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Parasites and promiscuity: Acute disease salience leads to more restricted sexual attitudes

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Abstract

How does disease threat influence sexual attitudes and behaviors? Although research on the influence of disease threat on social behavior has grown considerably, the relationship between perceived disease threat and sexual attitudes remains unclear. The current preregistered study (analyzed $N = 510$), investigated how experimental reminders of disease threat influence attitudes and anticipated future behaviors pertaining to short-term sexual relationships, using an ecologically valid disease prime. The central preregistered prediction was that experimental manipulation of disease threat would lead to less favorable attitudes and inclinations toward sexual promiscuity. Results were consistent with this preregistered prediction, relative to both a neutral control condition and a non-disease threat condition. These experimental results were buttressed by the finding that dispositional variation in worry about disease threat predicted less favorable attitudes and inclinations toward short-term sexual relationships. This study represents the first preregistered investigation of the implications of acute disease threat for sexual attitudes.

Keywords

Behavioral immune system, germ aversion, sexual behavior, sociosexuality

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Sexual attitudes and behaviors differ vastly between individuals. Whereas a large proportion of women and men report that they would be comfortable having just one sexual relationship throughout their lifetime, an equally large proportion report a desire for uncommitted sexual relationships with many people throughout their lives (e.g., Laumann et al., 1994). Dozens of factors have been suggested to explain this psychosocial variation. Early work linked specific early childhood experiences to adult sexual attitudes and behaviors, such as religious involvement or degree of parental presence (Miller & Bingham, 1989; Newcomer & Udry, 1987; Thornton & Camburn, 1989). Some behavioral genetics work links specific polymorphic variations to risky sexual behaviors (e.g., Garcia et al., 2010). And, although sexual relationship preferences are frequently assessed as trait-like individual differences (e.g., Jackson & Kirkpatrick, 2007; Penke & Asendorpf, 2008; Simpson & Gangestad, 1991), they are also variable across the lifespan (e.g., Pfeiffer et al., 1972), across periods of weeks or months (e.g., Arslan et al., 2018; Haselton & Gangestad, 2006; Pillsworth & Haselton, 2006), and even contextually responsive to one's immediate circumstances (e.g., Beall & Schaller, 2019; Lee & Zietsch, 2011).

How the threat of disease influences sexual attitudes and behaviors, however, remains unclear. To date, only two investigations have rigorously explored the effects of experimental reminders of disease threat for sexual relationship preferences. Results from one preliminary study suggest that the amplified threat of disease decreases desire for short-term sexual encounters, given the disease-related costs of such encounters (Murray et al., 2013). This experimental effect was largely driven by individuals who were more dispositionally concerned about the threat of disease. However, other obliquely related work—inspired by different theoretical perspectives and using qualitatively different experimental manipulations and outcome measures—suggests that reminders of disease threat *increase* desire for short-term sexual relationships and sexual variety (Hill et al., 2015). In the current preregistered study, we directly test the influence of experimentally manipulated disease threat on sexual attitudes using an ecologically valid disease threat (the emerging threat of COVID-19).

Disease threat, social cognition, and behavior

A growing body of research implicates disease threat in numerous social psychological phenomena (e.g., see Ackerman et al., 2018; Murray & Schaller, 2016; Shook et al., 2018). One constellation of phenomena influenced by disease threat pertains to aversions to social risk-taking and disinclinations toward novelty. Both trait-like worry about disease threat and experimental manipulations of disease threat predict higher levels of xenophobia, greater conformity to social norms, more social withdrawal, harsher moral judgment, greater social conservatism, and greater risk aversion (e.g., Duncan et al., 2009; Faulkner et al., 2004; Moran et al., 2021; Mortensen et al., 2010; Murray et al., 2019; Murray & Schaller, 2012; Prokosch et al., 2019; Terrizzi et al., 2013; Wu & Chang, 2012). This set of results from laboratory investigations is also conceptually replicated at the cross-cultural level of analysis (see Murray & Schaller, 2014, for review): Countries or societies that have faced historically higher levels of disease have cultural norms dictating more prophylactic behaviors, such as lower levels of social gregariousness, higher levels of conformity, more distinct ingroup/outgroup boundaries,

more emphasis on "binding" moral foundations, and more restrictions on civil liberties (Fincher et al., 2008; Murray et al., 2011, 2013; Murray & Schaller, 2017; Schaller & Murray, 2008; Tybur et al., 2016; van Leeuwen et al., 2012).

One study has also investigated this prophylactic perspective in the realm of sexual attitudes and behaviors (Murray et al., 2013). This study investigated whether perceived disease threat (trait measures and an experimental manipulation) was related to sexual attitudes and behaviors in a sample of 411 North American undergraduates (73% women, 59% of East Asian ethnic origin). Results revealed that higher dispositional worry about disease was related to 1) less favorable attitudes toward sexual promiscuity (assessed by the multidimensional Sociosexual Orientation Inventory, Jackson & Kirkpatrick, 2007), and 2) less promiscuous past behaviors (such as one-time sexual partners or number of partners within the past year). Results from this study also revealed a trait by prime interaction, such that participants higher in trait disease worry reported more restrictive attitudes when the threat of disease was made experimentally salient. Although these preliminary results are consistent with a prophylactic perspective, this study has several notable limitations, including inconsistent use of experimental primes across the sample (two different types of primes were used for different groups of participants), the small number of men in the sample, and low statistical power to detect the reported prime by person interaction.

Consistent with this experimental study is cross-cultural evidence demonstrating that higher levels of disease threat predict more restrictive sexual attitudes, as assessed by the Sociosexuality Orientation Inventory administered by Schmitt (2005) in 58 countries (Schaller & Murray, 2008). This relationship was especially strong in women. Evidence from small-scale societies even suggests that cultures with higher disease threat are less likely to have romantic kissing as a cultural practice (Murray et al., 2017). These cross-cultural results, however, cannot inform whether ephemeral variation in perceived disease threat situationally influences sexual attitudes; they may be due to mechanisms that unfold over the course of months, years, or generations. Thus, further research rigorously investigating the implications of *acute* reminders of disease threat for sexual attitudes and behaviors remains scant.

It is also worth noting that another obliquely related set of studies—motivated by a different theoretical framework and employing different experimental primes—has found a very different relationship between disease and specific facets of sexual attitudes (Hill et al., 2015). Across five studies (total $N = 496$ undergraduates; 87% women), results revealed that participants who were told that the threat of disease would be increasing *in the future* reported a desire for a greater number of future novel sexual partners (the experimental prime was explicitly intended to prevent evoking the affective reactions associated with immediate perceived disease threat, i.e. disgust). This effect was moderated by individual differences in perceived disease susceptibility (assessed by the Perceived Infectability subscale of the Perceived Vulnerability to Disease Questionnaire, Duncan et al., 2009), and was found only in women (though only one study included men). These results are generally consistent with a biological "genetic bet-hedging" perspective, in that evoking future environmental harshness or uncertainty may lead individuals to implicitly shift to favoring more genetically variable offspring. This research thus finds a markedly different relationship between acute reminders of disease threat and sexual attitudes than that of the prophylactic perspective described above. However, the qualitatively different types of

disease primes and outcome measures used make direct comparison of these results impossible; these divergent findings need not be mutually exclusive.

Overview of the current study

The current study directly tests how the immediate perceived threat of disease influences sexual attitudes. Given the questionable efficacy of previous disease primes, the current study employed the (at the time) emerging threat of the COVID-19 pandemic as the disease prime. This study was carried out during the first week of March 2020—an early time in the pandemic for the sampled population, with only 164 confirmed cases in the United State and 2,212 across the world (CDC, 2020). During this time, concerns and uncertainty about the pandemic were high, but it was prior to widespread practicing of social isolation or any institutional restrictions within the United States. This study was *not* intended to serve as a direct methodological replication of previous preliminary work—we recruited from an online rather than an undergraduate population, we used a conceptually novel, time-sensitive disease prime (that was administered online rather than in-person), and assessed sexual attitudes using a shorter measure (for time/attention considerations).

We hypothesized that perceived disease threat would lead to more restricted socio-sexual attitudes, consistent with a prophylactic perspective. We made two specific, preregistered predictions (accessible at https://osf.io/qm2kc):

1. Participants in the disease threat condition will report more restrictive sexual attitudes and motivations (assessed as less favorable attitudes toward promiscuity and lower desire for future promiscuity) than participants in a non-disease threat (home accidents) condition, or an affectively neutral condition.
2. Participants' trait-like worry about disease threat (assessed by the Germ Aversion subscale of the PVD) will predict less favorable attitudes toward promiscuous and short-term sexual behavior.

Both of these above predictions are independent main effects. Given the real-world validity of the current disease prime, we did *not* predict any statistical interaction between the experimental prime and trait-like worry of disease threat. We also did not predict differential effects between men and women. Finally, in exploratory (non-pre-registered) analyses we also investigated whether disease threat increased general risk aversion (as reported previously, e.g. Prokosch et al., 2019) and, if so, whether this effect partly accounted for any experimental effect of disease threat on sexual attitudes.

Method

All materials and data for this study are available at https://osf.io/2eaux/.

Participants

Participants were recruited from Amazon's Mechanical Turk via Cloud Research. The preregistered data collection plan dictated a collected sample size of 750 participants

(before exclusions). We pre-paid for 750 participants, as planned, but received 758 submitted surveys. All participants were paid $1.00, regardless of whether they met exclusion criteria. Data were collected between March 5–9, 2020. These dates were before self-isolation was encouraged, before travel bans were enacted by the United States, and when uncertainty about the morbidity and specificity of the emerging pandemic was high. In order to retain only attentive participants, the preregistered analysis plan included strict exclusion criteria: participants were excluded if they failed the experimental manipulation attention check (e.g., did not write about the manipulation that was presented to them, $n = 60$), could not appropriately produce or comprehend written English (e.g., did not answer a simple reading interpretation exercise correctly, $n = 116$), failed a second simple attention check (did not select Agree, when asked "please click agree," $n = 38$), reported that they were not honest with their answers ($n = 33$), or had duplicate IP addresses ($n = 1$; only the first response was retained).[1]

After exclusions, the analytical sample consisted of 510 participants (206 women; mean age = 37.93, $SD = 11.79$). This final sample size provided statistical power of .79 to detect an effect size of $d = .30$ (using two-tailed $\alpha = .05$) between any two experimental conditions, and power of .92 to detect a correlation of $r = .15$. The sample was mostly White (72.0%), and the majority of participants reported having been in at least one sexual relationship (90.4%). Participants identified as 85.9% straight, 2.0% gay or lesbian, 2.9% as bisexual but mostly attracted to women, 4.3% as bisexual but mostly attracted to men, 3.5% as bisexual with no preference, and 1.0% as asexual, 0.2% as pansexual, and 0.2% as other. Just under half of the sample (40.0%) reported being currently married.

Procedure

Participants accessed the survey on Amazon's Mechanical Turk via Cloud Research and were instructed that the research team was interested in how individuals perceive risk.

Experimental manipulation of disease salience. Participants were randomly assigned to one of three experimental conditions. In the disease threat condition ($n = 185$), participants were provided with a brief description of the (then-emerging) coronavirus outbreak with accompanying photos of public health officials. In the non-disease threat condition ($n = 141$), participants were provided with a brief description of how people accidentally poison themselves, with photographs demonstrating how easy it is to be poisoned. Afterward, in both the disease and accident prime, participants were instructed to describe their reactions to the primes and what they learned from it. They were asked:

> Take a moment to reflect on how this information made you feel. Please briefly write about your reactions to the information. What kind of world did the information describe? What details stood out to you most when reading? How did you feel as you read the story?

After participants described how they felt, they had to report two things they learned from what they had read. In the third, neutral control condition ($n = 184$) participants did not engage in a reading exercise, and were instead simply instructed to write about how they were feeling at the current moment.

Once participants completed the experimental manipulation, they immediately completed the materials described below, in the order detailed below (and one other exploratory questionnaire unrelated to the current study), after which they were debriefed and received payment.

Materials

Assessment of sexual attitudes and future promiscuity. Participants completed the Socio-sexual orientation inventory–revised (SOI-R). The SOI-R is a 9-item scale which assess people's attitudinal and behavioral inclinations toward sexual promiscuity. Higher scores indicate a more "unrestricted" (or short-term) mating orientation, characterized both by more favorable attitudes toward uncommitted sexual behaviors, greater desire to engage in uncommitted sexual behavior, and more promiscuous past sexual behaviors (Penke & Asendorpf, 2008). The SOI-R is comprised of three subscales, each with 3 items: an Attitude subscale (sample item: "Sex without love is OK"; (1 = very strongly disagree, 9 = very strongly agree; $\alpha = .77$), a Desire subscale (e.g., "How often do you have fantasies about having sex with someone you are not in a committed romantic relationship with?"; 1 = never, 9 = at least once a day; $\alpha = .90$), and a behavior subscale. Given our primary interest in the effects of the experimental manipulation on anticipated future promiscuity (rather than past behaviors), the behavioral items were altered *a-priori* to read (1) "How many sexual partners would you like to have in the next 12 months?," (2) "How many one-night stands would you like to have in the course of the next year?," and (3) "How many one-night stands would you like to have in the course of the next 10 years?" These items were assessed using a 9-point Likert scale (endpoints ranging from "zero" to "20-or more," $\alpha = .90$). (Although items assessing Desire are partly retrospective in nature, we chose not to modify the desire items for the current study, given their focus on motivations rather than actual concrete behaviors. Analyses without the Desire items included in the Global SOI measure produced inferentially identical results to those reported below).

Consistent with previous research, these subscales were moderately intercorrelated (Attitudes/Desire $r = .44$, Attitudes/Future Behavior $r = .41$, Desire/Future Behavior $r = .61$, p's $< .001$). As specified in the preregistration, central analyses focused upon a Global SOI measure. Thus, the three subscales were standardized and a mean composite of the Z-scores was created to be used in the central analyses.

Risk-taking. Risk-taking was assessed using the 8-item subscale from Dindo and colleagues' (2009) Disinhibition Inventory. Participants were instructed to "Please indicate your agreement or disagreement with the following statements using the scale provided." (sample item: "I seek thrilling experiences"; 1 = strongly disagree, 5 = strongly agree; $\alpha = .88$). A mean composite was created across the 8 items, with higher scores indicating a greater propensity toward risk-taking.

Dispositional perceived vulnerability to disease. Participants then completed the Perceived Vulnerability to Disease (PVD) questionnaire, a 15-item measure that assesses how people perceive their susceptibility to disease and their affective response to germs in

their environment (Duncan et al., 2009). The scale consists of two subscales. One subscale (Perceived Infectability or PI; $\alpha = .84$) measures the participants' perception of their susceptibility to being infected (e.g., "I have a history of susceptibility to infectious diseases," (1 = strongly disagree, 7 = strongly agree). A mean composite was created for the subscale, with higher scores indicating greater perceived infection susceptibility. The second subscale (Germ Aversion or GA; $\alpha = .75$) consists of 8 items that assess the participants' affective aversion to objects and situations that may pose a pathogenic threat (e.g., "I prefer to wash my hands pretty soon after shaking someone's hand," 1 = strongly disagree, 7 = strongly agree). A mean composite was created for the subscale, with higher scores indicating greater affective aversion to disease-relevant stimuli. Previous research attests to these subscales capturing distinct constructs and having unique predictive validity, with Germ Aversion being a more consistent predictor of attitudes pertaining to interpersonal behavior and close relationships (e.g., Duncan et al., 2009; Murray et al., 2013).

Demographics. Participants completed several demographics questions. Participants were asked to indicate their sex at birth (response options: male, female, intersex, other), and the gender they identify with (options: man, woman, non-binary, agender, transgender, other, [please specify]). They then were asked to identify their racial and ethnic background by choosing between White/Caucasian, Black/African American, Hispanic/Latinx, Native American, Asian, Multi-ethnic, or other, please specify. They also reported their current relationship status (options: single, casually having sex with someone, casually dating someone, in a committed relationship, engaged, or married), and whether or not they had ever been in a sexual relationship (yes/no). They also reported their sexual orientation (response options: straight, gay or lesbian, bisexual but mostly attracted to women, bisexual but mostly attracted to men, bisexual with no preference, asexual, aromantic, pansexual, other).

Results

Effects of the experimental manipulation

A preregistered one-way ANOVA was conducted to assess the effects of the experimental manipulation on Global sociosexuality between the three experimental conditions. Results of this analysis revealed a significant effect of experimental condition, ($F(2, 507) = 4.26$, $p = .015$, partial $\eta^2 = .017$).

We followed up this significant omnibus ANOVA with comparisons between each of the experimental conditions. Means and standard deviations within each of the conditions are shown in Table 1 and Figure 1. A set of orthogonal contrasts revealed that, consistent with preregistered predictions, participants in the Disease Threat condition reported significantly lower Global sociosexuality than participants in both the Accident condition (mean difference = 0.29, 95% CI [.08, .51], $p = .009$, Cohen's $d = .29$) and the Neutral control condition (mean difference = 0.24, 95%CI [0.04, 0.44], $p = .020$, $d = .24$). The Accident and Neutral conditions did not significantly differ, $p > .50$.

Table 1. Means (and standard deviations) for sociosexuality and risk scores across conditions.

	Experimental Condition		
Outcome Variable	Disease	Accident	Neutral
SOI—Global	−0.14 (0.73)	0.10 (0.85)	0.06 (0.84)
SOI—Future Behavior	2.36 (1.97)	2.80 (2.28)	2.81 (2.19)
SOI—Desire	3.15 (1.92)	3.81 (2.32)	3.57 (2.18)
SOI—Attitudes	4.68 (2.03)	5.11 (1.94)	5.08 (2.30)
Risk-taking	2.48 (0.74)	2.62 (0.78)	2.67 (0.90)

Note: SOI = Sociosexual orientation inventory. Sociosexuality scores were standardized based on preregistered analyses. Lower scores indicate more restricted attitudes.

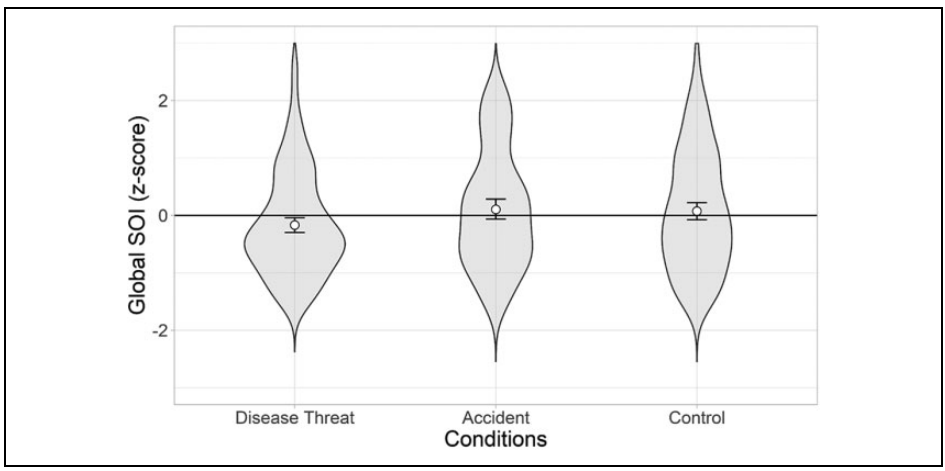

Figure 1. Global sociosexuality scores and distributions across experimental conditions.

Dispositional perceived disease threat and sexual attitudes

We also examined the zero-order correlations between dispositional worry of disease threat and sociosexuality. These correlations are shown in Table 2. As predicted, results revealed that trait-like worry about disease (assessed by the Germ Aversion subscale) was significantly negatively associated with Global sociosexuality, $r(508) = -.21$, $p = .001$. Germ Aversion was also a significant predictor of each of the SOI subscales, p's $< .001$.

A follow-up preregistered linear regression investigated the associations between germ aversion and Global sociosexuality while also concurrently assessing the predictive effects of biological sex (dichotomized—509 participants selected male or female), age, and relationship status (dichotomized as single or in a relationship). Results revealed effects of Germ Aversion (unstandardized $B = -0.12$, $p < .001$, 95%CI [−0.17, −0.06]), age ($B = -0.008$, $p = .006$, 95%CI [−0.014, −0.002]), and sex ($B = -0.49$, $p < .001$, 95%CI [−0.63, −0.35]), suggesting that, consistent with previous research, sociosexuality is lower for people higher in Germ Aversion,

Table 2. Zero-order correlations between dispositional worry about disease and outcome measures.

Variable	1	2	3	4	5	6
1. Germ Aversion	—					
2. Perceived Infectability	.13**	—				
3. Sociosexuality—Global	−.21**	.07	—			
4. Sociosexuality—Behavior	−.17**	.11*	.83**	—		
5. Sociosexuality—Desire	−.19**	.10*	.84**	.61**	—	
6. Sociosexuality—Attitude	−.15**	−.03	.76**	.41**	.44**	—
7. Risk-taking	−.22**	.12**	.36**	.36**	.30**	.22**

**$p < .01$; *$p < .05$.

lower for older individuals, and lower in women than men. Relationship status did not uniquely predict sociosexuality, $p > .50$.

Does risk-taking mediate the effects of the experimental manipulation?

A one-way ANOVA revealed that experimental condition accounted for a marginally significant amount of variation in risk-taking scores ($F(2, 507) = 2.58$, $p = .076$, partial $\eta^2 = .010$) (see Table 1). This difference was significant when comparing the disease threat condition to the combined control conditions ($F(1,508) = 4.92$, $p = .027$, partial $\eta^2 = .010$), such that individuals scored significantly lower on propensity toward risk-taking in the disease threat condition ($M = 2.48$, $SD = 0.74$) than in the combined control conditions ($M = 2.65$, $SD = 0.85$, $d = 0.21$).

In order to test the exploratory hypothesis that the effects of disease threat on sociosexuality are mediated by decreases in risk-taking propensity in the experimental condition, the condition variable was dichotomized and dummy-coded (0 = control conditions, 1 = disease threat condition). We then ran a bootstrapping mediation analysis (10000 iterations) with experimental condition variable as the independent variable, risk-taking as the mediator, and global sociosexuality as the dependent variable. This analysis yielded a small but significant indirect effect of condition via risk, $B = 0.06$ ($SE = 0.03$), 95%CI [0.01, 0.14). This model also retained a direct effect of experimental condition, $B = 0.33$ ($SE = 0.15$), 95%CI [0.04, 0.62]. Thus, while cross-sectional mediational models cannot definitively speak to causal order, this model is consistent with the idea that the effects of acute disease threat on sociosexuality may be partly accounted for by decreases in general risk aversion.

Was the experimental effect moderated by dispositional worry about disease?

To test whether the experimental effects were moderated by Germ Aversion, we ran a bootstrapped moderation analysis (10000 iterations) to test for any condition by trait effects on Global sociosexuality. Results of this analysis revealed a negligible moderation effect, with its confidence intervals almost evenly straddling zero, $B = -0.01$ ($SE = 0.14$), 95%CI [−0.28, 0.25]. Similarly, a second moderation analysis found no

evidence of moderation by Perceived Infectability, $B = 0.05$ ($SE = 0.13$), 95%CI [−0.20, 0.32].

We also investigated whether the effects of the experimental manipulation differed between men and women. A bootstrapped moderation analysis found no interaction between condition and biological sex in predicting Global sociosexuality, $B = -0.13$ ($SE = 0.30$), 95%CI [−0.72, 0.46].

Finally, given the lack of interactive effects between experimentally manipulated disease threat and dispositional worry about disease threat, in order to investigate their concurrent unique effects on sociosexuality we performed a multiple regression in which we entered dummy-coded condition (disease threat vs. both control conditions), Germ Aversion, and the three previous controls (sex, age, and dummy-coded relationship status) as predictors of Global sociosexuality. Results of this analysis revealed a unique effect of experimentally manipulated disease threat ($B = -0.17$, $p = .012$, 95%CI [−0.31, −0.04]), a unique effect of Germ Aversion, ($B = -0.11$, $p < .001$, 95%CI [−0.17, −0.05]), as well as unique effects of age and sex (p's $< .01$), and no effect of relationship status ($p > .50$). These results further suggest that, consistent with preregistered predictions, both contextual reminders of disease and dispositional worry about disease concurrently (yet uniquely) influence sociosexual attitudes.

Discussion

The results can be summarized as follows: Consistent with preregistered predictions, an experimental reminder of the threat posed by infectious disease leads to significantly less favorable inclinations toward short-term sexual relationships, relative to both a neutral control condition and a non-disease threat condition. These experimental results are conceptually buttressed by correlational and regression analyses uniquely linking dispositional worry about disease threat to more restricted sociosexuality. Also consistent with predictions, these experimental and trait effects of perceived disease threat on sexual relationship preferences were non-interactive. Exploratory analyses revealed that these experimental effects were consistently distributed across the attitude, desire, and future behavior sociosexuality facets and, further, that decreases in propensity toward general risk-taking partly mediated these experimental effects. These results are consistent with prophylactic (or "behavioral immune system") perspectives on the implications of disease threat for sociosexuality.

Although results of the current study supported the two central preregistered predictions, these results contrast with previous related work in several ways. However, it is again worth noting that given the temporary nature and uniqueness of the disease prime used here, the current study was *not* intended to directly replicate this previous work. Thus, reasons for differences to previous results are just as likely to be methodological as they are to be conceptual. One potential methodological reason pertains to differences in assessment of the key dependent variables. The current study assessed sociosexuality using the SOI-R (Penke & Asendorpf, 2008). Previous work used a multidimensional, longer-form SOI measure (from Jackson & Kirkpatrick, 2007; Murray et al., 2013). Other related work assessed desire for sexual variety by examining the number of novel

(dating and sexual) partners that participants desired at different time points (Hill et al., 2015).

A second key methodological difference between this and previous work is the experimental manipulations used. Experimental primes in previous studies used both pictorial disease primes involving stimuli depicting multiple different disease symptoms (coughing, rashes, sores; Murray et al., 2013), or used slideshows that discussed how the threat of infectious disease would be increasing *in the future* (Hill et al., 2015). This distinction between present- versus future-focused disease primes may be the key determinant of whether manipulations of disease threat result in aversion to sexual promiscuity (immediate disease threat) or a greater desire for sexual variety (future disease threat). Indeed, the manipulation used in the current experiment was closely based upon real media reports, accompanied by photos of public health officials dealing with an actual current disease outbreak—a more immediate-based experimental manipulation that had prophylactic implications for sociosexual attitudes. Only more direct forms of replication can speak to the reliability of previous work.

Further, whereas the current study found an experimental main effect, previous work has found trait by condition interactions (Hill et al., 2015; Murray et al., 2013). Within the broader disease cognition literature this disparity is unexceptional; the corpus of published results reports both main effects and interactions for no obvious systematic reason (see Ackerman et al., 2018). However, what inspired our preregistered prediction of a main effect (rather than the interactive effects reported previously) was the greater ecological validity and perceived severity of the disease prime used here. MAIN EFFECTSthreated type of manipulation that had prophylactic-like implications for sociosexual attitudes.ractions, and effect Many previous laboratory manipulations of disease threat (such as viewing still pictures or slides) have had questionable efficacy and/or limited psychological immersiveness. Especially in regions such as North America, until recently the threat posed by infectious disease was considered a relatively remote and inconsequential threat (especially for young adult participants sampled previously)—many likely never considered disease to be a threat that would affect them personally. It is thus possible that in past work, attempts to make the threat of disease immediately salient were only effective for a subset of participants, such that only individuals higher in trait disease worry were affected by laboratory disease threat primes. Conversely, experimentally manipulating a real, once-in-a-generation disease threat is more likely to be psychologically *evocative* for almost all participants (albeit perhaps to different degrees), regardless of trait-like differences in worry about disease threat.

Another, more mundane, potential reason for the lack of interactive effects in the current study is that the current sample size was not adequately powered to detect subtle condition by trait interactions. Despite the fact that statistically significant interactions are normatively reported in the social psychological literature, the power to detect such "true" interactions are often miniscule, and this power is crucially dependent upon the nature of the interactive effect (e.g., see Blake & Gangestad, 2020). However, these power considerations also question the reliability of previous related studies reporting significant condition by trait effects (e.g., Hill et al, 2015: $N = 496$ across five experiments; Murray et al., 2013: $N = 411$ in one experiment).

The current results may also inform future hypotheses of how the perceived threat of disease may impact other facets of sexual and romantic relationships. For instance, the dualistic model of sexual passion articulates that individuals have a stable and motivational drive to engage in sexual activities (Philippe et al., 2017). This dualistic model of passion consists of both "harmonious" sexual passion—characterized as a motivation to engage in sexual activity based on an individual's preferences—and "obsessive" sexual passion, which tends to follow societal norms and beliefs (Philippe et al., 2017). Both types of sexual passion impact relationship function, and are independently related to sociosexuality (Beaudoin et al., 2020; Guilbault et al., 2020; Philippe et al., 2017). Thus, future work should begin to understand how infectious disease may hinder each facet of sexual passion. For example, research conducted during the COVID-19 pandemic observed that 34% of couples reported conflict due to the disease and in turn engaged in less-frequent sexual activity (Luetke et al., 2020; see also Lehmiller et al., 2020). One likely mechanism accounting for this decrease in sexual activity is a decrease in sexual passion, whereby an infectious disease threat may shape one's harmonious and obsessive passion via personal psychological reactions to the disease and via internalizing societal messages about the disease, respectively. Ultimately, it will behoove researchers to investigate how an acute disease threat may impact sexual desire and passion.

While the current study investigated how perceived disease vulnerability influences sociosexuality, it is limited in that it did not also assess the implications of *actual* immunocompetence or health history. Results from research investigating how one's immune function influences one's perceived vulnerability to disease is equivocal—some work suggests that poorer childhood health predicts greater dispositional worry about disease (e.g., Makhanova et al., 2020), whereas other work finds no such influence of childhood health (e.g., de Barra et al., 2014; Murray et al., 2020). Further, several studies suggest that serious childhood illnesses may influence sexual behavior, with adolescents who suffer from serious chronic conditions initiating sexual behaviors earlier in their lives and being more likely to engage in risky sexual behavior (Choquet et al., 1997; Suris et al., 2008; Waynforth, 2012). This relationship between immune function and sexual behavior is likely also bidirectional; recent works suggests that entering a new intimate relationship is associated with upregulation of genes involved in antiviral defenses (Murray et al., 2019). However, exactly how childhood disease experiences or current immune function may moderate the effects of acute reminders of disease threat on sociosexuality remains largely unexplored. More broadly, this area will benefit from a better synthesis of the physiological and psychological factors that influence close relationships.

Other limitations deserve note. First, the research was conducted on an online American sample. Further research is necessary to determine whether the effects reported here would generalize to other cultures or demographics. Second, the dependent variable did not measure behavior per se, but self-reported attitudes and future behavioral desire and motivations. Thus, future work might aim to investigate whether these effects can be replicated in longitudinal work to assess if disease threat influences *actual* sexual behavior, and how. Moreover, previous work suggests that immediate sexual arousal tends to downregulate both disgust and risk aversion (Lee et al., 2014; Stevenson et al., 2011). Future work may benefit from exploring how sociosexuality is influenced concurrently by the interplay between immediate sexual motivations and immediate

contextual reminders of disease. Third, this study used a very specific disease threat; it remains unknown whether the implications of disease threat for sociosexuality are conditional upon the type of perceived disease threat. These results may not generalize to more benign disease threats or to diseases that produce less overt signs of infection.

Lastly, a potential measurement limitation that deserves note is that while the Behavioral items of the SOI were modified so assess anticipated future behavior, the Desire items were not. Although the experimental effects were consistent across the three SOI facets, given that the Desire items are partly retrospective (e.g., "In everyday life, how often do you have spontaneous fantasies about having sex with someone you have just met?"), it may be problematic to interpret what any experimentally induced changes in this subscale actually mean. One possibility is that participants' responses simply reflect their current levels of sociosexual desire rather than thoughtful, tabulated recounts of past desire (or, similarly, their projection of current desire onto past desire). Another possibility comes from the multiple self-aspects framework (MSF; McConnell, 2011). According to this perspective, the self consists of multiple, context-dependent self-aspects, and the attributes of each of these self-aspects become more or less accessible based upon situational constraints. In the current experimental context, then, the differences in the Desire facet may be due to reminders of infectious disease making participants' "sexual desire" self-aspects temporarily less cognitively accessible.

Despite these limitations, however, the current study represents the first preregistered study that adds to our understanding of the interplay between acute reminders of disease threat, dispositional worry about disease, and sexual attitudes and desire.

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Open research statement

This research was pre-registered. The aspects of the research that were pre-registered were the hypotheses, materials, and data. The registration was submitted to: https://osf.io/2eaux/. The data used in the research are available. The data can be obtained at: https://osf.io/2eaux/. The materials used in the research are available. The materials can be obtained at: https://osf.io/2eaux/, or by emailing: jamesmoran320@gmail.com.

Note

1. The key experimental and correlational results remained significant and of a similar magnitude when all excluded participants were included in analyses.

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