



From drug laws to recreational substance use: The adaptationist role of disgust sensitivity



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ABSTRACT

Disgust promotes evolutionary fitness by reducing contact with stimuli that pose pathogenic, sexual, and moral threats. One behavior that may be viewed as a threat to evolutionary fitness is substance use, which is associated with disease transmission, reproductive issues, and engagement in moral transgressions. However, the extent to which individual differences in disgust sensitivity are related to substance use is unclear. Across three studies, associations were examined among sexual, moral, and pathogen disgust sensitivity and beliefs and behaviors regarding substance use. Individuals with higher sexual and moral disgust sensitivity viewed drug laws as more important, endorsed greater punishment for breaking those laws, reported less engagement in substance use, and had lower intentions of engaging in future substance use. Greater sexual disgust was uniquely associated with stronger feelings of obligation to obey drug laws and fewer opportunities to engage in substance use offered by others. Furthermore, associations among sexual disgust, substance use intentions, and self-initiated behavior were partially mediated by beliefs about the harmfulness of substance use. Findings support the adaptationist role of disgust, and suggest that disgust sensitivity is an important individual difference in substance use beliefs and behaviors.

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1. Introduction

Substance use is an important public health concern that has prompted a long history of psychological inquiry (Hawkins, Catalano, & Miller, & 1992). Much of this work has sought to identify social contexts (Andrews, Tildesley, Hops, & Li, 2002), personality traits (Kotov, Gamez, Schmidt, & Watson, 2010), and emotional factors (Tschann et al., 1994) that account for variation in illicit drug use and abuse. One potentially important individual difference factor that has received considerably less empirically attention is disgust sensitivity. Disgust is an emotional response that is thought to motivate the avoidance of people and objects that pose reproductive, disease, or moral threats (Tybur, Lieberman, & Griskevicius, 2009). Thus, individuals who are more sensitive to disgust are more likely to engage in behaviors and endorse beliefs that limit contact with potential sexual, pathogen, and moral dangers (Deacon & Olatunji, 2007; Terrizzi, Shook, & McDaniel, 2013). Substance use is often viewed as a moral transgression (Robinson, Kurzban, & Jones, 2007), and many substances (e.g., drugs, alcohol, tobacco) contain toxins that contribute to the contraction of disease and decrease the likelihood of optimal reproduction (Kaushik, Kapila, & Prahara, 2011). As such, disgust sensitivity may play an important role in

attitudes toward and engagement in substance use. The purpose of this research was threefold. The first aim was to determine the extent to which sexual, pathogen, or moral disgust sensitivity are associated with support for drug laws. The second aim was to test whether similar associations were found between disgust sensitivity and actual substance use. The third aim was to examine potential mediators of the anticipated links between disgust sensitivity and engagement in substance use.

1.1. Disgust: An adaptationist perspective

Disgust evolved to prevent contact with contaminants (e.g., ingesting rotten food) that could make the individual sick and endanger the organism's survival (Darwin, 1872). As such, disgust often leads to prophylactic behaviors (e.g., vomiting, gagging) intended to expel or avoid the potential contaminant. Disgust may be evoked by a variety of different stimuli such as ingesting sour milk, the smell of rotten garbage, the sound of someone clearing phlegm from his or her throat, the thought of two siblings having sex, and seeing a person steal (e.g., Haidt, McCauley, & Rozin, 1994). Given the diversity of stimuli that may induce disgust, adaptationist models propose that disgust has evolved to serve specialized functions within three different domains (see Tybur, Lieberman, Kurzban, & DeScioli, 2013, for a review). *Pathogen disgust* is hypothesized to have evolved as a means of reducing contact with pathogens, and subsequently motivates the avoidance of

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contaminating microorganisms and other disease causing agents, such as dead bodies, rotten food, and bodily fluids. In contrast, *moral disgust* is thought to have evolved as a means of reducing contact with social norm violators (e.g., liars, cheaters), and motivates the avoidance of individuals who commit moral transgressions as a means of reducing the likelihood of becoming the victim of deviant acts. *Sexual disgust* is thought to have evolved as a means of reducing contact with objects that impede healthy reproduction or individuals that have poor mate quality (e.g., promiscuous or unhealthy sexual partners, incest), and motivates the avoidance of sexual partners and behaviors that may jeopardize successful procreation. Thus, disgust prompts the avoidance of disease-bearing microbial pathogens, deviant others, and stimuli that pose reproductive threats, in order to maintain opportunities for survival and reproductive success.

Although disgust is a universally recognized emotion (Ekman & Keltner, 1970), there is substantial individual variability in sensitivity to disgust. Disgust sensitivity has been characterized as a stable personality trait that is thought to motivate avoidant social behaviors and endorsement of beliefs that limit contact with stimuli that pose pathogenic, sexual, and moral threats (Terrizzi et al., 2013). Empirical evidence supports this adaptationist perspective of disgust and suggests that disgust sensitivity is an important individual difference in social behavior and cognition. For instance, previous research has found that those who are more sensitive to disgust are more behaviorally avoidant (Deacon & Olatunji, 2007). Additionally, several studies have found that individuals with greater disgust sensitivity endorse social and political beliefs that support avoidance of outgroup members, who may have been an historical source of pathogens (e.g., Terrizzi et al., 2013).

1.2. Disgust sensitivity and substance use

One topic that would seem to be related to disgust sensitivity but has received relatively little examination is recreational substance use, which may pose several distinct types of fitness-related threats. Many substances contain harmful toxins, and the use of certain substances often elicits disgust responses (e.g., the smell of tobacco or marijuana smoke, the bitter taste of alcohol). Additionally, those who use substances are at a greater likelihood of contracting and spreading infectious diseases (DeBeck et al., 2009; Gordon & Lowy, 2005; Wilson & DeHovitz, 1997). Thus, pathogen disgust sensitivity may be associated with substance use behaviors and beliefs.

Alcohol, marijuana, and tobacco use also pose several potential reproductive threats. Both male and female victims of sexual abuse (whether by known or unknown perpetrators) are often under the influence of drugs or alcohol during the time of the incident (e.g., Abbey, Saenz, & Buck, 2005), suggesting that certain forms of substance use may make individuals vulnerable for unwanted sexual contact. Substance use has also been directly linked with potential biological threats to healthy reproduction, as drug use is associated with infertility and reproductive issues in both men (Fronczak, Kim, & Barqawi, 2012) and women (e.g., Joesoef, Beral, Aral, Rolfs, & Cramer, 1993). Additionally, individuals rate substance users as being less healthy and less attractive compared to non-users (Clark, Klesges, & Neimeyer, 1992), which suggests that substance use may be an indicator of poor mate quality. As such, substance use beliefs and behaviors may be related to sexual disgust sensitivity.

Alcohol, tobacco, and illicit substance use are also typically viewed as moral and social transgressions (Killen, Leviton, & Cahill, 1991), and drug users are often stigmatized as social deviants (Room, 2005). Additionally, drug and alcohol use has been shown to play a direct, causal role in aggression, and those who engage in substance use are more likely to engage in delinquency and vandalism (Bushman, 1997; Ellickson, Tucker, & Klein, 2001). This research indicates that substance use itself may be a social transgression that increases the likelihood of engaging in other deviant behaviors and coming into contact with

deviant others. Accordingly, moral disgust sensitivity may be linked to beliefs about drug laws and engagement in substance use.

To date, no research has directly examined the intersection between disgust sensitivity and substance use. However, some evidence examining links among committed versus promiscuous sexual strategies and support for drug laws suggests that disgust sensitivity may be associated with beliefs about recreational substance use. Specifically, this research has shown that those with more committed sexual strategies (as indicated by lower sociosexuality, *higher sexual disgust*, and greater endorsement of conservative political attitudes about sexual issues) more strongly support laws that limit recreational drug use, potentially as means of reducing sexual promiscuousness and the affiliated threats to committed relationships (Kurzban, Dukes, & Weeden, 2010; Quintelier, Ishii, Weeden, Kurzban, & Braeckman, 2013). Linking sexual disgust with beliefs about drug laws is also consistent with the adaptationist view of disgust. Those who are more sensitive to sexual disgust are thought to endorse beliefs and engage in behaviors that reduce sexual contact with sub-optimal mates (Tybur et al., 2009). The promiscuousness and health concerns affiliated with substance use may indicate poor mate quality (Buss & Schmitt, 1993), and subsequently serve as input for the adaptive function of sexual disgust. Those who are more sensitive to sexual disgust may support drug laws to reduce contact with poor quality mates.

Although this research provides preliminary evidence that sexual disgust may be connected with beliefs about drug laws, there has not been a comprehensive examination of whether different forms of disgust sensitivity (moral, sexual, pathogen) are independently linked with beliefs about recreational drug use. Furthermore, the extent to which these associations extend to engagement in actual substance use has not been assessed. If disgust is meant to prompt the avoidance of stimuli that pose pathogenic, reproductive, and moral threats, those who are more sensitive to disgust across multiple domains may endorse greater support for drug laws, be less engaged in substance use, and be less inclined to seek out situations where substance use occurs to avoid the fitness costs affiliated with drug use and contact with drug users. Thus, a primary goal of this research was to examine whether multiple domains of disgust sensitivity are independently associated with beliefs about drug laws, actual engagement in substance use, and substance-seeking behaviors. Examining associations among disgust sensitivity and engagement in substance use may provide a more direct test of the adaptationist functions of disgust and simultaneously help explicate an important individual difference in recreational drug use and abuse.

1.3. Current research

The current research sought to systematically examine whether those who are more sensitive to pathogen, sexual, and moral disgust view personal substance use as harmful and threatening and are less likely to engage in substance use. Specifically, the current set of studies examined whether those who are more sensitive to pathogen, sexual, or moral disgust condemn other's drug use, feel a greater personal obligation to obey drug laws, report less frequent substance use during college, are less likely to seek out opportunities for substance use, and have lower intentions of using substances in the future. Based on previous work, it was expected that those who are more sensitive to disgust across domains would condemn others' drug use, endorse a greater obligation to personally obey drug laws, less frequently use substances during college, less frequently seek out opportunities for substance use, and have lower intentions of using substances in the future.

2. Study 1

The purpose of Study 1 was to examine whether disgust sensitivity across domains (pathogen, sexual, moral) was associated with a greater likelihood of endorsing beliefs concerning general support for drug laws (i.e., view them as important). Further, this study also sought to

determine whether disgust sensitivity was associated with beliefs that condemn others' drug use (i.e., view violations of drug laws as worthy of greater punishment) and those concerning a personal obligation to obey existing drug laws. It was expected that those with greater disgust sensitivity across domains would view drug laws as more important, but also view violations of these laws as worthy of greater punishment, and perceive that they have a personal obligation to obey them.

2.1. Method

2.1.1. Participants and procedure

Participants were 260 young adult community members recruited through Amazon's Mechanical Turk who received \$0.75 for their participation. Eleven participants were missing key dependent variables and were removed from all analyses. The final sample ($N = 249$; $M_{\text{age}} = 23.24$ years, $SD = 4.24$) was 56.5% female; 63.3% White/Caucasian, 7.7% African American, 6.2% Asian, 3.8% Hispanic/Latino, and 1.2% Native American. Thirty-one participants did not report their race/ethnicity.

The study was advertised on Amazon's Mechanical Turk targeting young adults (ages 18 to 24 years). Recruitment was restricted to only those in the United States with a hit percentage over 80%, and the survey was only available during regular waking hours (8 A.M. to 10 P.M. EST). Participants who self-selected into the study first completed a questionnaire that assessed general beliefs about laws, which included items about the importance of drug laws, severity of punishment for transgressions, and obligation to obey laws. Participants then completed measures of political ideology followed by a set of filler questions unrelated to the current study before completing the disgust sensitivity measures and demographic questions.

2.1.2. Measures

2.1.2.1. Disgust sensitivity. Disgust sensitivity was assessed with the Three Domains of Disgust Scale (TDDS; Tybur et al., 2009). The TDDS is a 21-item scale composed of three 7-item subscales that assess sensitivity to moral, pathogen, and sexual disgust. Items were rated on a 7-point scale ranging from 0 (*not at all disgusted*) to 6 (*very disgusted*). Example items include "Forging someone's signature on a legal document" (moral disgust), "Bringing someone you just met back to your room to have sex" (sexual disgust), and "Standing close to a person who has body odor" (pathogen disgust). Alphas ranged from 0.81 to 0.90.

2.1.2.2. Beliefs about drug laws. Beliefs about drug laws were assessed through ratings about the importance, deserved punishment for transgressing, and obligation to obey two different drug-related behaviors (i.e., using prescription pills not meant for you and using drugs such

as cocaine). Participants rated how important it is to have laws about these activities, how much punishment people should receive for breaking laws concerning these activities, and how obligated they are to obey laws concerning these activities (even when they do not agree with them). Responses were given on a 5-point scale ranging from 1 (*not at all important/no punishment/don't have to obey*) to 5 (*very important/A lot of punishment/definitely have to obey*). Alphas ranged from 0.73 to 0.81.

2.1.2.3. Political ideology. To ensure that findings were not due to overlapping variance among disgust sensitivity and political ideology (e.g., Terrizzi et al., 2013), 9 items ($\alpha = 0.73$) were included that assessed political ideology via support or opposition to four cornerstone issues (i.e., immigration, big business, environmentalism, gun control). These issues were selected because they do not overlap with specific sexual (e.g., abortion) or drug-related (e.g., marijuana legalization) topics. An example item includes "The government should not try to regulate gun ownership." All items were rated on a scale of 1 (*strongly disagree*) to 6 (*strongly agree*) with higher scores representing greater support for more conservative political ideology.

2.1.2.4. Demographics. Participants reported their age, gender, and race/ethnicity. Given previous research that has shown that religious identification is linked with less substance use (Marsiglia, Kulis, Nieri, & Parsai, 2005), participants reported their religious identification which was coded as 0 (*does not identify with a religion*) and 1 (*identifies with a religion*). Additionally, given previous research that has shown systematic variation in support for drug laws across education (Meares, 1997), participants also reported their highest level of completed education on a 9-point scale ranging from 1 (*completed 8th grade*) to 9 (*completed a doctoral degree or equivalent*).

2.2. Results

Table 1 displays means, standard deviations, and bivariate correlations for all study variables. Females and those who reported being religious viewed drug laws as more important and ascribed greater punishment for violations than males and those that did not affiliate with a religion. Individuals who were more sensitive to overall disgust, as assessed by the TDDS composite, viewed drug laws as more important, felt they had a greater obligation to obey them (even if they did not agree with them), and ascribed greater punishment to violations. Moral, pathogen, and sexual disgust sensitivity were each correlated with higher importance and punishment ratings. However, sexual disgust sensitivity was the only subscale correlated with higher obedience ratings. Political ideology and education level did not significantly correlate with any of the drug belief items.

Table 1

Means, standard deviations, and bivariate correlations for Study 1 variables.

	<i>M</i>	<i>SD</i>	2	3	4	5	6	7	8	9	10	11
1. Gender	—	—	0.09	0.10	−0.24***	0.27***	0.13	0.21**	0.32***	0.19**	0.15**	0.04
2. Religious affiliation	—	—		0.03	0.13*	0.24***	0.17**	0.21**	0.19**	0.22**	0.22***	0.10
3. Education	4.88	1.34			−0.12	0.02	0.12	−0.04	−0.02	−0.03	0.01	−0.05
4. Political ideology	2.74	0.80				0.01	0.01	−0.08	0.08	−0.03	0.07	−0.07
5. TDDS composite	4.14	1.15					0.76***	0.83***	0.85***	0.38***	0.36***	0.13*
6. Moral disgust	4.28	1.37						0.44***	0.43***	0.29***	0.26***	0.10†
7. Pathogen disgust	4.54	1.35							0.60***	0.29**	0.23***	0.07
8. Sexual disgust	3.51	1.51								0.34***	0.32***	0.15*
9. Importance	4.22	1.08									0.74***	0.57**
10. Punishment	3.86	1.09										0.63***
11. Obedience	4.09	1.49										

Note. TDDS = Three Domain Disgust Scale. Religious affiliation coded as 0 = not affiliated with a religion, 1 = affiliated with a religion. Gender coded as 1 = male, 2 = female.

† $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

Table 2
Study 1 multiple regression models predicting beliefs about drug laws.

	Importance of laws			Obligation to obey laws			Deserved punishment		
	B	SE	95% CI	B	SE	95% CI	B	SE	95% CI
Demographic covariates									
Gender	0.15	0.15	−0.14,0.43	−0.09	0.18	−0.45,0.28	0.15	0.16	−0.16,0.46
Education	−0.04	0.05	−0.13,0.05	−0.06	0.06	−0.18,0.06	−0.01	0.05	−0.11,0.09
Political ideology	−0.06	0.08	−0.22,0.09	−0.18	0.10	−0.37,0.02	0.06	0.09	−0.11,0.23
Religious affiliation	0.28*	0.12	0.04,0.53	0.23	0.16	−0.09,0.54	0.33*	0.13	0.06,0.59
Disgust sensitivity									
Moral disgust	0.11*	0.05	0.02,0.21	0.05	0.06	−0.07,0.18	0.11*	0.05	0.01,0.22
Pathogen disgust	0.03	0.06	−0.08,0.15	−0.08	0.07	−0.23,0.06	0.00	0.06	−0.12,0.12
Sexual disgust	0.14*	0.05	0.03,0.24	0.15*	0.07	0.01,0.28	0.15**	0.06	0.04,0.26
Adj R²	0.14			0.02			0.12		
F value (7, 252)	7.14***			1.73			6.26***		

Note. Gender coded as 1 = male, 2 = female. Religious affiliation coded as 1 = not affiliated with a religion, 2 = affiliated with a religion.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Three regression models were used to examine associations among the three domains of disgust subscales (sexual, pathogen, moral) and beliefs about drug laws controlling for gender, religious affiliation, education and political ideology (see Table 2). Higher levels of sexual and moral disgust sensitivity, but not pathogen disgust sensitivity, were associated with stronger beliefs about the importance of drug laws and amount of deserved punishment individuals should receive for breaking drug laws. Additionally, higher levels of sexual disgust sensitivity were associated with a stronger belief that individuals are obligated to obey drug laws, even when they do not agree with them.

2.3. Discussion

Results from the first study demonstrate that those who are generally more sensitive to disgust endorse greater beliefs about the importance of drug laws, support harsher punishment for drug offenses, and report more personal obligation to obey drug laws. However, associations among disgust and beliefs about drug laws appear to be domain specific. Both moral and sexual disgust sensitivity were associated with stronger beliefs about importance of drug laws and severity of punishment for others' drug use, and only sexual disgust was associated with beliefs that concern personal responsibility to adhere to drug laws. Individuals who are more sensitive to moral and sexual disgust may endorse stronger beliefs about the importance of drug laws and higher punishment for violations as a means of limiting contact with norm violators and promiscuous sexual partners (Kurzman et al., 2010), but those higher in sexual disgust may feel more obligation to obey drug laws themselves due to the potential reproductive concerns (e.g., increased risky sexual decision making, vulnerability to unwanted sexual contact, potential infertility) affiliated with personal drug use. These findings held even when controlling for theoretically-relevant covariates (e.g., political ideology, gender, religious affiliation, education) that have been linked with attitudes toward drug use in previous studies. Pathogen disgust was not uniquely associated with any of the beliefs about drug laws. Pathogen concerns involved with drug use may be less apparent and severe than moral and sexual threats.

Although findings from this study help to elucidate domain and belief specificity in associations between disgust sensitivity and views toward drug laws, it is still unknown whether those who are more sensitive to disgust are less likely to engage in actual substance use. Personal engagement in substance use may pose pathogen, sexual, and moral threats. Examining links between disgust sensitivity and substance use behavior may help identify an important individual

difference in recreational drug use, and provide further evidence to support the adaptationist role of disgust sensitivity.

3. Study 2

The purpose of Study 2 was to extend findings from Study 1 by examining associations among the disgust sensitivity domains and self-reported substance use during college. College is a time of significant transition for most students and a period marked by increased autonomy and exposure to substance use (Fromme, Corbin, & Kruse, 2008). Young adults who are more sensitive to disgust may be less inclined to engage in substance use during this transitional period when substance use is more normative and more widely available. To test this proposition, we examined associations among moral, sexual, pathogen disgust sensitivity and self-reported substance use. It was hypothesized that those higher in disgust sensitivity would report lower substance use. Furthermore, given that disgust sensitivity within the sexual domain (but not pathogen or moral domains) was uniquely associated with stronger beliefs about personal responsibility to obey drug laws (Study 1), it was expected that sexual disgust sensitivity would be uniquely associated with engagement in substance use.

3.1. Method

3.1.1. Participants and procedures

One hundred fifty-seven introductory psychology students from a mid-Atlantic state university completed the study during the first three weeks of the fall semester. Due to a computer error, 63 participants were missing key dependent variables and were removed from analyses.¹ Participants ($N = 94$; $M_{\text{age}} = 19.43$ years, $SD = 2.63$) were 58.9% female, 84.5% White/Caucasian, 3.0% Hispanic, 2.5% Black, and 3.6% 'other'.

Participants completed the study in person. Upon arrival to the lab, participants were seated in individual rooms with personal computers, given an overview of the study, and asked to sign a consent form. Participants then completed self-report measures of disgust sensitivity,

¹ Compared to the analytic sample, these participants did not significantly differ by gender ($\chi^2 = 2.54, p = 0.11$), ethnicity ($\chi^2 = 1.68, p = 0.79$), or on reports of moral disgust or pathogen disgust ($t(155) = -1.03$ to $-1.92, ps = 0.30$ to 0.06). However, those excluded from analyses were slightly older ($M = 20.15, SD = 3.78$) compared to those included ($M = 18.97, SD = 1.10; t(155) = -2.35, p = 0.02$) and reported slightly less sensitivity to sexual disgust ($M = 3.10, SD = 1.57$) compared to those included ($M = 3.74, SD = 1.60; t(155) = -2.51, p = 0.01$).

Table 3
Means, standard deviations, and bivariate correlations for Study 2 variables.

	<i>M</i>	<i>SD</i>	2	3	4	5	6	7	8	9
1. Gender	–	–	0.06	0.48***	–0.02	0.16	0.43***	0.54***	0.01	–0.01
2. Religious affiliation	–	–		0.15	0.15	0.08	0.11	0.16	–0.21*	–0.14
3. Political ideology	3.29	0.45			0.09	–0.04	0.13	0.12	–0.10	–0.08
4. TDDS composite	3.86	1.11				0.76***	0.74***	0.86***	–0.32**	–0.36***
5. Moral disgust	3.84	1.48					0.33***	0.42***	–0.33**	–0.37***
6. Pathogen disgust	4.24	1.18						0.55***	–0.13	–0.11 ⁺
7. Sexual disgust	3.48	1.61							–0.26*	–0.31**
8. Intensity substance use	2.64	1.48								0.90***
9. Breadth substance use	2.79	1.32								

Note. TDDS = Three Domain Disgust Scale. Gender coded as 1 = male, 2 = female. Religious affiliation coded as 1 = not affiliated with a religion, 2 = affiliated with a religion.

⁺ $p < 0.10$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

substance use, political ideology, demographics questions, and some measures unrelated to the current project. After completing the session, participants were thanked for their time and given course credit.

3.1.2. Measures

3.1.2.1. Disgust sensitivity. Similar to Study 1, disgust sensitivity was assessed with the TDDS (Tybur et al., 2009).

3.1.2.2. Substance use. To assess substance use, participants reported on the frequency with which they used a variety of different legal and illicit substances (i.e., marijuana, alcohol, other drugs, cigarette smoking, hookah smoking) since the beginning of the semester on a 5-point scale ranging from 1 (*never*) to 5 (*very often*). Two metrics concerning the intensity and breadth of substance use were calculated. *Intensity* of substance use represented the mean level of engagement across all substances ($\alpha = 0.77$). *Breadth* of substance use represented the variety of substances used and was calculated by dichotomizing (0 = *never used this substance*, 1 = *have used this substance*) and summing responses to each substance use item.²

3.1.2.3. Political ideology. Political ideology was measured with an expanded 42 item questionnaire (Shook & Clay, 2011; $\alpha = 0.92$) that assessed participants agreement with various political issues on a 5-point Likert scale ranging from 1 (*agree strongly*) to 5 (*disagree strongly*). A mean score was calculated with higher values representing greater endorsement of conservative ideology.

3.2. Results

Table 3 displays means, standard deviations, and bivariate correlations for all study variables. Individuals who identified with a religion engaged in a lower intensity of substance use. Greater general disgust sensitivity, as assessed by the TDDS composite, was correlated with lower intensity and breadth of substance use. When examining the three domains of disgust, moral and sexual disgust sensitivity, but not pathogen disgust sensitivity, were correlated with lower intensity and breadth of substance use. Gender and political ideology were not significantly correlated with intensity or breadth of substance use.

² Data collection occurred over the course of 33 days. Thus, participants who completed the study later in the semester would have had a longer period of time to use substances compared to those who completed the study earlier in the semester. To account for this potential confound, a weighted assessment time score was assigned to each participant that represented the number of days that had passed since the beginning of recruitment. Bivariate correlations indicated that neither intensity ($r = -0.04$, $p = 0.71$) nor breadth ($r = 0.00$, $p = 0.98$) of substance use were correlated with the assessment time. Additionally, the pattern of significant findings did not change when controlling for assessment time.

Two hierarchical regression models were used to test associations among the three domains of disgust and the breadth and intensity of substance use at the beginning of the semester (see Table 4). Gender, religious affiliation, and political ideology were included as covariates. Higher levels of moral and sexual disgust sensitivity, but not pathogen disgust sensitivity, were associated with lower breadth and intensity of substance use.

3.3. Discussion

The findings from Study 2 suggest that disgust sensitivity may be linked with actual engagement in substance use. Greater overall disgust sensitivity was correlated with lower substance use during college. Similar to Study 1, these associations followed domain-specific patterns, with greater sensitivity to moral and sexual disgust associated with a lower breadth and intensity of substance use. Whereas moral disgust is thought to have evolved as a means of avoiding social norm violations and communicating disapproval of social transgressions, sexual disgust is thought to have evolved as a means of reducing contact with stimuli that may pose reproductive threats and individuals with poor mate quality (Tybur et al., 2009). Substance use is viewed as a social transgression that has been affiliated with several sub-optimal reproductive behaviors (e.g., encountering unwanted sexual contact, engaging in sexually promiscuous behavior, not using contraceptives) and may communicate poor mate quality to others. Findings from this study support this adaptationist view of disgust sensitivity, and suggest that those who are more sensitive to moral and sexual disgust may have

Table 4
Study 2 multiple regression models predicting the intensity and breadth of substance use.

	Intensity of substance use			Breadth of substance use		
	B	SE	95% CI	B	SE	95% CI
Covariates						
Gender	0.55	0.38	–0.20, 1.30	0.61	0.40	–0.19, 1.42
Religious affiliation	–0.49	0.32	–1.14, 0.14	–0.29	0.33	–0.96, 0.38
Political ideology	–0.19	0.33	–0.84, 0.46	–0.16	0.35	–0.86, 0.53
Disgust sensitivity						
Pathogen disgust	0.06	0.18	–0.32, 0.75	0.16	0.19	–0.21, 0.54
Moral disgust	–0.27*	0.12	–0.49, –0.04	–0.33**	0.14	–0.61, –0.06
Sexual disgust	–0.25*	0.13	–0.50, –0.01	–0.33*	0.12	–0.58, –0.09
Adj. R²	0.13			0.16		
F value (6,87)	3.20**			3.88**		

Note. Gender coded as 1 = male, 2 = female. Religious affiliation coded as 1 = not affiliated with a religion, 2 = affiliated with a religion.

* $p < 0.05$.

** $p < 0.01$.

less frequent contact (both in terms of amount and variety) with illicit and legal substances.

Although these findings suggest that those who are more sensitive to moral and sexual disgust may be more avoidant of substance use during college, it is still unknown whether individuals who are more sensitive to disgust avoid substances themselves or others who provide opportunities to engage in substance use. Individuals who are lower in disgust sensitivity may be more likely to find themselves in situations (e.g., college party) that involve drugs, not that they specifically seek out opportunities to use substances. To more accurately understand the relation between substance use and disgust, it is important to determine whether sexual and moral disgust sensitivity are linked with tendencies to intentionally seek out substance use or place oneself in contexts where others may offer substances.

Additionally, it is important to identify potential mechanisms that may underlie associations between disgust sensitivity and substance use. The moral and sexual threats affiliated with alcohol, drugs, and tobacco use entail harm (whether to the self, others, or both). Previous research has shown that individuals vary in the degree to which they view substance use as harmful, and this variability is an important predictor of engagement in drug use (e.g., Arria, Caldeira, Vincent, O'Grady, & Wilsh, 2008). Individuals higher in disgust sensitivity may be more concerned about the potential harm affiliated with substance use and subsequently have lower inclinations to seek out opportunities to use substances as means of avoiding harm. Thus, in Study 3, we examined whether links between disgust sensitivity and substance use are mediated by beliefs about the perceived harmfulness of substances.

4. Study 3

The purpose of Study 3 was to further examine the intersection between disgust sensitivity and substance use by testing associations among the three domains of disgust and the frequency with which individuals seek out and are offered opportunities to engage in substance use. To gain a more comprehensive understanding of the link between disgust sensitivity and substance use, we also examined whether disgust sensitivity was associated with substance use prior to college and intended substance use in the future. Further, previous research has shown that substance use tendencies systematically vary by personality characteristics (e.g., behavioral inhibition and activation; Franken & Muris, 2006), and trait negative affect (Wills, Sandy, Shinar, & Yaeger, 1999). Thus, to ensure the findings from Study 2 were not due to shared variance among disgust sensitivity, negative affect, and personality, these constructs were controlled. An additional goal of this study was to examine whether beliefs about the harmfulness of substance use mediate associations among disgust sensitivity and the extent to which individuals are offered, seek out, or intend to use substances. If disgust prompts the avoidance of harmful stimuli, those who are more sensitive to disgust may view engaging in substance use as more harmful, and these beliefs may partially explain links between disgust sensitivity and substance use.

4.1. Method

4.1.1. Participants and procedure

Participants were 136 introductory psychology students from a mid-Atlantic state university ($M_{\text{age}} = 20.07$ years, $SD = 4.47$), who participated for course credit. Participants were 57.4% female, 84.6% White/Caucasian, 5.9% Black, 3% Hispanic/Latino, and 4.6% 'other'.

The procedure for Study 3 was similar to Study 2. Upon arrival to the lab, participants were seated in individual rooms with personal computers, given an overview of the study, and asked to sign a consent form. After completing all of the measures, participants were thanked and given credit.

4.1.2. Measures

4.1.2.1. Disgust sensitivity. Similar to Study 1 and Study 2, disgust sensitivity was assessed with the TDDS (Tybur et al., 2009).

4.1.2.2. Substance use indices. Similar to Study 2, participants rated the frequency with which they used substances (i.e., marijuana, alcohol, other drugs, cigarette smoking, hookah smoking) prior to attending college on a scale from 1 (*never*) to 5 (*all the time*), whether they planned on using these substances in the future on a 5-point scale ranging from 1 (*not at all*) to 5 (*definitely will*), how often they seek out opportunities to use substances on a scale from 1 (*never*) to 5 (*all the time*), and how often others have provided opportunities for them to use substances on a scale from 1 (*never*) to 5 (*all the time*). Composite scores were created for each category (i.e., prior use, planned, sought out, and provided opportunity to use substances) by averaging across all of the substances ($\alpha = 0.67$ to 0.81). Additionally, participants completed ratings about the harmfulness of each substance on a 5-point scale ranging from 1 (*not at all harmful*) to 5 (*very harmful*). A composite harmfulness score was created by averaging across harmfulness ratings of each of the substances ($\alpha = 0.68$).

4.1.2.3. Personality characteristics and trait negative affect. Participants completed the BIS/BAS scale (Gray, 1987) which consisted of 20 items that assessed behavioral inhibition (7 items; $\alpha = 0.62$) and activation. The behavioral activation dimension of the BIS/BAS scale is further delineated into 3 subscales: Fun Seeking (BAS-Fun; 4 items $\alpha = 0.83$), Reward Responsiveness (BAS-Reward; 5 items $\alpha = 0.85$), and Drive (BAS-Drive; 4 items $\alpha = 0.78$). Example items include "Criticism or scolding hurts me quite a bit" (BIS), "When I'm doing well at something I love to keep at it" (BAS-Reward), "I'm always willing to try something new if I think it will be fun" (BAS-Fun), and "I go out of my way to get things I want" (BAS-Drive). Participants rated the extent to which they agreed with each item on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Additionally, trait negative affect was assessed utilizing 5 items ($\alpha = 0.72$) taken from the Affect Valuation Index (Tsai, Knutson, & Fung, 2006). Participants rated the degree to which they felt fearful, hostile, nervous, sad, and unhappy in a typical week on a 5-point scale ranging from 1 (*never*) to 5 (*all the time*).

4.1.2.4. Political ideology. Participants completed the same measure of political ideology used in Study 2 (Shook & Clay, 2011).

4.2. Results

Table 5 displays bivariate correlations, means, and standard deviations for all study measures. Females engaged in less substance use prior to college and viewed substance use as more harmful than males. Greater endorsement of conservative political ideology was correlated with lower planned and sought out substance use and stronger beliefs that substance use is harmful. Higher endorsement of BIS was correlated with lower substance use prior to college, and greater BAS-Reward was correlated with stronger beliefs that substance use is harmful. Greater BAS-Fun was correlated with greater substance use prior to college, planned, offered, and sought out substance use. Trait negative affect was not significantly correlated with substance use. Greater overall, sexual, and moral disgust sensitivity were correlated with less substance use before attending college, lower intended substance use, lower frequency of seeking out substances, and fewer opportunities to engage in substance use offered by others. Overall and sexual disgust sensitivity were correlated with stronger beliefs that substances are harmful.

Multiple regression models were conducted in which moral, pathogen, and sexual disgust sensitivity were simultaneously entered as predictors of prior, planned, sought out, and offered substance use as well as beliefs about the harmfulness of substance use. Demographic (gender, religious affiliation, political ideology) and personality characteristics

Table 5
Means, standard deviations, and bivariate correlations for Study 3 variables.

	M	SD	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Gender	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Rel. affiliation	—	—	—0.17*	—0.24**	—0.02	0.11	0.12	0.05	0.16	0.34**	0.11	0.17	0.46**	—0.24**	—0.07	—0.16	—0.01	0.20*
3. Political ideology	2.77	0.57	0.49**	0.00	—0.02	—0.02	0.06	0.06	—0.08	0.12	0.04	0.03	0.18*	—0.03	—0.09	—0.01	—0.08	0.13
4. Negative affect	2.01	0.65	—0.04	—0.04	—0.13	0.07	—0.02	—0.16	—0.16	0.24**	0.15	0.09	0.27**	0.01	—0.27**	—0.17*	—0.16	0.31**
5. BIS	2.76	0.51	0.18*	0.18*	0.18*	—0.03	—0.10	0.06	—0.18*	—0.05	—0.18*	0.07	0.01	0.13	0.13	0.16	0.08	0.10
6. BAS-Reward	3.61	0.51	—0.24**	—0.24**	—0.13	0.14	—0.13	—0.24**	—0.24**	0.09	0.02	—0.03	0.19*	—0.18*	—0.11	—0.10	—0.09	0.03
7. BAS-Drive	2.96	0.69	0.43**	0.20*	0.43**	—	0.20*	0.20*	0.36**	0.12	0.08	0.07	0.10	—0.02	—0.06	—0.06	0.02	0.21*
8. BAS-Fun	3.09	0.66	—0.01	—0.01	—0.01	—	—0.01	—0.01	—0.08	0.08	0.08	0.08	—0.08	0.13	0.02	0.05	0.11	—0.02
9. TDDS composite	4.47	0.94	0.74**	0.74**	0.74**	—	0.74**	0.74**	—0.06	0.07	0.07	0.07	—0.14	0.27**	0.32**	0.32**	0.23**	—0.08
10. Moral disgust	4.70	1.33	0.65**	0.65**	0.65**	—	0.65**	0.65**	—0.06	0.07	0.07	0.07	—0.14	0.27**	0.32**	0.32**	0.23**	—0.08
11. Pathogen disgust	4.72	1.00	0.82**	0.82**	0.82**	—	0.82**	0.82**	—0.06	0.07	0.07	0.07	—0.14	0.27**	0.32**	0.32**	0.23**	—0.08
12. Sexual disgust	3.99	1.44	0.74**	0.74**	0.74**	—	0.74**	0.74**	—0.06	0.07	0.07	0.07	—0.14	0.27**	0.32**	0.32**	0.23**	—0.08
13. Prior sub. use	1.74	0.73	0.38**	0.38**	0.38**	—	0.38**	0.38**	—0.06	0.07	0.07	0.07	—0.14	0.27**	0.32**	0.32**	0.23**	—0.08
14. Planned sub. use	1.95	0.80	0.21*	0.21*	0.21*	—	0.21*	0.21*	—0.06	0.07	0.07	0.07	—0.14	0.27**	0.32**	0.32**	0.23**	—0.08
15. Seek sub. use	1.92	0.81	0.38**	0.38**	0.38**	—	0.38**	0.38**	—0.06	0.07	0.07	0.07	—0.14	0.27**	0.32**	0.32**	0.23**	—0.08
16. Offered sub.	2.77	1.12	0.38**	0.38**	0.38**	—	0.38**	0.38**	—0.06	0.07	0.07	0.07	—0.14	0.27**	0.32**	0.32**	0.23**	—0.08
17. Harmful sub. use	3.72	0.75	0.40**	0.40**	0.40**	—	0.40**	0.40**	—0.06	0.07	0.07	0.07	—0.14	0.27**	0.32**	0.32**	0.23**	—0.08

Note. TDDS = Three Domain Disgust Scale. BIS = Behavior Inhibition System. BAS = Behavioral Activation System. Gender coded as 1 = male, 2 = female. Religious affiliation coded as 1 = not affiliated with a religion, 2 = affiliated with a religion.

+ $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$.

(trait negative affect, BIS, BAS-Reward, BAS-Drive, BAS-Fun) were controlled in all of these analyses (see Table 6). Those with higher levels of moral and sexual disgust sensitivity engaged in lower substance use prior to college, had lower intentions of using substances in the future, and sought out fewer opportunities to use substances. Further, those with higher levels of sexual disgust sensitivity were offered fewer opportunities to use substances and viewed substance use as more harmful. Additionally, those higher in pathogen disgust were more likely to seek out substance use.³

The PROCESS macro (Hayes, 2012) was used to test whether sexual disgust sensitivity was indirectly associated with the extent to which individuals are offered, seek out, or intend on using substances through harmfulness judgments. After controlling for gender, religious affiliation, political ideology, trait negative affect, BIS, BAS-Drive, BAS-Fun, BAS-Reward, pathogen disgust sensitivity, and moral disgust sensitivity, sexual disgust sensitivity was indirectly associated with planned substance use and actual substance-seeking behavior through harmfulness judgments (see Figs. 1 and 2, respectively). Participants who were more sensitive to sexual disgust viewed substances as more harmful and subsequently had lower intentions of engaging in future substance use and sought out fewer opportunities to use substances. Sobel tests indicate that including the harmfulness judgment in each model accounted for a significant amount of variance in the association between sexual disgust sensitivity and intended future substance use (see Fig. 1) and substance-seeking behavior (see Fig. 2). Indirect effects of harmfulness judgments on opportunities to engage in substance use offered through others was not significantly mediated through harmfulness judgments ($B = 0.01, SE = 0.05, 95\% CI [-0.10, 0.10]$).⁴

4.3. Discussion

The findings from Study 3 indicate that disgust sensitivity may motivate the intentional avoidance of substance use and contexts where one is likely to have an increased chance of being offered substances. Overall disgust sensitivity was correlated with lower substance use prior to college, lower intentions to use substances, lower sought-out opportunities to use substances, and fewer offered opportunities to engage in substances by others. Furthermore, similar to Study 1 and Study 2, associations among disgust sensitivity and substance use differed across domains. After controlling for a host of theoretically relevant covariates, those higher in sexual and moral disgust sensitivity engaged in less substance use prior to college, had lower intentions to use substances, and were less likely to seek out opportunities to use substances. Further, those higher in sexual disgust sensitivity were less often offered opportunities to engage in substances by others and viewed substance use as more harmful. One potential reason why those with higher levels of sexual disgust sensitivity are less likely to seek out and intend on engaging in substance use is because of stronger beliefs that using substances is harmful. Moral disgust sensitivity was not associated with harmfulness ratings, indicating that individuals who are more sensitive to sexual disgust may be more aware of or view the harm that accompanies use as more serious, and thus be less likely to seek out or intend on using substances. Together, these findings provide some support for the adaptationist perspective of disgust, and indicate that the sexual threats and potential moral implications that accompany substance

³ Bivariate correlations indicate that pathogen disgust is not significantly correlated (trending negative) with frequency of seeking out substance use. Given the moderate, positive correlations among the three domains of disgust (Table 5), the positive association among pathogen disgust and frequency of seeking out substance use may likely be due to suppression (Darlington, 1968).

⁴ Alternative models were tested that specified intent, sought out, and offered substance use as the mediator and harmfulness judgments as the outcome. None of the indirect effects were significant across all three models (i.e., all 95% CIs included zero), indicating that substance use indicators did not mediate associations among sexual disgust and harmfulness judgments.

Table 6
Study 3 multiple regression models predicting planned, sought out, and offered substance use, and harmfulness beliefs.

	Prior substance use			Planned substance use			Seek out substances			Offered substances			Harmfulness of substances		
	B	SE	95% CI	B	SE	95% CI	B	SE	95% CI	B	SE	95% CI	B	SE	95% CI
Demographics															
Gender	-0.13	0.14	-0.41,0.15	0.10	0.15	-0.19,0.40 ⁺	0.02	0.15	-0.27,0.32	0.35	0.24	-0.11,0.82	0.05	0.14	-0.23,0.33
Rel. affiliation	-0.08	0.13	-0.34,0.18	0.15	0.14	-0.13,0.42	0.21	0.14	-0.06,0.49	0.07	0.22	-0.36,0.51	-0.09	0.13	-0.35,0.18
Pol. ideology	0.20	0.12	-0.05,0.45	-0.18	0.13	-0.43,0.08	-0.06	0.13	-0.31,0.20	-0.01	0.21	-0.42,0.39	0.26*	0.12	0.01,0.51
Personality															
Negative affect	0.10	0.09	-0.07,0.28	0.06	0.09	-0.12,0.24	0.10	0.09	-0.08,0.28	0.12	0.15	-0.18,0.40	0.14	0.09	-0.04,0.31
BIS	-0.07	0.12	-0.31,0.17	-0.01	0.13	-0.26,0.24	0.05	0.13	-0.20,0.29	-0.04	0.20	-0.44,0.35	-0.16	0.12	-0.40,0.08
BAS-Reward	-0.04	0.12	-0.28,0.21	-0.05	0.13	-0.30,0.21	-0.06	0.13	-0.32,0.19	0.05	0.20	-0.35,0.45	0.29*	0.12	0.05,0.54
BAS-Drive	0.06	0.10	-0.13,0.25	-0.13	0.10	-0.32,0.07	-0.08	0.10	-0.28,0.11	0.03	0.16	-0.28,0.34	-0.04	0.10	-0.23,0.15
BAS-Fun	0.23*	0.10	0.04,0.43	0.31**	0.10	0.11,0.52	0.33**	0.10	0.13,0.53	0.20	0.16	-0.12,0.52	-0.05	0.10	-0.24,0.14
Disgust sensitivity															
Path. disgust	0.05	0.06	-0.07,0.17	0.13	0.06	-0.01,0.25	0.14*	0.06	-0.25,-0.06	0.04	0.10	-0.16,0.24	-0.06	0.06	-0.14,0.05
Moral disgust	-0.13**	0.06	-0.21,-0.04	-0.14**	0.05	-0.23,-0.04	-0.15**	0.05	0.12,0.27	-0.09	0.08	-0.24,0.06	-0.04	0.05	-0.18,0.06
Sexual disgust	-0.15**	0.05	-0.26,-0.04	-0.22**	0.06	-0.34,-0.10	-0.25**	0.06	-0.36,-0.13	-0.31**	0.09	-0.49,0.12	0.26**	0.06	0.15,0.37
Adj R²															
	0.24			0.31			0.35			0.13			0.29		
F value (11,124)															
	4.89**			6.58**			7.52**			2.79**			5.95**		

Note. BIS = Behavior Inhibition System. BAS = Behavioral Activation System. Path = pathogen. Religious affiliation coded as 1 = not affiliated with a religion, 2 = affiliated with a religion.
⁺ $p < 0.10$.
 * $p < 0.05$.
 ** $p < 0.01$.

use may prompt avoidance by individuals who have stronger disgust reactions to moral and sexual issues.

5. General discussion

Engagement in substance use poses an important personal and social health concern. Identifying individual differences in substance use tendencies may help elucidate the mechanisms responsible for variation in substance use, highlight potential points of intervention, and contribute to theory on personality and individual differences. The current set of studies demonstrates that disgust sensitivity may have important implications for beliefs about drug laws and engagement in substance use. Disgust is thought to increase the likelihood of survival and reproductive success by prompting the avoidance of people and objects that pose pathogen, moral, and sexual threats. Legal and illicit substances may be one potential source of pathogen, reproductive, and moral concerns. Across three studies with undergraduate and community samples, we demonstrated that higher levels of general disgust sensitivity was correlated with greater support for regulation of recreational drugs and lower engagement in substance use. Furthermore, the link between disgust sensitivity and substance use was domain specific, with moral and sexual (but not pathogen) disgust sensitivity both emerging as individual differences in substance use behavior and beliefs. Importantly, these findings held after accounting for demographic

covariates and other personality dimensions, including trait negative affect and BIS/BAS.

Disgust sensitivity is proposed to be an evolved psychological mechanism that has been co-opted to prompt the avoidance of people and objects that may jeopardize fitness through reproductive (sexual disgust) and moral threats (moral disgust). Legal and illicit substances pose both moral and sexual concerns which may be incurred through contact with others who use substances or personal drug use. Substance use by others may increase the likelihood of coming into contact with promiscuous or unhealthy (sub-optimal) sexual partners (e.g., Tybur et al., 2013), and personal substance use increases the likelihood of engaging in risky sexual behaviors (e.g., Abbey et al., 2005) and may communicate poor mate quality to others (Clark et al., 1992). Furthermore, whether implemented by oneself or others, substance use has been typically characterized as a stigmatized social transgression (Room, 2005). Findings across all three studies support this adaptationist view of moral and sexual disgust. Specifically, sensitivity to both moral and sexual disgust were independently associated with beliefs about the condemnation of others' drug use (Study 1), less personal substance use during college (Study 2), and less personal substance use prior to college (Study 3). Further, sexual and moral disgust sensitivity were both linked to lower intentions of engaging in future substance use and seeking out opportunities to engage in substance use during college (Study 3).

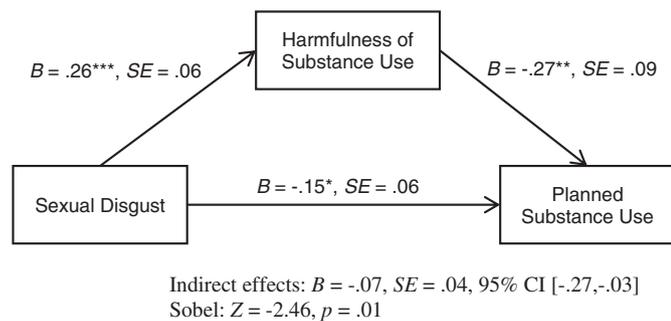


Fig. 1. Indirect effects of sexual disgust on planned substance use through harmfulness judgments. Note: analysis controlled for gender, religious affiliation, political ideology, BIS, BAS-Fun, BAS-Reward, BAS-Drive, trait negative affect, moral disgust sensitivity, and pathogen disgust sensitivity. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

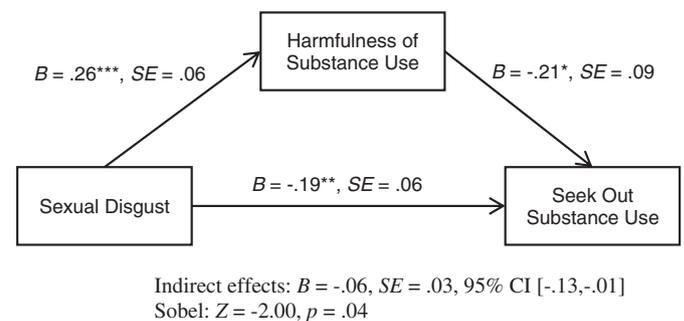


Fig. 2. Indirect effects of sexual disgust on seek out substance use through harmfulness judgments. Note: analysis controlled for gender, religious affiliation, political ideology, BIS, BAS-Fun, BAS-Reward, BAS-Drive, trait negative affect, moral disgust sensitivity, and pathogen disgust sensitivity. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Support for the adaptationist model of disgust sensitivity was particularly evident with sexual disgust. Sexual disgust sensitivity was uniquely associated with beliefs about one's obligation to obey drug laws and with potential avoidance of contexts where others are using substances, which was indicated by less frequent opportunities to engage in substance use offered by others. These findings suggest that concerns of avoiding poor mate choices or altered states of mind that leave one potentially vulnerable to unwanted sexual advances may be an important individual difference in substance use. This interpretation is also consistent with evolutionary theory regarding sexual strategies, which proposes that those with more conservative mating strategies may support beliefs and engage in behaviors that limit contact with promiscuous others (Kurzban et al., 2010). Further, sexual (but not moral or pathogen) disgust sensitivity was uniquely associated with greater beliefs about the harmfulness of substance use, and these beliefs mediated associations with sought-out and intended substance use. Individuals who were more sensitive to sexual disgust may focus on the sexual risks that are affiliated with substance use, which may be more prevalent, serious, and longstanding (e.g., pregnancy from an uncommitted or unhealthy partner) than the potential moral or pathogen risks. Subsequently, individuals who are more sensitive to sexual disgust may avoid substances so as not to incur the accompanied cost. In contrast, harmfulness ratings did not explain links between moral disgust sensitivity and substance use indices. Potentially, those who are more sensitive to moral disgust may be more concerned with the social norm violation affiliated with substance use rather than the harm that it may pose to the self or others. Future research is needed to examine whether links between moral disgust and intentions to engage in substance use vary based on the cultural norms that surround drug use.

Pathogen disgust was not associated with engagement in substance use. Although a variety of different substances were assessed in the current set of studies, these substances (e.g., alcohol, marijuana) may not have posed severe pathogen concerns as compared to other drugs (e.g., heroin, cocaine). In particular, drugs that are more commonly administered with syringes may be associated with pathogen disgust sensitivity. Future research is needed to examine the link between disgust sensitivity and a wider array of drug use.

5.1. Limitations

Findings from the current research should be taken in light of certain limitations. Data across all studies were correlational and thus, no causal inference can be drawn. Experimental evidence is needed to examine whether induced disgust predicts willingness to engage in substance use or beliefs about drug laws. Additionally, retrospective reports of substance use were used in Studies 2 and 3, which may be subject to recall bias. Future research is needed to examine whether disgust sensitivity is longitudinally associated with actual substance use.

5.2. Conclusion

Disgust originally evolved to protect individuals from coming into contact with harmful toxins. However, it has been theorized that the disgust system was co-opted to serve multiple adaptive purposes by reducing contact with risky sexual partners and social norm violators (Tybur et al., 2009). A growing body of evidence has demonstrated that disgust may guide social beliefs and behavior (Deacon & Olatunji, 2007; Terrizzi, Shook, & Ventis, 2010). Consistent with the adaptationist view of disgust, findings from this research contribute to this body of evidence by demonstrating that disgust sensitivity is linked with the avoidance of substance use and broader social beliefs about recreational drugs.

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