drug views, are these correlations still significant after we control for a range of nonsexual ideological variables? Third, do the correlations between sexual variables and drug views differ between countries?

Additionally, we explore the extent to which nonsexual ideological variables are related to views towards recreational drug use. Here we ask if there is a relationship between nonsexual ideological variables and drug views and if these correlations are still significant after we control for sexual variables.

We have seen that, in Japan, Belgium, and the Netherlands, it is unclear if ideological variables relate to views towards sex and drugs. Relying on ideological theories and not taking into account strategic interests, *if* views towards sex and drug correlate in Japan, Belgium, and the Netherlands, then one would predict that this relationship will be reduced to non-significance when controlling for regionally relevant ideological factors.

We argue that one should take reproductive strategy into account. We predict that, in line with reproductive strategy theory, in Belgium, the Netherlands and Japan, sexual attitudes will correlate with views towards recreational drug use and that these relationships will still be significant and substantial after controlling for regionally relevant ideological variables.

We do not have strong expectations about the extent to which ideological variables will correlate with drug views before or after controlling for sexual variables in Japan, Belgium and the Netherlands. In this regard, the relationships between ideological variables and drug views before and after controlling for sexual variables are exploratory.

Methods

Participants. We recruited first- and second-year undergraduates in Belgium (B), the Netherlands (NL) and Japan (J) to fill out the survey in class. In the Netherlands, we additionally recruited undergraduate participants via lecturers and study organizations, who made the paper surveys available for their members or advertised the URL of the electronic survey. Participation was voluntary and participants did not receive credit for their participation. We only analyzed data from students who had never been married and did not have children. We thus included 476 Belgian participants (196 men, 280 women, M_{age} = 18.54 +/- 1.95 SD years, age range = 17-46 years), 298 Dutch participants (107 men, 191 women, M_{age} = 21.11 +/- 2.751 SD years, age range = 17-35 years) and 296 Japanese participants (92 men, 204 women, M_{age}= 19.89 +/- 1.141 SD years, age range: 18-24 years). All participants provided informed consent.

Measures. We adapted the survey used in Kurzban et al. (2010) and let professional translators translate and back-translate it to Dutch for Belgium and the Netherlands; two Japanese-English bilinguals translated and back-translated the survey to Japanese for Japan. We provide the items that were created for the current study in Appendices A (Belgium and the Netherlands) and B (Japan).

Table 1 provides the means and standard deviations for all variables for the three samples. For our dependent variable, participants answered questions about their views on the morality and legality of the use of various recreational drugs (Drug Views, cf. undergraduate sample in Kurzban et al., 2010; Cronbach's alpha's = 0.88 (B), 0.89 (NL), 0.86(J)). High scores on drug views indicate greater opposition to recreational drug use.

For our independent variables, we constructed 3 sexual and 12 nonsexual variables. Our nonsexual variables consisted of political and religious variables, as well as personality variables, as these might shape ideologies.

Participants completed the revised sociosexual orientation index (Sociosexuality, Penke & Asendorpf, 2008; Cronbach's alpha's = 0.86 (B), 0.87 (NL), 0.86 (J)). Higher scores indicate more promiscuous behavior and less opposition to promiscuity.

Participants filled out Tybur, Lieberman, & Griskevicius' (2009) disgust scale, yielding the sexual variable 'Sexual Disgust', and the nonsexual variables 'Moral Disgust' and 'Pathogen Disgust' (Sexual Disgust: Cronbach's alpha's = 0.78 (B), 0.83 (NL), 0.86(J); Moral Disgust: Cronbach's alpha's = 0.80(B), 0.81(NL), 0.81(J); Pathogen Disgust: Cronbach's alpha's = 0.81(B), 0.81(NL), 0.74(J)). Higher scores indicate greater feelings of disgust for a range of sexual, social or hygienic transgressions.

We also constructed a sexual and a nonsexual political orientation variable based on agreement with a variety of regionally salient political issues. For Belgium and the Netherlands, participants indicated their agreement with issues that were prominent issues on the parties' websites, or appeared in "de stemtest" (Belgium)[1] or "stemwijzer" (The Netherlands)[2], two popular tests to indicate party affiliation based on 30 questions. One group of items concerned sexual issues involving prostitution, pornography, and abortion (for Belgium and the Netherlands) or online-dating (for Japan), while the other group of items concerned nonsexual issues such as punishment and welfare redistribution (all samples), environmental policies, migrants and criminality (Belgium and the Netherlands), corruption and foreign affairs (Japan). We performed a factor analysis (alpha factoring, oblimin rotation) on the political measures for each sample. For Belgium and the Netherlands, a factor analysis revealed that 4 sexual variables clustered in one factor, and we calculated a Sexual Politics variable consisting of these clustering sexual items (Cronbach's alpha's = 0.60 (B), 0.65 (NL)). These reliabilities could not be increased by removing items. Higher scores on Sexual

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[1] http://www.standaard.be/extra/verkiezingen/stemtest/ (Accessed 10 December 2011)

[2] http://www.stemwijzer.nl/TweedeKamer2010/index.html (Accessed 10 December 2011)

Politics indicate stronger agreement with restrictive sexual policies. We calculated a

Nonsexual Politics variable consisting of the nonsexual variables that together had the highest

reliability (Cronbach's alpha's = 0.70 (B), 0.71 (NL)). Higher scores on Nonsexual Politics

indicate stronger agreement with authoritarian statements – such as harsher punishments for

violent behavior – and less agreement with green or redistributive policies – such as

protecting the environment, and promoting subsidized social services. These reliabilities

could not be increased by removing items. For Japan, the factor analysis revealed a two-factor

structure, where the item about gay rights and the item about sex education belonged to the

nonsexual group rather than to the sexual group. We constructed a Japanese Sexual Politics

variable, consisting of 3 sexual items that together had the highest reliability (Cronbach's

alpha = 0.89 (J)). Higher scores on Sexual Politics indicate stronger agreement with restrictive

sexual policies. Our Japanese Nonsexual Politics variable with the highest possible reliability

consisted of 6 nonsexual items, the item about gay rights and the item about sex education

(Cronbach's alpha = 0.59). The reliability of this construct could not be increased by

removing items.

　　　　Because the political variables generally did not have high reliabilities, we did an

additional analysis with each individual political item in order to see if individual sexual

political items were strongly and consistently related to views towards recreational drug use.

For this analysis, we left out the items about gay rights and sex education in the Belgian and

Dutch sample because we could not determine whether they were sexual or nonsexual items:

The content was sexual but they did not cluster with any of the other sexual or nonsexual

items. For Japan, we left out the items about gay rights and buying a mobile phone[3] for one's

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[3] We assumed that In Japan, buying a mobile phone for one's children is associated with increased dating
　opportunities for these children, via matchmaking websites.

children: These items had sexual content but they did not cluster with any of the other sexual or nonsexual items.

We located participants along a one-dimensional general (nonsexual) political orientation (Progressivism). As mentioned ('Ideological theories'), the political landscape in Belgium and the Netherlands is multidimensional. We therefore asked participants to indicate their party affiliation and we ranked the party affiliations according to their position on a general progressive/conservative factor. For the Netherlands, we used Krouwel's progressive/conservative scale (Krouwel, 2008). For Belgium (Flanders), we ranked the electorate according to their ethical progressivism/conservatism (Abts et al., 2010; Swyngedouw, 2007) (Progressivism; 1 = Progressive, 4 = Conservative; the Netherlands: 1= GL (GroenLinks), D66 (Democraten 66), PvdD (Partij voor de Dieren); 2 = SP (Socialistische Partij), PvdA (Partij van de Arbeid), VVD (Volkspartij voor Vrijheid en Democratie); 3 = CDA (Christen-Democratisch Appèl), CU (ChristenUnie), 4 = SGP (Staatkundig Gereformeerde Partij), PVV (Partij voor de Vrijheid); Belgium: 1 = Groen!, Open VLD (Vlaams, Liberaal, Democratisch); 2 = sp.a (socialistische partij anders), PvdA (Partij van de Arbeid), LSP (Linkse Socioalistische Partij); 3 = NVA (Nieuw-Vlaamse Alliantie), VB (Vlaams Belang); 4 = CD&V (Christen-Democratisch & Vlaams)). Progressivism correlated with nonsexual politics in the Belgian and Dutch samples (Pearons' r = 354 p <.001 (B), Pearson's r = 418, p < .001 (NL). For Japanese participants, we asked if they considered themselves right-wing or left-wing on a 7-point scale (Left /Right wing, 1 = *strongly support left-wing*, 7 = *strongly support right-wing*) as previous work suggests that citizens' left-right position in Japan is an appropriate indicator of Japanese political orientation (Jou, 2010, 2011; Willy, 2011). The variable Left /Right wing did not correlate with nonsexual politics (Pearson's r = -0.021; p = .722). Given the low reliability of Nonsexual Politics in Japan, and the fact that L/R did not correlate with Nonsexual Politics, we decided to include two

questions about party support in the analysis: We asked Japanese participants to what extent they supported either of the two Japanese political parties, i.e., the Democratic Party of Japan (DPJ) and the Liberal Democratic Party of Japan (LDP).

Participants responded to region-specific measures of religiosity. For Belgium and the Netherlands, these included level of religiosity, level of spirituality, frequency of private prayer, frequency of current church attendance, expected future frequency of church attendance, and how orthodox versus liberal they were concerning their religious affiliation. For Japan, these included level of religiosity, and how often they (now and in the expected future) visit a local shrine, temple or church, and participate in other religious activities. We left out level of spirituality and how often they visit the family grave and make offers to the family altar because these items lowered the reliability of the religiosity construct. For religiosity, we used the standardized item alpha (i.e. the Cronbach's alpha on the standardized items) to measure reliability, because not all items were scaled the same. We accordingly calculated the religiosity variable with the standardized items. Internal consistencies of our final variables were acceptable to good (standardized item alpha's: 0.81 (B), 0.90 (NL), 0.75 (J)). Higher scores indicate higher religious engagement.

Participants completed the Ten Item Personality Inventory (TIPI), a measure of the big five (Gosling, Rentfrow, & Swann, 2003), and Graham et al.'s (2009) moral foundation items. Because the alpha's of each moral foundation item were often lower than .60, we used the individualizing foundation and binding foundation (cf. van Leeuwen & Park, 2009), and we left out items that decreased the reliability of our variables. Individualizing is the mean of the harm and reciprocity subscales while binding is the mean of the loyalty, authority and purity subscales (Individualizing: Cronbach's alpha's = 0.73 (B), 0.71(NL), 0.76(J); Binding: Cronbach's alpha's = 0.82(B), 0.81(NL), 0.78(J)).

Analyses

In order to test if reproductive strategy is related to views towards recreational drug use, we (1) list the correlations of all independent variables with the dependent variable (Drug Views), controlling for age and sex. We also (2) list the correlations of all three sexual variables with Drug Views, controlling for all nonsexual ideological and personality variables and for age and sex. Correlations are the most appropriate measures for our purposes: At this stage, we mainly want to know if reproductive strategy correlates with Drug Views, controlling for ideological variables. Moreover, we are not interested in the unique effects of each sexual variable, controlling for the two other sexual variables (for this hierarchical regression would be the more appropriate analysis); instead, we want to know if reproductive strategy correlates with Drug Views, independent of which of the three sexual variables is taken to measure reproductive strategy. Moreover, a correlation analysis makes no assumptions about causal directions, which are uncertain for the relationships between sexual variables and ideological variables – a mediation analysis would make such assumptions.

To explore the relationships between ideological variables and Drug Views, we (3) list the correlations between each ideological variable, controlling for all three sexual variables and for age and sex. We compare these correlations with the correlations in (1).

Results

Table 1 provides the means and standard deviations for all variables for the three samples. There was a statistically significant difference between samples in Drug Views as determined by one-way ANOVA (F (2, 1070) = 254.76; $p < .001$). A Bonferroni post hoc test revealed that participants in the Netherlands were significantly less opposed to recreational drug use (M_{drugs} = 4.07 +/- 1.28 SD) than Belgian participants (M_{drugs} = 5.01 +/- 1.23 *SD*, p <.001) or Japanese participants (M_{drugs} = 6.25+/- 0.99 SD, p <.001); Belgian participants were significantly less opposed to recreational drug use than were Japanese participants ($p < .001$).

[Table 1 about here]

The results from the Belgian sample are shown in Table 2. In this sample, sexual variables showed the highest correlations with Drug Views, and these correlations were still significant and substantial when controlling for ideological and personality variables. Drug Views also related with nonsexual variables in the Belgian sample (Progressivism, Nonsexual Politics, Religiosity, Moral Disgust, Binding, Conscientiousness). After controlling for sexual variables, Nonsexual Politics, Religiosity and Binding were still significantly related to Drug Views.

[Table 2 about here]

The results from the sample from the Netherlands are shown in Table 3. In this sample, the three sexual variables had three of the four highest correlations with Drug Views, and these correlations were still significant and substantial when controlling for ideological and personality variables. Drug Views also related with the nonsexual variables in this sample (Progressivism, Nonsexual Politics, Religiosity, Binding, and Conscientiousness); after controlling for sexual variables, Progressivism, Nonsexual Politics, Binding and Conscientiousness were still significantly related to Drug Views and Individualizing became significantly correlated with Drug Views.

[table 3 about here]

The results from the Japanese sample are shown in Table 4. Here, the three sexual variables had three of the four highest correlations with Drug Views and two of the three

correlations remained significant and substantial when controlling for other variables (Sexual

Disgust had a p-value of .013). The following nonsexual variables correlated with Drug

Views: Moral Disgust, Individualizing, Agreeableness, Neuroticism. Only the correlations

with Moral Disgust and Individualizing remained significant after controlling for sexual

variables.

[table 4 about here]

In order to test if the correlations between Drug Views and sexual variables varied

between countries, we compared the bivariate correlations of Drug Views with sexual

variables between samples (Steel, Torrie, & Dickey, 1997), including the US student sample

from Kurzban et al. (2010). The chi-square values and significance levels are listed in Table 5.

As predicted, the bivariate correlations between sexual variables and Drug Views did not

differ significantly at the .01 level between countries. We did not test this for the partial

correlations (Levy & Narula, 1978) because in each sample we controlled for different

(regionally relevant) constructs – differences in partial correlations might thus be caused by

country, but also by differences in the control variables.

[table 5 about here]

In line with Kurzban et al. (2010), we can do a less formal test to see if sexual

variables are important correlates of drug views. We examined correlations between drug

views and each individual political item that was taken up in the Nonsexual and Sexual

Politics variables (controlling for age and sex). Consistent with our predictions, for Belgium,

we found that (out of these political items) the items making up Sexual Politics had 4 of the 5

strongest correlations with drug views and they were still significantly correlated with drug

views after controlling for each individual nonsexual political item. In the Netherlands, the items making up Sexual Politics had 3 of the 4 strongest correlations with drug views but only 2 correlations were still statistically significant after controlling for the nonsexual political items. In Japan, the items making up Sexual Politics had the 3 strongest correlations with drug views. After controlling for individual nonsexual political items, these were still significant.

Discussion

We predicted that, in line with reproductive interests, views on promiscuous sexual behavior would correlate with views towards recreational drug use in Europe and Japan and would remain significant when controlling for nonsexual ideological variables. The predictions of the strategic interests theory were upheld: In all samples, the relationships between Drug Views and sexual variables were substantial and significant at the .01 level, before and after controlling for nonsexual variables except for Sexual Disgust in Japan after controlling for nonsexual variables, which was marginally significant with $p = .013$. Moreover, the bivariate correlations between Drug Views and sexual variables did not differ significantly between samples (table 5). (There were significant differences in Sociosexuality at the .05 level with $p = .043$; however, we used the .01 level throughout because we tested many correlations.) These results are thus in line with findings in two U.S. samples (Kurzban et al., 2010). Our findings add to this that reproductive strategy also correlates with drug views *across* politico-religious contexts.

In contrast to these similarities, we found differences across samples in the significance of correlations between *non*sexual variables and views towards recreational drug use. In our samples, controlling for sexual variables did not reduce the correlations between Drug Views and nonsexual variables to the same extent as in the U.S. samples (Kurzban et al., 2010). In the U.S. samples, 20 correlations (between nonsexual variables and views towards recreational drug use) were significant *before* controlling for sexual variables, and only 5 of

these correlations were still statistically significant *after* controlling for sexual variables. In our samples, this fraction is 9 out of 15 significant correlations[4], and one variable became significantly correlated after controlling for sexual variables. Thus, nonsexual variables seem to be more important in our samples - especially in Belgium and the Netherlands – than in the U.S. samples. While this speaks for the importance of nonsexual variables, it also speaks for the importance of sexual attitudes: In contrast to the differential importance of nonsexual variables, the correlations between sexual variables and Drug Views occurred reliably across samples. Moreover, in each sample, controlling for sexual attitudes had an effect on the correlations between nonsexual variables and drug views. It is therefore important to take sexual attitudes into account when investigating the determinants of moral views that might relate to reproductive strategies, such as moral views about recreational drug use.

Could these results stem from issues with measurement? In the case of the Japanese sample, one might worry about the possibility of a ceiling effect for Drug Views - the maximum of drug views is 7 while the mean is 6.27 – and this might have attenuated the relationships in the Japanese sample. This however means that we should be cautious when interpreting non-significant correlations in the Japanese sample. It might explain why we did not find many significant correlations between nonsexual variables and drug views, but it might also explain why we found no significant correlation for Sexual Disgust after controlling for nonsexual variables. Thus, the possibility of a ceiling effect does not clearly weaken or strengthen our case.

The internal consistencies of the political variables (Sexual and Nonsexual Politics) varied from good to poor. Skeptics could argue that, if we had controlled for better nonsexual political constructs, the correlations between sexual variables and Drug Views would not have been significant. However, the analysis with only the individual political items gave similar

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[4] We thank an anonymous reviewer for calling our attention to this difference..

results: Most sexual items significantly correlated with Drug Views, before and after controlling for nonsexual items. This was somewhat less clear in the Netherlands. Moreover, we included other appropriate political variables in order to make sure that we controlled for political orientation (i.e., Progressivism, L/R, support for Japanese political parties).

For Japan, one might argue that other nonsexual variables should also have been included. According to ideological theories, moral views are transferred from a social network to the focal individual. In the case of views towards sex and recreational drug use (or 'family values'), these values might be propagated by secular social networks such as one's family. Indeed, as Miller (1998) suggests, family, work, and school-related social networks may function to support monogamous families and their children in Japan, just as religious social networks support monogamous families in the U.S. (Weeden et al., 2008). This is an interesting avenue for future investigations, and future studies would do well to include engagement in family, work and school-related social networks when studying determinants of moral views in Japan.

Does all this show that reproductive strategy is a determinant of views towards recreational drug use? A reproductive strategy is implemented by one's own sexual behavior and by moral views towards others' sexual behavior. The sociosexual orientation index contains questions about one's own sexual behavior and general views towards promiscuity. Sexual Politics has questions about moral and political views towards sex and Sexual Disgust has questions about emotional reactions towards the sexual behavior of others. In this regard, the measures we used are a fair proxy for reproductive strategy with respect to promiscuous sexual activity. In line with other studies (Kurzban et al., 2010; Li et al., 2010; Weeden et al., 2008), it is also unlikely that other variables explain the correlation between sexual attitudes and drug views. All together these studies suggest that sexual attitudes are central to understanding a range of moral views. Though experimental studies have begun to examine

the relationship between religion and reproductive strategies (e.g., Li et al., 2010;

McCullough, Carter, DeWall, & Corrales, 2012) more work needs to be pursued assessing the

causal relationships among political, moral, and ideological variables.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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Kurzban, R., & DeScioli, P., & Fein (in press). Hamilton vs. Kant: Pitting adaptations for altruism against adaptations for moral judgment. Evolution and Human Behavior.

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Table 1

Means and Standard Deviations of all variables

	Belgium		The Netherlands		Japan	
	M	SD	M	SD	M	SD
Drug Views	5.01	1.23	4.07	1.28	6.26	0.99
Sociosexuality	3.44	1.49	3.73	1.53	2.17	1.24
Sexual Disgust	2.91	1.16	2.64	1.24	4.34	1.32
Sexual Politics	4.09	1.08	3.48	1.20	4.59	1.60
Nonsexual Politics	4.04	0.73	3.98	0.66	5.06	0.71
Progressivism/LR	1.89	0.97	1.15	0.35	3.90	0.79
Religiosity	0.04	0.69	0.16	0.20	0.13	0.08
Moral Disgust	3.40	1.03	3.70	0.96	4.92	0.90
Pathogen Disgust	3.07	1.15	3.01	1.08	4.14	0.98
Individualizing	3.50	0.57	3.32	0.54	3.52	0.61
Binding	2.35	0.65	2.28	0.64	2.55	0.57
Conscientiousness	4.51	1.26	4.97	1.16	3.42	1.17
Agreeableness	4.84	1.01	5.21	0.92	4.59	1.16
Openness	5.42	1.00	5.42	0.86	4.12	1.31
Extraversion	4.57	1.42	4.78	1.24	3.90	1.37
Neuroticism	3.47	1.31	4.78	1.24	4.59	1.22

Table 2

Correlations in the Belgian Undergraduate Sample[a]

	Correlations with Drug Views (r)	Partial correlations, controlling for non-sexual items (r)	Partial correlations, controlling for sexual items (r)
Sociosexuality	-0.310**	-0.227**	
Sexual Disgust	0.308**	0.188**	
Sexual Politics	0.335**	0.274**	
Nonsexual Politics	0.203**		0.142*
Progressivism	0.175*		0.132
Religiosity	0.212**		0.154*
Moral Disgust	0.205**		0.098
Pathogen Disgust	0.075		0.012
Individualizing	0.067		-0.005
Binding	0.300**		0.192**
Conscientiousness	0.193**		0.101
Agreeableness	0.082		0.016
Openness	-0.094		-0.017
Extraversion	-0.078		0.128
Neuroticism	0.003		-0.023

Notes.

[a]All correlations between Drug Views and other items in the Belgian undergraduate sample

(n=476) are controlled for age and sex.

p < .01; **p* < .001

Table 3

Correlations in the Dutch Undergraduate Sample[a]

	Correlations with Drug Views (r)	Partial correlation, controlling for non-sexual items (r)	Partial correlations, controlling for sexual items (r)
Sociosexuality	-0.398**	-0.293**	
Sexual Disgust	0.338**	0.262**	
Sexual Politics	0.371**	0.184*	
Nonsexual Politics	0.252**		0.231**
Progressivism	0.314**		0.209*
Religiosity	0.291**		0.131
Moral Disgust	0.014		-0.102
Pathogen Disgust	-0.027		-0.068
Individualizing	-0.117		-0.170*
Binding	0.367**		0.178*
Conscientiousness	0.252**		0.170*
Agreeableness	0.116		0.044
Openness	-0.091		-0.072
Extraversion	-0.077		0.081
Neuroticism	0.013		0.009

Notes.

[a]All correlations between Drug Views and other items the Dutch undergraduate sample

(n=299) are controlled for age and sex.

p < .01; **p* < .001

Table 4

Correlations in the Japanese undergraduate sample[a]

	Correlations with Drug Views (r)	Partial correlation, controlling for non-sexual items (r)	Partial correlations, controlling for sexual items (r)
Sociosexuality	-0.267**	-0.178*	
Sexual Disgust	0.260**	0.150	
Sexual Politics	0.356**	0.256**	
Nonsexual Politics	0.007		-0.044
Left/Right-wing	-0.122		-0.088
Religiosity	-0.076		-0.055
LDP	-0.036		-0.051
DPJ	0.036		-0.020
Moral Disgust	0.265**		0.165*
Pathogen Disgust	0.011		-0.037
Individualizing	0.231**		0.180*
Binding	0.101		0.048
Conscientiousness	0.039		-0.032
Agreeableness	0.168*		0.083
Openness	-0.079		-0.060
Extraversion	-0.114		-0.069
Neuroticism	0.173*		0.151

Notes.

[a]All correlations between Drug Views and other items in the Japanese undergraduate sample

(n=296) are controlled for age and sex.

p < .01; **p* < .001

Table 5

Differences between Bivariate Correlations of Sexual Variables across Samples[a,b]

	Overall difference in correlations with Drug Views $\chi^2(df=3)$	p-value
Sociosexuality	8.1263	0.0435
Disgust_Sexual	4.9122	0.1783
Politics_Sexual	1.2909	0.7313

Notes.

[a]We used the bivariate correlations, i.e., uncontrolled for age and sex, for this analysis. The reason is that the reported correlations in Kurzban et al. (2010) are also the bivariate correlations, uncontrolled for age and sex.

[b]We did not do this analysis for the partial correlations (i.e., controlling for nonsexual variables), because we controlled for different nonsexual variables in different samples.

Appendix A : Survey questions for Belgium and the Netherlands (Drug Views, Religiosity, Sexual and Nonsexual Politics)

Drug Views

Please read the statements below and rate your agreement with the items that follow. 1= strongly disagree; 4 = neutral; 7 = strongly agree.

Eric is going to a dance party and is considering taking Ecstasy, an illegal mood-altering substance.

Using Ecstasy in this way is morally wrong:	1	2	3	4	5	6	7
Using Ecstasy in this way should be legally permitted:	1	2	3	4	5	6	7

Megan is hanging out with friends and is considering smoking cannabis, an illegal but tolerated ('gedoogd' in Dutch) mood-altering substance.

Using cannabis in this way is morally wrong:	1	2	3	4	5	6	7
Using cannabis in this way should be legally permitted:	1	2	3	4	5	6	7

John is on vacation and is considering taking cocaine, an illegal mood-altering substance.

Using cocaine in this way is morally wrong:	1	2	3	4	5	6	7
Using cocaine in this way should be legally permitted:	1	2	3	4	5	6	7

Claudia is going out and is considering taking speed, an illegal mood-altering substance.

Using speed in this way is morally wrong:	1	2	3	4	5	6	7
Using speed in this way should be legally permitted:	1	2	3	4	5	6	7

For the following items, please rate your agreement or disagreement.

People who use recreational drugs are dirty:	1	2	3	4	5	6	7
It is ok to obtain drugs for the purpose of making you feel good:	1	2	3	4	5	6	7

Religiosity

How religious are you? (1)Not at all religious   (4) Somewhat religious   (7) Very religious

1   2   3   4   5   6   7

How spiritual are you? (1)Not at all spiritual   (4) Somewhat spiritual (7) Very spiritual

1   2   3   4   5   6   7

These days, which of the following best describes how often you attend religious services?

(1)Never or almost never
(2)A few times a year
(3)About once a month
(4)About every week
(5)More than once a week

Which of the following best describes how often you pray in private, on your own?

(1)Never or almost never
(2)A few times a year
(3)About once a month
(4)About every week
(5)Several times a week
(6)About once a day
(7)Several times a day

Thinking ahead, ten or fifteen years from now, how often do you think you will attend religious services?

(1)Never or almost never
(2)A few times a year
(3)About once a month
(4)About every week
(5)More than once a week

Please indicate your level of support for the following items:

Promoting the use of the Dutch language:	1	2	3	4	5	6	7
More tax money to military defense:	1	2	3	4	5	6	7
Tougher restrictions against pornography on the Internet:	1	2	3	4	5	6	7
More police guards to prevent social disorder:	1	2	3	4	5	6	7
More binding EU rules to protect the environment:	1	2	3	4	5	6	7
Abolish the possibility of 'early prison release through good behavior':	1	2	3	4	5	6	7
More subsidized rental homes:	1	2	3	4	5	6	7
Increasing(B)/Decreasing(NL) the period in which abortion is legal:	1	2	3	4	5	6	7
Immigration exams for immigrants:	1	2	3	4	5	6	7
Higher unemployment benefits for the unemployed:	1	2	3	4	5	6	7
More tax money for foreign aid:	1	2	3	4	5	6	7
More attention for the value of relationships during sex education in schools:	1	2	3	4	5	6	7
Forbidding face-covering clothing:	1	2	3	4	5	6	7
To better inform and guide people with	1	2	3	4	5	6	7

excessive debt:

Stricter punishments for people who use violence:	1	2	3	4	5	6	7
Homosexual couples can adopt children:	1	2	3	4	5	6	7

Appendix B: Survey questions for Japan (Drug Views, Religiosity, Sexual and Nonsexual Politics)

Drug Views

Please read the statements below and rate your agreement with the items that follow. 1 = Strongly Disagree; 4 = Neutral; = 7 Strongly Agree

Eiji is going to a dance party and is considering taking MDMA, *an illegal mood-altering substance.*

Using MDMA in this way is morally wrong.	1	2	3	4	5	6	7
Using MDMA in this way should be legally permitted.	1	2	3	4	5	6	7

Megumi is hanging out with friends and is considering smoking marijuana, an illegal mood-altering substance.

Using marijuana in this way is morally wrong.   1   2   3   4   5   6   7
Using marijuana in this way should be legally permitted. 1   2   3   4   5   6   7

Takeshi is on vacation and is considering taking cocaine, an illegal mood-altering substance.

Using cocaine in this way is morally wrong.   1   2   3   4   5   6   7
Using cocaine in this way should be legally permitted.   1   2   3   4   5   6   7

Kumi is going out and is considering taking Speed, an illegal mood-altering substance.

Using Speed in this way is morally wrong   1   2   3   4   5   6   7
Using Speed in this way should be legally permitted   1   2   3   4   5   6   7

For the following items, please rate your agreement or disagreement.

People who use recreational drugs are dirty.   1   2   3   4   5   6   7
It is ok to obtain drugs for the purpose of
making you feel good.   1   2   3   4   5   6   7

Religiosity

How religious are you? (1)Not at all religious   (4) Somewhat religious   (7) Very religious

1   2   3   4   5   6   7

How spiritual are you? (1)Not at all spiritual   (4) Somewhat spiritual (7) Very spiritual

1   2   3   4   5   6   7

Which of the following best describes how often you offer incense at and put offerings on the family altar?

(1)Never or almost never
(2)A few times a year

(3)About once a month
(4)About every week
(5)Several times a week
(6)About once a day
(7)Several times a day

Which of the following best describes how often you visit the family grave?

(1)Never or almost never
(2)A few times a year
(3)About once a month
(4)About every week
(5)Several times a week
(6)About once a day
(7)Several times a day

Which of the following best describes how often you visit a local shrine/temple/church?

(1)Never or almost never
(2)A few times a year
(3)About once a month
(4)About every week
(5)Several times a week
(6)About once a day
(7)Several times a day

Which of the following best describes how often you engage in religious activities except for the ones described above?

(1)Never or almost never
(2)A few times a year
(3)About once a month
(4)About every week
(5)More than once a week

Thinking ahead, ten or fifteen years from now, how often do you think you will visit a local shrine/temple/church?

(1)Never or almost never
(2)A few times a year
(3)About once a month
(4)About every week
(5)More than once a week

Thinking ahead, ten or fifteen years from now, how often do you think you will engage in other public religious activities?

(1)Never or almost never
(2)A few times a year
(3)About once a month

(4)About every week
(5)More than once a week

Political items

Please indicate your level of support for the following items

(1)Strongly oppose
(4)Neutral
(7)Strongly support

Tougher restrictions against pornography on the Internet:	1	2	3	4	5	6	7
Tougher restrictions against online dating sites, from which compensated dating stems:	1	2	3	4	5	6	7
Paying for sex with a prostitute should be illegal:	1	2	3	4	5	6	7
Parents should not buy a mobile phone for their elementary school children:	1	2	3	4	5	6	7
Consumption tax should increase:	1	2	3	4	5	6	7
Tougher restrictions against smoking:	1	2	3	4	5	6	7
Futenma base of US Marine should relocate anywhere in Okinawa:	1	2	3	4	5	6	7
Sanctions over North Korea should be strengthened:	1	2	3	4	5	6	7
Death penalty should be abolished:	1	2	3	4	5	6	7
Politicians' corruption should be strictly punished:	1	2	3	4	5	6	7
Lifetime employment system should be ended:	1	2	3	4	5	6	7
Harsher punishment for violent criminals:	1	2	3	4	5	6	7
Higher taxes for the wealthy:	1	2	3	4	5	6	7
Expanded stem-cell research:	1	2	3	4	5	6	7
Legalized marriage between homosexuals:	1	2	3	4	5	6	7
Comprehensive sex education programs in public schools:	1	2	3	4	5	6	7