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Smells Like Safe Sex: Olfactory Pathogen Primes Increase Intentions to Use Condoms

Joshua M. Tybur, Angela D. Bryan, Renee E. Magnan,
and Ann E. Caldwell Hooper

University of New Mexico

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Avoiding infectious disease is a fundamental, universal human motivation (Kenrick, Griskevicius, Neuberg, & Schaller, 2010). However, maximal pathogen avoidance is impossible, as many adaptive behaviors involve some risk of exposure to an infectious disease. Sexual intercourse, for example, is necessary for reproduction, but it also increases risk for numerous infectious diseases, including chlamydia, gonorrhea, syphilis, and HIV. Natural affective systems (e.g., disgust) help mitigate such risks by motivating people to avoid risky sexual interactions (Stevenson, Case, & Oaten, in press; Tybur, Lieberman, & Griskevicius, 2009). Additionally, some technologies (e.g., condoms) drastically reduce the threat of infectious disease posed by sex (Holmes, Levine, & Weaver, 2004). Indeed, correct use of a condom during an act of penile-vaginal intercourse can reduce the probability of transmission from an HIV-positive man to his HIV-negative female partner by 95% (Pinkerton & Abramson, 1997).

When ecological cues for pathogen threat are salient, cognitive and motivational systems appear to encourage myriad pathogen-avoidance behaviors (Ackerman et al., 2009; Faulkner, Schaller, Park, & Duncan, 2004; Mortensen, Becker, Ackerman, Neuberg, & Kenrick, 2010). Operating from the presumption that fundamental motivations to avoid pathogens can influence prophylactic behaviors, we aimed to test a novel hypothesis related to condom use: that ecological cues for the presence of pathogens would increase intentions to use condoms.

Method

Ninety-nine undergraduate psychology students (66 women, 33 men) participated in this experiment one at a time in exchange for course credit. Seventy-four percent of participants reported having had sexual intercourse with at least one partner in the past year, as assessed by an item on the revised Sociosexuality Orientation Inventory (SOI-R; Penke & Asendorpf, 2008). At the beginning of the experimental

session, an experimenter informed participants that pipes in the building were sporadically emitting unpleasant odors because of plumbing issues. Participants were then asked to leave the study room to drink at a nearby water fountain in preparation for providing a saliva sample. After returning, they completed a series of questionnaires on a laptop. The questionnaires included measures of attitudes toward condoms, condom self-efficacy (i.e., belief in one's ability to successfully use condoms), and perceptions of condom norms (i.e., frequency of condom use among peer groups), all of which are theoretically related to intentions to use condoms (e.g., Bryan, Rocheleau, Robbins, & Hutchison, 2005), as well as the behavioral component of the SOI-R, which assesses history of casual sexual encounters. After completing these measures, participants provided saliva and were again asked to leave the room to drink at the water fountain. Participants were then randomly assigned to a condition (pathogen prime vs. control). The experimenter was blind to condition up to this point.

In the pathogen-prime condition, while participants were out of the room, the experimenter sprayed the wall of the room with a single pump of "Liquid ASS," a novelty odor liquid that smells strongly of common bacterial threats (e.g., feces). In the control condition, the experimenter did not administer the spray. After returning from getting water, participants reported their intentions to purchase and use condoms over the next 6 months. Participants were asked to use a scale from 1 (*not at all likely*) to 7 (*extremely likely*) to rate the likelihood of their buying condoms, carrying condoms, discussing condoms with a sex partner, and using condoms during every event of sexual intercourse. Responses to these four items were averaged ($\alpha = .79$). To examine the specificity of the manipulation, we asked participants to rate the friendliness of the experimenter, how

Corresponding Author:

Joshua M. Tybur, Department of Psychology, University of New Mexico,
 Logan Hall B38E, Albuquerque, NM 87106
 E-mail: tybur@unm.edu

interesting the study was, and how pleasant the temperature, smell, and lighting in the room were. Participants also reported their current affect using the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988).

Results

An independent-samples *t* test demonstrated that participants in the pathogen-prime condition reported greater intentions to use condoms ($M = 4.48$, $SD = 1.70$) than did participants in the control condition ($M = 3.74$, $SD = 1.85$), $t(97) = 2.06$, $p < .05$, $d = 0.42$. The effect was identical across individuals who had and had not had sexual intercourse in the past year, $F(1, 95) = 0.13$, $p = .72$, and persisted after controlling for gender, SOI-R, and baseline condom attitudes, norms, and self-efficacy, $t(92) = 2.03$, $p < .05$, semipartial $r = .17$ (see Table 1). Participants in the pathogen-prime condition rated the room as smelling worse than did participants in the control condition, $t(80)^1 = 4.17$, $p < .0001$, $d = 1.09$. However, the groups did not differ in positive or negative affect ($ps > .49$), nor did they differentially rate how friendly the experimenter was, how interesting the study was, or how pleasant the room's temperature or lighting was (all $ps > .12$).

Discussion

As predicted, participants exposed to pathogen cues reported greater intentions to use condoms than did participants in the control condition. Indeed, the pathogen prime accounted for more unique variance in intentions to use condoms than did condom attitudes and perceptions of condom norms, both of which are commonly viewed as critical predictors of intentions to use condoms (Bryan et al., 2005). Further, the manipulation was highly specific to olfaction; it did not influence other perceptual systems or general affect.

Table 1. Bivariate and Semipartial Correlations Between Predictors and Intentions to Use Condoms

Predictor	Mean	SD	α	r	Semipartial r
Pathogen prime	.55	.50	—	.21	.17
Gender	.38	.49	—	.13	.08
SOI behaviors	4.07	2.33	.76	.43	.41
Condom self-efficacy	5.73	0.83	.90	.36	.27
Condom attitudes	5.14	1.23	.80	.22	.13
Condom norms	5.02	1.40	.81	.07	.04

Note: Pathogen prime and gender were measured dichotomously, with 0 corresponding with control condition and female gender, and 1 corresponding with pathogen-prime condition and male gender. The score for Sociosexuality Orientation Inventory (SOI; Penke & Asendorpf, 2008) behaviors is a composite of three items measured on a 9-point scale, with higher values indicating a greater history of casual sexual encounters. Condom self-efficacy, attitudes, and norms are composite scores based on items with response scales from 1 (*strongly disagree*) to 7 (*strongly agree*); higher scores indicate greater self-efficacy, more positive attitudes toward condom use, and perceptions of more frequent normative condom use among peers.

Just as fundamental motives related to intersexual courtship and intrasexual competition can influence risky health-related behaviors such as tanning and dieting (Hill & Durante, in press), basic motivations to avoid pathogen threats can influence condom use. The current study contributes to a growing literature suggesting that pathogen-avoidance mechanisms are responsive to ecological conditions and have broad downstream effects, and it complements research demonstrating that olfaction can influence behavior in nonintuitive ways (e.g., by increasing moral judgment; Schnall, Haidt, Clore, & Jordan, 2008). Traditional interventions designed to increase intentions to use condoms have conveyed pathogen threat with complex, cognitively intense information (e.g., long-term consequences of infection with an STD). Such information usually fails to increase perceptions of susceptibility to or severity of sexually transmitted illness (e.g., Bryan, Aiken, & West, 1996). Further, explicit beliefs about susceptibility to and severity of a health threat predict health behavior weakly and inconsistently (Janz & Becker, 1984). This study suggests that motivational systems influencing condom use may respond to cues for general (rather than specifically sexually transmitted) pathogen threats, and that sensory systems evolved to detect pathogen threats (e.g., olfaction) may influence intentions to use condoms in a different manner than do verbal communications of STD threat.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Note

1. Responses to the five manipulation-check items were lost for 17 participants because of a computer malfunction.

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