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When Kinks Come to Life: An Exploration of Paraphilic Behaviors and Underlying Predictors

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ABSTRACT

Paraphilia is defined as a condition in which sexual excitement relies on fantasizing about and/or participating in unusual sexual behavior. Although recent studies have assessed the concordance between paraphilic interests and paraphilic behaviors, few studies have studied which individual traits and demographics predict engaging in paraphilic behaviors, or the level of concordance between arousal and behavior. The current study replicated and expanded Joyal and Carpentier's 2022 study. We assessed concordance between paraphilic arousal and behavior. Further, we assessed the impact of Dark Tetrad traits, impulsivity, social desirability and demographic variables on engaging in paraphilic behaviors using self-report questionnaires in a sample from the general population and FetLife. Finally, we were interested in whether these individual differences moderated the concordance between arousal and behavior. Results indicated high concordance between paraphilic arousal and behavior for all paraphilias except pedophilia and hebephilia. Younger, male participants were more likely to engage in various paraphilias than women and older participants. Machiavellianism was linked with lower paraphilic behavior, particularly impulsive or risky ones. Psychopathy predicted engaging in more deviant or illegal paraphilias, whereas sadism only showed an association for engaging in frotteurism and narcissism was not a predictor for engaging in any paraphilia. For several paraphilias, individual traits moderated the effect of arousal on behavior. Implications of these findings and future directions are discussed.

Human sexual fantasy is thought to be universal (O'Donohue et al., 1997). The content of such fantasies varies widely, with themes like exhibitionism, sadism and masochism commonly reported. For many people, being aroused by such themes remains a fantasy (Ahlers et al., 2011). Fewer people act on their fantasies. This concordance between fantasy and behavior has become a focus of research. Previously, various aspects of sexual interests such as behavior or fantasy were studied in isolation.

Several sexually arousing themes have been characterized as “unusual,” and are considered paraphilias. Within paraphilia, sexual excitement relies on fantasizing about and/or engaging in sexual behavior that is thought to (but does not necessarily) deviate from what society deems “normal” (Longpré, Burdis, et al., 2022; Seto et al., 2021). To encompass that people might engage in atypical sexual behaviors without meeting the threshold of a mental disorder, the Diagnostic and Statistical Manual of Mental Disorders – 5th Edition ([DSM-5] American Psychiatric Association [APA], 2013) has clarified the distinction between paraphilia (atypical) and paraphilic disorder, which is defined as a mental disorder resulting from atypical behavior that lasts for more than 6 months and that is causing personal distress or “involves another person's psychological distress, injury or death, or a desire for sexual behaviors involving unwilling persons or persons unable to give legal consent” (p. 685).

Research in the last decade has focused on the developmental causes of paraphilias and paraphilic disorders (e.g., Longpré, Burdis, et al., 2022), the prevalence of fantasies, arousal and behaviors (e.g., Bártová et al., 2021; Joyal et al., 2015; Longpré, Burdis, et al., 2022; Seto et al. 2021;), psychological correlates (e.g., Paquette et al., 2022; Snow & Longpré, 2022; Stefanska et al., 2022) and the concordance between interests and behaviors (Joyal & Carpentier, 2015, 2022; Seto et al., 2021). To distinguish these terms, to assess interest, participants are asked about whether a paraphilia interests them, whereas for arousal they are asked whether they find the paraphilia sexually arousing. Finally, behavior concerns whether people have engaged in the paraphilic behavior. However, no studies have looked at the concordance levels between arousal and behaviors, and few studies have looked at a) what other factors predict engagement in paraphilic behaviors and b) what factors might affect concordance levels.

Paraphilic Interests: Concordance & Correlates

Some correlates of paraphilic interest, and concordance between interest and behavior have been identified in recent years. Gender (i.e., men; Joyal & Carpentier, 2022), non-heterosexual orientation (Seto et al., 2021), hypersexuality (Longpré, Burdis, et al., 2022; Snow & Longpré, 2022), offense-supportive cognitions (Paquette et al., 2022; Snow & Longpré,

2022) and problematic pornography consumptions (Paquette et al., 2022; Stefanska et al., 2022) have been found to impact the level of concordance. Age has also been proposed as a moderating variable affecting concordance, since older people may have had more occasion to engage in paraphilic behavior; however, this effect seems negligible (Seto et al., 2021).

Most research on personality as it relates to paraphilic interest has been conducted in clinical populations, and as a result tends to focus either on paraphilias that might be illegal if acted upon (i.e., pedophilia), the extreme end of the spectrum, or on behavior that involves non-consenting others (e.g., H. C. Chan & Beaugard, 2016; Longpré, Guay, Knight, & Benbouriche, 2018). Further, a substantial amount of research on personality as a predictor of paraphilic interest focuses on personality disorders rather than traits (e.g., Watts et al., 2019). For example, in a comparison of sex offenders and non-sex offenders, those who had deviant fantasies scored higher on psychopathic deviate, masculinity-femininity, paranoia, and schizophrenia subscales of the MMPI (Curnoe & Langevin 2002). Recently, Longpré, Burdis, et al. (2022) looked at personality traits rather than disorders, and found an effect of schizoid, antisocial, narcissistic and borderline traits on paraphilic arousal. Similarly, neuroticism and psychopathy have been identified as correlates of deviant fantasies (Williams et al., 2009). However, few studies have looked at subclinical traits and their impact on paraphilic interests and acting on such interests in the general population.

Dark Tetrad

The Dark Tetrad of personality (Buckels et al., 2013) consists of four overlapping but distinct traits. These are hypothesized to share a common core of callous-manipulative behavior (Jones & Figueredo, 2013), which predisposes people high on these traits to engage in behavior that causes interpersonal harm. First, subclinical psychopathy is characterized by impulsive, sensation-seeking behavior, little regard for others, and an antisocial, parasitic lifestyle (Paulhus & Williams, 2002). Second, subclinical narcissism is linked with a sense of grandiose entitlement, and a particular vulnerability to threats to the ego (Paulhus & Williams, 2002). Machiavellianism, on the other hand, emphasizes a cynical worldview and risk-aversion that makes a more subtle scheme of greater interest (Jones, 2020). Sadism is the most recent addition to this model. Those high on what is termed “everyday sadism” take pleasure in the suffering of others and are uniquely motivated to put in effort to be able to do so (Buckels et al., 2013). The term “everyday sadism” is used to denote sadistic tendencies that fall within the realm of normal behavior, and are evident in ordinary, non-criminal situations. One small correlation of everyday sadism and sexual sadism has been found, but it was based on a one-item measure of sadism (Paulhus & Dutton 2016). Indeed, members of the sadomasochistic community have argued that sexual sadism is a form of sexual roleplay rather than real enjoyment of hurting others (Richters et al., 2008). As such, these appear to be distinct concepts.

The Dark Tetrad have been linked with various negative outcomes in terms of sexual behaviors. The Dark Triad (minus

sadism) have been linked to sexual coercion (Figueredo et al., 2015), sexual prejudice (Jonason et al., 2020), sexual harassment (Zeigler-Hill et al., 2016), and rape myth endorsement (Willis et al., 2017). Similar results were found with the Dark Tetrad (Longpré et al., 2023; Longpré, Moreton, et al., 2022) and everyday sadism (Saravia Lalinde et al., 2023). Specifically, sadism has been linked to lower perception of harassment and both sadism and narcissism predict endorsement of rape myths (Longpré, Moreton, et al., 2022). Psychopathic traits have been linked to coercive behaviors (Krstic et al., 2018), including manipulation, physical restraint and blocking attempts at retreat (Jones & Olderbak, 2014). Narcissism has been linked to coercive behaviors (Jones & Olderbak, 2014), and entitlement to fulfill one’s needs (Zeigler-Hill et al., 2016). Finally, Machiavellianism was negatively associated with coercive behaviors (Jones & de Roos, 2016); it is hypothesized that Machiavellians prefer short-term sexual relationships (Jones & de Roos, 2016) and harassment (Brewer et al., 2018) over sexually coercive behaviors. At its extreme end, the confluence model of rape (Malamuth et al., 2021) includes factors that overlap with Dark Tetrad traits such as exploitative mating strategy (Jonason et al., 2017). Psychopathy in particular is a strong and consistent predictor of sexual violence perpetration (Navas et al., 2022), and both psychopathy and narcissism have been linked to greater physical violence during the commission of a sexual offense (Balcioglu et al., 2023).

Less attention has been paid to how Dark Traits affect non-pathological, paraphilic interest in the general population. Lodi-Smith et al. (2014) found that exhibitionism and voyeurism were related to high narcissism, and sadomasochism was related to high Machiavellianism in women only. Similarly, Longpré, Moreton, et al. (2022) found that psychopathic and narcissistic traits were associated with an increase of paraphilic arousal, but no distinctions were made across the different types of interests. Further, psychopathy predicts translation of deviant fantasy into behavior (Williams et al., 2009). Although paraphilic interest is not an indication of potentially harmful sexual behaviors and sexual violence, Longpré, Moreton, et al. (2022) suggested that it may increase the risk of seeking sexual gratification by using non-traditional routes that involve few physical contacts, physical contacts without consent or may lead them to seek sexual gratification within inappropriate or illegal age-groups. Higher levels of risky sexual behaviors along paraphilic interests were associated with sexual violence (H. C. O. Chan & Li, 2020). Further, deviant sexual fantasy is an important risk factor of sexual reoffending (i.e., deviant sexual interests (Brankley et al., 2021), sexual preoccupation (Hanson et al., 2007)). Therefore, studying the nomological network of paraphilic interest and identifying which potential correlates can increase the likelihood of developing atypical sexual interest or behaviors is of great importance.

Other Factors

Various other individual differences have been suggested as predictors of engaging in paraphilic behavior. First, impulsivity has been linked with a greater overall engagement in sexual activity (Kafka, 2010). Further, it has been implicated in sex

offending (Efrati et al., 2019) and indeed, impulsivity may be what separates people who only fantasize about potentially illegal sexual behaviors from those who act accordingly. For example, pedophilia in particular is associated with impulsivity (Joyal et al., 2007) and it is thought to play a role in highly stigmatized paraphilic interests such as pedophilia and hebephilia (Molen et al., 2023). Indeed, what separates non-offending people with pedophilic interest from those who do offend, is superior behavioral inhibitory control (Kargel et al., 2017). Finally, opportunistic sex offenders tend to score high on impulsivity (Robertiello & Terry, 2007). Not much is known about how impulsivity may affect engaging in less stigmatized paraphilic behaviors, or whether impulsivity remains relevant with the addition of other individual differences such as the Dark Tetrad.

Second, social desirability may affect how people respond, particularly in the case of reporting sensitive or potentially illegal activity (Krumpal, 2013). However, in a large community study, Dombert et al. (2016) found a baseline self-reported pedophilic fantasies of 4.1%, suggesting people do admit to illegal activity in research surveys. Further, people with dark traits may be more likely to engage in socially aversive behavior, but they are not disproportionately prone to social desirability and thus we do not expect them to provide less honest answers (Kowalski et al., 2018).

The Present Study

The goal of the present study was first, to replicate and expand the research conducted by Joyal and Carpentier (2022), through assessment of concordance between paraphilic arousal and behavior. We expected to find a similar pattern of concordance as they did in their study [H1]. Second, we aimed to determine whether demographic factors, Dark personality traits, impulsivity or social desirability predict engagement (behavior) in paraphilia. We expected age (younger) and gender (male) to be significant predictors of concordance [H2]. With regard to Dark personality traits, we expected psychopathy to predict engagement in paraphilias that might constitute illegal behavior if acted upon (hebephilia, zoophilia, pedophilia, biastophilia) in particular, but other associations are exploratory [H3]. We expected any effect of social desirability to be minimal, and for impulsivity to particularly have an effect on engaging in paraphilias that might constitute illegal behavior if acted upon [H4]. Finally, we expected individual differences (impulsivity and D4 traits) to moderate the relationship between arousal and behavior [H5].

Method

Participants

Participants were recruited through the university research participation pool and by sharing a link to the survey on research students' social media (Twitter, LinkedIn, Facebook), as well as various subreddits focused on research studies. The final sample was composed of 384 participants (67.3% female, 30.3% male, 2% non-binary or prefer not to say), after removing participants who did not complete at least

70% of the survey and participants with fast completion time (i.e., less than 5 minutes). Country of residence of these participants was mostly Europe, North America or Asia.

To allow a broader exploration of paraphilic interests and provide a richer perspective, we recruited an additional sample from FetLife, an online community for people interested in BDSM, fetishism, and kink. The inclusion of a community that embraces sexual diversity and is likely to have a greater interest in paraphilias allowed us to examine such interest on a greater spectrum, without needing to include a clinical population. Further, using a sample that covers a greater spectrum is necessary for understanding the nomological network of paraphilias.

With permission from both the FetLife staff and community channel owners, a link was shared on the forum that directed participants to a separate, identical survey. From FetLife, 111 people clicked on the link. We removed 44 participants who finished less than 70% of the survey and a further two participants who finished in less than five minutes, resulting in a final sample of 65 participants (Male: $n = 30$; Female: $n = 29$; Non-binary or prefer not to say: $n = 5$). Participants in this sample were almost exclusively from North America, Europe or Australia. The combined final sample consisted of 449 participants, which exceeded the required number of participants. A power-analysis indicated a linear multiple regression fixed model with ten predictors required 172 participants to detect even a small sample size (.15). Full demographic details for both samples are displayed in Table 1.

Measures

This study was part of a larger study looking at personality characteristics and sexual interest. For the purpose of this study four scales were used.

Dark Tetrad

Dark Tetrad traits were measured using the 28-item Short Dark Tetrad (Paulhus et al., 2020). Each trait forms a subscale of seven items, and participants are asked to indicate the degree to which they agree with each item (1 = *Strongly Disagree* to 5 = *Strongly Agree*). Sample items include, for Machiavellianism: "It's not wise to let people know your secrets," narcissism: "I have some exceptional qualities," psychopathy: "I tend to dive in, then ask questions later" and sadism: "I enjoy watching violent sports." Items are summed per subscale, with higher scores indicating higher level of the trait. Internal reliability for the subscales ranged from acceptable to good ($\alpha = .66$ to $.78$).

Paraphilic Interest

To assess people's paraphilic interest, we used the Paraphilias Scale, which is an 80-item scale that has been used in previous research (Seto et al., 2012). It assesses fourteen paraphilias. The first half of the survey asks participants to indicate how sexually arousing or repulsive they find each activity, whether or not they have tried it. Answer options range from -3 (*Very repulsive*) to 0 (*Neutral*) to $+3$ (*Very arousing*). The second half of the survey asks participants how frequently they have engaged in each activity in their lifetime (1 = *Never*, 2 = *Once or twice*, 3 = *Once a year or more on average*, 4 = *Once a month*

Table 1. Demographic details of general and FetLife sample.

	General Sample (N = 384)	FetLife Sample (N = 65)	χ^2
Age M (SD)	25.92 (7.02)	42.29 (13.26)	^a 8.46***
Min – Max	18–62	18–73	
Sexual orientation			51.59***
Straight	74.6%	52.3%	
Gay/Lesbian	8.5%	3.0%	
Bisexual	14.3%	29.2%	
Other sexual orientation	2.1%	15.3%	
Ethnicity			28.69***
White	61.5%	95.3%	
Asian	32.5%	0%	
Other ethnicity	0%	4.7%	
Relationship status			1.52
Single	35.5%	39.1%	
In a relationship	56.0%	48.4%	
Dating	8.5%	12.5%	
Employment			64.67***
Full-time	39.4%	7.3%	
Part-time	11.1%	12.5%	
Unemployed/retired	5.6%	12.5%	
Student	4.2%	4.7%	
Education			33.83***
GED or equivalent	13.7%	4.7%	
Some university	1.2%	31.3%	
Bachelor's degree	35.0%	37.5%	
Postgraduate degree	36.4%	26.6%	

^at-statistic based on independent samples t-test.

Table 2. Sample items per paraphilia on the Paraphilias Scale.

Paraphilia	Sample item
Voyeurism	You are watching an unsuspecting stranger while they undress
Exhibitionism	You are exposing your penis to a stranger who is not expecting it
Scatologia	You are making obscene phone calls to someone who is not expecting it
Fetishism	You are touching an object like shoes, gloves, or plush toys
Transvestic fetishism	You are dressing up as someone of the opposite sex
Frotteurism	You are touching or rubbing a stranger who is not expecting it
Sadism	You are spanking, beating, or whipping someone; You are cutting someone's skin
Masochism	You are being spanked, beaten or whipped; You are having your skin cut
Blastophilia	You are forcing someone into sexual activity
Urophilia	You are urinating on someone ("golden showers"); You are being urinated on by someone ("golden showers")
Scatophilia	You are defecating on someone ("scat"); You are being defecated on by someone ("scat")
Hebephilia	You are having sex with a girl (age 12 to 14); You are having sex with a boy (age 12 to 14)
Zoophilia	You are having sex with an animal
Pedophilia	You are having sex with a boy below the age of 12; You are having sex with a girl below the age of 12

or more on average, 5 = Once a week or more on average). Internal reliability in this sample was excellent for the overall ($\alpha = .94$), fantasy ($\alpha = .93$) and behavior scales ($\alpha = .87$). Sample items are displayed in Table 2.

(Dys)functional Impulsivity

The Dickman Impulsivity Inventory short-form (Dickman, 1990) measures functional impulsivity (11 items, e.g., "Most of the time, I can put my thoughts into words very rapidly") and dysfunctional impulsivity (12 items, e.g., "I often get in trouble because I don't think before I act"). Participants score each item as *true* or *false*. Items are then summed, with higher scores indicating greater impulsivity. Internal reliability was good (Functional $\alpha = .74$, dysfunctional $\alpha = .78$).

Social Desirability

Social desirability was assessed using the Marlowe-Crowne Social Desirability Scale short form (Reynolds, 1982). It consists of thirteen items (e.g., "I sometimes feel resentful when I don't get my own way"), that participants score as *true* or

false. Items are summed, with higher scores indicating greater social desirability. Internal reliability was acceptable ($\alpha = .66$).

Procedure

Participants who clicked the link to the survey were first provided with an information sheet and asked to provide their consent. Once consent was given, participants filled out the questionnaires in randomized order. Finally, they answered demographic questions and they were presented with a debrief form. This study was approved by the first author's university's Ethical Review Board.

Data Analyses

For the purpose of the frequency analyses, paraphilic arousal variables were created by dichotomizing items into arousing (1) or not arousing (0). Items were then summed per paraphilia, and again dichotomized to indicate finding the paraphilia arousing (1) or not arousing (0). A similar procedure

was followed for behavior, which was dichotomized into having engaged in the activity ever (1) or never (0). Items were then summed per paraphilia, and again dichotomized to indicate having engaged in the paraphilia ever (1) or never (0). To assess concordance between arousal and behavior, Kendall's Tau-b correlations were conducted using these dichotomized variables. Following this, a series of multiple regression analyses were conducted to assess the effects of gender, sample source, and Dark Tetrad traits on the concordance between arousal and behavior for each paraphilia. For these analyses, the full range of responses were included rather than the dichotomized variables. Finally, we took the significant individual differences (impulsivity and D4 traits) predictors per paraphilia to conduct a series of moderation analyses to determine whether those differences moderated the relationship between paraphilic arousal and paraphilic behavior. For this purpose, the predictors were mean-centered.

Results

First, we calculated descriptive statistics for each paraphilic interest, for men and women and for the Fetlife sample and the general sample. Results are displayed in Table 3. Sadism and masochism were the paraphilic interests most arousing and most engaged in by men and women and in both the Fetlife sample and the general sample. Whilst every paraphilia appears, on average, to be rated as repulsive, the large standard deviations indicate substantial variability in individual responses to paraphilic interests. Overall, men were more

likely to find a paraphilia arousing and to have engaged in it, with the exception of masochism, which women found more arousing and had engaged in more. The Fetlife sample found almost all paraphilias more arousing than the general sample, and had engaged in nearly all paraphilias more often. No effects were found for scatophilia, hebephilia, and scatologia. Results for voyeurism, exhibitionism and masochism were mixed. Descriptive statistics of all other variables are displayed in Table 4.

Concordance Between Arousal and Behavior

We tested the concordance between arousal and behavior using Kendall's Tau-b correlations. We calculated these correlations twice, once with the full sample, and once only with the participants who indicated they found the paraphilia arousing. Results are displayed in Table 5.

Using the full sample, all correlations between arousal and behavior were positive and significant except for hebephilia and pedophilia. Looking at only participants who found the paraphilic interest arousing, results were the same, except the correlation for frotteurism was also non-significant.

Hierarchical Multiple Regressions: Arousal and Correlates

We then assessed what factors predict whether someone will engage in a specific paraphilic behavior. To this end, we conducted a series of hierarchical multiple regressions

Table 3. Descriptive statistics of arousal and behavior for each Paraphilic Interest split by gender and sample source.

Paraphilic Interest	Arousing <i>M</i> (<i>SD</i>)			Arousing %			Engaged in %		
	Men	Women	<i>t</i>	Men	Women	χ^2	Men	Women	χ^2
Voyeurism	-.17 (1.89)	-1.36 (1.85)	6.25***	49.7	23.3	30.82***	40.7	17.4	27.87***
Exhibitionism	-2.04 (1.46)	-2.52 (1.16)	3.44***	7.6	5.6	.68	8.3	2.1	9.28**
Scatologia	-2.04 (1.43)	-2.18 (1.39)	.97	8.3	5.6	1.18	9.7	6.6	1.28
Fetishism	-.26 (1.08)	-.96 (1.09)	6.27***	46.2	27.4	15.21***	79.3	69.1	5.05*
Transvestic fetishism	-1.15 (1.49)	-.74 (1.54)	-2.64**	32.4	28.8	.59	44.1	43.4	.02
Frotteurism	-1.71 (1.67)	-2.30 (1.39)	3.59***	14.5	8.0	4.46*	13.8	5.6	8.59**
Sadism	-.12 (1.44)	-1.04 (1.24)	6.62***	84.8	70.8	10.22***	86.9	66.3	20.82***
Masochism	-1.06 (1.41)	-.66 (1.54)	-2.62**	67.6	78.8	6.50*	66.2	80.9	11.41***
Bistophilia	-1.41 (1.86)	-2.34 (1.29)	5.37***	33.8	11.8	30.09***	23.4	12.5	8.53**
Urophilia	-1.60 (1.69)	-2.51 (1.07)	5.91***	29.0	7.3	36.44***	19.3	9.7	7.87**
Scatophilia	-2.68 (.91)	-2.82 (.66)	1.56	7.6	2.1	7.74**	2.8	4.2	.54
Hebephilia	-2.56 (1.00)	-2.78 (.76)	2.30*	9.0	4.9	2.78	2.8	1.4	1.00
Pedophilia	-2.82 (.83)	-2.89 (.63)	.97	3.4	3.5	2.01	1.4	2.4	.08
Zoophilia	-2.75 (.98)	-2.82 (.84)	.80	3.4	1.4	.00	1.4	1.7	.52

Paraphilic Interest	Arousing <i>M</i> (<i>SD</i>)			Arousing %			Engaged in %		
	Fetlife	General	<i>t</i>	Fetlife	General	χ^2	Fetlife	General	χ^2
Voyeurism	3.67 (1.98)	2.92 (1.92)	2.89***	37.5	30.8	1.13	46.9	21.4	18.94***
Exhibitionism	1.98 (1.41)	1.57 (1.24)	2.21*	7.8	5.7	.41	6.3	3.9	.73
Scatologia	1.67 (1.05)	1.90 (1.46)	-1.48	1.6	7.3	2.99	6.3	7.8	.20
Fetishism	4.01 (.78)	3.17 (1.13)	7.43***	53.1	30.8	12.17***	93.8	68.9	16.94***
Transvestic fetishism	3.94 (1.41)	3.02 (1.53)	4.73***	48.4	27.7	11.12***	64.1	41.0	11.83***
Frotteurism	2.78 (1.74)	1.76 (1.43)	4.44***	20.3	8.9	7.62**	18.8	6.8	10.09***
Sadism	4.42 (1.38)	3.11 (1.31)	7.36***	90.6	73.4	8.91**	89.1	70.5	9.63**
Masochism	4.20 (1.67)	3.07 (1.43)	5.14***	82.8	73.9	2.34	87.5	74.7	5.02*
Bistophilia	3.36 (1.94)	1.76 (1.40)	6.31***	45.3	15.1	31.84***	37.5	12.5	25.30***
Urophilia	3.24 (1.75)	1.58 (1.17)	7.31***	48.4	9.9	62.32***	42.2	9.7	47.29***
Scatophilia	1.23 (.56)	1.24 (.80)	-.01	6.3	3.7	.96	3.1	3.9	.09
Hebephilia	1.27 (.72)	1.29 (.87)	-.18	6.3	6.0	.01	1.6	1.8	.02
Pedophilia	1.16 (.49)	1.14 (.73)	.24	3.1	1.8	.47	1.6	1.6	.00
Zoophilia	1.63 (1.44)	1.14 (.74)	2.62*	9.4	2.3	8.35**	4.7	1.6	2.71

Arousing means were from -3 (very repulsive) to 3 (very arousing). The relatively higher the score, the less repulsive is the relevant paraphilic interest.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4. Independent samples T-Tests and descriptive statistics of dark tetrad traits, impulsivity and social desirability split by gender.

Variable	Men		Women		t
	M (SD)	Min – Max	M (SD)	Min – Max	
Machiavellianism	23.37 (4.15)	9–33	22.95 (4.04)	12–35	1.00
Narcissism	20.93 (4.00)	9–29	20.22 (4.05)	8–32	1.72
Psychopathy	16.06 (4.80)	7–33	14.92 (4.36)	6–29	2.48*
Sadism	19.01 (5.04)	7–32	14.89 (5.10)	7–31	7.97***
Dysfunctional impulsivity	1.65 (1.96)	0–7	1.59 (1.86)	0–7	.34
Functional impulsivity	6.61 (2.87)	0–12	5.47 (2.87)	0–12	3.91***
Social desirability	6.15 (2.76)	0–13	6.07 (2.77)	0–13	.38

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5. Correlations between paraphilic arousal and correspondent behavior for the full sample and the subset of the sample who expressed finding the paraphilia arousing.

Paraphilia		r	p -value
Voyeurism	Full sample	0.43	.001
	Find arousing	0.32	.001
Exhibitionism	Full sample	0.24	.001
	Find arousing	0.21	.010
Scatologia	Full sample	0.27	.001
	Find arousing	0.24	.001
Fetishism	Full sample	0.33	.001
	Find arousing	0.26	.001
Transvestic Fetishism	Full sample	0.46	.001
	Find arousing	0.38	.001
Frotteurism	Full sample	0.31	.001
	Find arousing	0.12	.086
Sadism	Full sample	0.57	.001
	Find arousing	0.55	.001
Masochism	Full sample	0.61	.001
	Find arousing	0.59	.001
Biastophilia	Full sample	0.49	.001
	Find arousing	0.38	.001
Urophilia	Full sample	0.45	.001
	Find arousing	0.39	.001
Scatophilia	Full sample	0.14	.003
	Find arousing	0.22	.056
Hebephilia	Full sample	0.03	.542
	Find arousing	0.17	.099
Pedophilia	Full sample	0.09	.060
	Find arousing	0.23	.157
Zoophilia	Full sample	0.20	.001
	Find arousing	0.32	.047

with demographic control variables entered in the first block (age, gender, sample), followed by (dys)functional impulsivity and social desirability in the second block, Dark Tetrad traits in the third block, and paraphilia-specific arousal in the final block. Within each block, a stepwise selection method was used. Results are displayed in Table 6. Related interest in the paraphilic behavior was a significant, and the strongest, positive predictor for all paraphilias. Regarding demographic factors, we found younger people were more likely to engage in pedophilic behaviors. Similarly, men were more likely than women to engage in voyeurism, exhibitionism, frotteurism, sadism and scatophilia. Participants from the Fetlife sample were more likely to engage in voyeurism, sadism, masochism, biastophilia and urophilia.

In terms of Dark Tetrad traits, we found various significant effects. Higher scores on Machiavellianism were linked with lower engagement in voyeurism, exhibitionism, and sadism. Psychopathy, on the other hand, was associated with behavior

for frotteurism, transvestic fetishism, scatophilia, hebephilia, pedophilia and zoophilia. Surprisingly, sadism had a significant effect only on engaging in fetishism. Finally, narcissism positively predicted engagement in both exhibitionism and voyeurism.

Social desirability was a predictor for engaging in masochism only and functional impulsivity significantly negatively predicted both exhibitionism and transvestic fetishism. Dysfunctional impulsivity entered the model as a significant predictor for engaging in voyeurism, scatologia, and urophilia.

Individual Differences Moderate the Link Between Paraphilic Arousal and Paraphilic Behavior

Finally, we conducted a series of moderation analyses to examine which individual differences moderate the link between paraphilic arousal and behavior. To select individual difference variables, we used those identified as significantly contributing to paraphilic behavior in the hierarchical multiple regressions. Results are displayed in Table 7. For voyeurism, exhibitionism and sadism, the interaction between arousal and Machiavellianism significantly and negatively predicted engaging in those paraphilias. For exhibitionism, functional impulsivity also moderated the link between arousal and behavior. In terms of the more extreme (scatophilia) or potentially illegal (hebephilia, pedophilia and zoophilia) paraphilias, the interaction between psychopathy and arousal significantly predicted engaging in those paraphilias. The same was true for urophilia. No other significant moderating effects were found.

Discussion

The aim of this study was to assess concordance between paraphilic arousal and engagement in paraphilic behaviors. We were particularly interested in what factors predicted engaging in paraphilic behavior and whether any individual differences moderated concordance. Prevalence of paraphilic interest (arousal and behavior), overall, corresponded with previous findings. Men showed greater interest in all paraphilias except masochism. Sadism, masochism, and voyeurism were the most arousing and most engaged in paraphilias, but we also found a relatively high interest in (transvestic) fetishism, urophilia and biastophilia for male participants. Paraphilias that might constitute illegal behavior if acted upon and “extreme” paraphilias showed low prevalence,

Table 6. Results of multiple hierarchical regression of demographic variables, individual differences, dark tetrad variables, and paraphilia-related arousal on behavior engagement per paraphilia.

	Voy	Exh	ScLog	Fetish	Tr Fetish	Frot	Sad	Mas	Blast	Uro	Scat	Heb	Pedo	Zoo
Independent variables														
Step 1: Demographic variables														
Gender	-.12*	-.18***		-.09	-.06	-.11*	-.13***	-.07*	-.04	-.18***	-.12*			
Sample	-.19***					-.08	-.10**		-.10*					
Age	.13	.04		.03	.02	.05	.06	.12***	.10	.13	.02	-.09	-.10*	-.08
R ²	29.59***	19.01***		14.66***	9.81**	11.10***	37.28***	26.84***	23.96***	62.14***	7.35**	4.60*	6.87**	4.39*
F	.10*		.11*						.06	.09*	.05	.02	.00	
Step 2: Individual differences														
Dysfunctional impulsivity		-.12*		-.07	-.10*		.06							
Functional impulsivity		.05	.03	-.07	-.06	-.06	-.06	.10**	.11	.14	.03	.01	.03	
Social desirability		.01	.03	.01	.03	.03	.24	.14	.01	.01	.01	.02	.01	
R ²	7.95**	4.31*	11.35***	6.06*	6.24*	6.87**	11.17***	4.49*	4.49*	6.13*	6.13*	4.05*	4.36*	
ΔF					.11*	.14**	.05		.05		.11*	.13**	.15***	.15***
Step 3: Dark Tetrad variables														
Psychopathy	.09*	.13*	.06											
Narcissism	-.15***	-.15**					-.08*	-.04						
Machiavellianism	.08	.08	.04	.10*	.07	.08	.03	-.06	.13	.17	.05	.04	.05	.05
Sadism	.04	.03	.01	.03	.02	.03	.04	.03	.01	.01	.02	.02	.03	.04
R ²	6.56*	5.36*	5.21*	12.54***	9.21**	11.10***	7.66**	8.14**	6.33*	6.43*	6.43*	9.44**	1.77***	16.15***
ΔF														
Step 4: Arousal														
Paraphilia-related arousal	.40***	.31***	.35***	.35***	.51***	.26***	.61***	.74***	.52***	.45***	.17***	.23***	.30***	.29***
R ²	.32	.17	.16	.19	.32	.14	.55	.62	.35	.31	.07	.10	.14	.13
ΔR ²	.14	.09	.12	.11	.25	.06	.27	.45	.122	.17	.03	.05	.09	.08
ΔF	81.61***	43.67***	58.04***	55.31***	149.49***	28.51***	247.64***	485.982***	139.763***	101.85***	11.85***	24.22***	43.01***	37.52***

Gender coded 1 = male, 2 = female; Sample coded 1 = Fetlife, 2 = general.

Table 7. Moderation analyses of the moderating effects of individual differences and dark tetrad variables on the association between arousal and behavior for each paraphilia.

	b	SE	t	p	95% CI
Voyeurism R² = .25***					
Arousal	.140	.010	11.67	<.001	[.12, .17]
Dysfunctional impulsivity	.020	.010	1.76	.078	[−.003, .05]
Machiavellianism	−.010	.006	−1.99	.047	[−.03, < −.001]
Arousal x dysfunctional impulsivity	.006	.006	.940	.350	[−.006, .02]
Arousal x Machiavellianism	−.007	.003	−2.51	.013	[−.01, −.001]
Exhibitionism R² = .18***					
Arousal	.070	.009	8.55	<.001	[.06, .09]
Functional impulsivity	−.003	.003	−.81	.416	[−.01, .004]
Machiavellianism	−.006	.003	−2.50	.013	[−.01, −.001]
Arousal x functional impulsivity	−.007	.003	−2.52	.012	[−.01, −.001]
Arousal x Machiavellianism	−.009	.002	−5.07	<.001	[−.01, −.006]
Scatologia R² = .18***					
Arousal	.110	.010	8.44	<.001	[.09, .14]
Dysfunctional impulsivity	.020	.010	1.84	.066	[−.001, .04]
Arousal x dysfunctional impulsivity	.010	.006	1.90	.058	[<−.001, .02]
Fetishism R² = .18***					
Arousal	.350	.040	8.59	<.001	[.27, .43]
Sadism	.070	.030	2.78	.006	[.02, .12]
Arousal x sadism	.005	.007	.690	.493	[−.009, .02]
Frotteurism R² = .13***					
Arousal	.070	.010	6.21	<.001	[.05, .09]
Psychopathy	.010	.004	3.46	<.001	[.006, .02]
Arousal x psychopathy	.004	.003	1.77	.078	[<−.001, .009]
Sadism R² = .52***					
Arousal	.400	.020	21.91	<.001	[.36, .43]
Machiavellianism	−.070	.030	−1.83	.068	[−.14, .01]
Arousal x Machiavellianism	−.010	.004	−2.55	.011	[−.02, −.002]
Masochism R² = .61***					
Arousal	.420	.020	25.96	<.001	[.39, .45]
Social desirability	.120	.690	.170	.870	[−1.24, 1.47]
Arousal x social desirability	−.014	.070	−.200	.840	[−.15, .12]
Urophilia R² = .52***					
Arousal	.190	.010	13.51	<.001	[.16, .22]
Dysfunctional impulsivity	.040	.020	1.74	.082	[−.005, .08]
Arousal x dysfunctional impulsivity	.010	.007	2.17	.031	[.001, .03]
Scatophilia R² = .24***					
Arousal	.010	.010	.430	.670	[−.02, .03]
Psychopathy	.010	.004	1.74	.080	[−.001, .02]
Arousal x psychopathy	.020	.002	9.90	<.001	[.01, .02]
Hebephilia R² = .45***					
Arousal	<−.010	.010	−1.50	.880	[−.01, .01]
Psychopathy	.010	.002	2.50	.013	[.001, .009]
Arousal x psychopathy	.020	.001	17.24	<.001	[.014, .02]
Pedophilia R² = .39***					
Arousal	−.020	.010	−1.93	.055	[−.03, .001]
Psychopathy	.005	.002	2.15	.032	[<−.001, .009]
Arousal x psychopathy	.016	.001	15.28	<.001	[.01, .02]
Zoophilia R² = .28***					
Arousal	.030	.010	2.49	.013	[.004, .04]
Psychopathy	.003	.002	1.86	.064	[<−.001, .006]
Arousal x psychopathy	.013	.001	9.81	<.001	[.01, .02]

****p* < .001.

which is consistent with the literature (Joyal & Carpentier, 2022; Longpré, Moreton, et al., 2022).

Our first hypothesis concerned a pattern of concordance between arousal and behavior. In support of our hypothesis, we found highly significant correlations between arousal and behaviors for all paraphilias except hebephilia and pedophilia. Indeed, concordance between arousal and behavior for these paraphilias tends to be low, because they involve criminal behavior. Consistent with Joyal and Carpentier (2022), correlations for participants who found the paraphilia arousing decreased in magnitude but remained significant. Further, correlations were highest for masochism and sadism, but in our sample, correlations for urophilia, voyeurism and biastophilia also exceeded .40.

Second, we expected age (younger) and gender (male) to be significant predictors of engaging in paraphilic behavior. Younger people were more likely to engage in pedophilic behavior. Although the question specifically asked about sexual activity with children below the age of 12, this effect may be partially explained by participants' own young age, as the question does not specify a time frame. As such, these experiences may have occurred when they were of a similar age, and may also be more recent in their memories. Therefore, this finding needs to be interpreted with caution. Age was not a significant predictor for any other paraphilic behavior, which may be due to the relatively restricted age range in this sample. With regards to gender, men showed a greater engagement in exhibitionism and voyeurism, as well as sadism,

frotteurism and scatophilia. Although previous studies focused on paraphilic interest rather than paraphilic arousal, our findings correspond to these earlier findings (i.e., Bártová et al., 2021; Joyal & Carpentier, 2022; Seto et al., 2012).

Our third hypothesis concerned the effect of Dark Tetrad traits. The Dark Tetrad traits showed differential patterns of association with engagement in paraphilic behavior that highlight that the four traits are overlapping but distinct. Most notably, Machiavellianism was unique among Dark Tetrad traits, as any significant association with engaging in paraphilic behavior was negative. This negative association was apparent for voyeurism and exhibitionism, both of which have been characterized as impulsive, risky paraphilias to engage in (Stefanska et al., 2022). A substantial body of research has documented that Machiavellians are risk-averse (e.g., Bereczkei et al., 2013; Jones, 2014) and consider the cost-benefit of their actions in a manner the other Dark Traits do not (Jones, 2020). Such risk-aversiveness may be further underlined by the negative association with engaging in sadism. Their cynical worldview and suspicion of other people may fuel a need to abstain from engaging in sexual behaviors that could come back to them in a negative manner.

A different pattern emerged for the remaining three traits. As expected, psychopathy was linked with engaging in paraphilias that might constitute illegal behavior if acted upon (e.g., frotteurism, hebephilia, pedophilia and zoophilia) as well as the more extreme scatophilia, which was only predicted by gender, arousal and psychopathy. These findings are consistent with an impulsive omnivorous sexual appetite among individuals who score high on psychopathy (Knight & Guay, 2018; Krstic et al., 2018). The role of psychopathy in increasing the risk of sexual coercion and severe sexual violence is well-documented (Knight & Guay, 2018; Longpré, Guay, Knight, & Benbouriche, 2018). We did not find an effect of sadism on engaging in sexual sadism, which is consistent with literature that suggests the everyday sadism of the Dark Tetrad is conceptually different from sexual sadism (Paulhus & Dutton, 2016). Sadistic individuals will seek proactive hurt (Saravia Lalinde et al., 2023). It may be that consensual, sexual sadism is not appealing for individuals scoring high on everyday sadism, and that other alternatives are sought to fulfill their needs for enjoying others' hurt. Finally, narcissism was a significant predictor of engaging in voyeurism and exhibitionism. Exhibitionism in other areas such as showing off possessions or accomplishments is a facet of narcissism (Ackerman et al., 2011). It is feasible that such exhibitionism stretches to sexual settings, where such an opportunity is used to flaunt and boost one's ego. Indeed, narcissism has been associated with unsolicited sending of "dick pics" (Oswald et al., 2020), and Lodi-Smith et al. (2014) found a positive association between narcissism and both exhibitionism and voyeurism. Future research should further examine this potential association, perhaps with a larger sample size and more precise measure of behavior.

Finally, social desirability affected engagement in masochism only, suggesting participants answered questionnaires in an honest manner. Future research may want to explore this finding further. It may be that people who engage in sexual

masochism are motivated differently with regards to social acceptance compared to other sexual interests. Similarly, functional impulsivity was negatively associated with engaging in exhibitionism and transvestic fetishism. This suggests that people who score higher on functional impulsivity may exert more control but this impulsivity may also manifest in ways not consistent with these specific behaviors. Future research should further explore these effects.

On the other hand, dysfunctional impulsivity predicted engaging in urophilia, voyeurism and exhibitionism. These paraphilias could be characterized as spur-of-the-moment, and they may be more likely to occur in a state of hyperfocused sexual arousal. Indeed, such a state of hyperfocused sexual arousal is linked with ignoring factors that might stop someone from engaging in a specific sexual behavior (Loewenstein, 1996). This pattern could be explained by an attentional shift that occurs during such a state of heightened arousal, where attention is increasingly directed toward sexual cues (Nordgren & Chou, 2011). Such arousal has also been linked to greater willingness to engage in a sexual activity (Imhoff & Schmidt, 2014), lower self-control in sexual situations (Skakoon-Sparling & Cramer, 2016), and continued viewing of CSAM despite having a desire to quit during non-arousal (Knack et al., 2020). It may be that the other paraphilias, when acted upon, are the result of a carefully negotiated, consensual process (Dunkley & Brotto, 2020), that is not affected by impulsivity in the same manner. We did not find the hypothesized effect of dysfunctional impulsivity on engaging in paraphilias that would be illegal if acted upon. It is likely that we failed to find such an effect because our participants were not part of a clinical population. As such, it may not be low dysfunctional impulsivity that stops them from engaging in these behaviors, but rather, other factors may be more distinguishing, such as psychopathy.

Finally, we assessed which individual differences moderated the link between arousal and behavior. Most notably, whereas arousal did not significantly predict engagement in scatophilia, hebephilia, or pedophilia, the interaction between psychopathy and arousal predicted engagement in those paraphilias. This finding underlines the importance of psychopathy as a risk factor for engaging in potentially illegal sexual behaviors. It further suggests that the combination of deviant sexual arousal and psychopathy is particularly important for engaging in such behaviors, rather than either serving as a single-factor explanation, which is consistent with the literature (e.g., Ward, 2014). Similarly, Machiavellianism significantly and negatively moderated the link between paraphilic arousal and behavior for voyeurism, exhibitionism, and sadism. In other words, Machiavellianism may act as an inhibiting factor in terms of acting on one's paraphilic arousal, further highlighting the distinction between Machiavellianism and psychopathy. This distinction is particularly salient when taking behaviors and long-term consequences into account (Jones, 2020). As mentioned previously, Machiavellians are risk-averse, whereas psychopaths are unlikely to consider risk. As such, those high on Machiavellianism will be more likely to act upon their arousal in a socially acceptable manner that takes long-term consequences into consideration, such as through

manipulation. In contrast, those high on psychopathy will be less likely to make such considerations and simply act on arousal.

Implications & Future Directions

This study has several implications. First, it allows us to bridge knowledge streaming from research on fantasy and behavior with research on arousal and behavior. The reliability and validity of findings is not determined by a single study, but by the convergence of findings across studies (Longpré et al., 2020; Meehl, 1995). Therefore, replication is a cornerstone of good research. Although fantasies are not necessarily indicative of an actualization outside of the fantasy realm, arousal is a more likely candidate (Bártová et al., 2021; Longpré, Burdis, et al., 2022). This paper replicates and extends Joyal and Carpentier's (2017, 2022) studies, and offers additional knowledge on engagement in paraphilic behavior, as well as the concordance of paraphilic fantasy, arousal and behavior. These can exist in less severe forms that are not deleterious. However, individuals presenting with paraphilic interests are more likely to engage in sexual risk-taking behaviors (Chan, 2021; Longpré, Burdis, et al., 2022), and deviant sexual fantasy is recognized as a risk factor of sexual reoffending (Brankley et al., 2021; Brouillette-Alarie et al., 2022), stressing the need to expand our knowledge on the underlying mechanisms in order to develop effective prevention and treatment programs (Stefanska et al., 2022). Future studies should also include physiological assessment of paraphilic arousal, such as penile plethysmography (PPG) assessment. PPG holds several advantages over other methods, including a more objective portrait of sexual preferences than self-report measures or evaluation of physiological correlates of sexual excitement (Longpré, Guay, & Knight, 2018). This combination of self-report measures and physiological assessment could improve the ecological validity of findings.

Furthermore, this study expanded our knowledge of which correlates could potentially influence engaging in paraphilic behavior as well as the concordance between arousal and behavior. This is also in line with Joyal and Carpentier (2022), who recommended that future studies should assess the presence of other underlying factors that impact the variation of concordance or of engaging in paraphilic behavior. The engaging in paraphilic behavior is not a one-size-fits-all explanation, and several correlates were found to predict behavior across paraphilias. Notably, age (younger), gender (men), group (FetLife), and dark traits (Machiavellianism, Sadism & Psychopathy) were significant predictors. Expanding our knowledge on the nomological network of paraphilia is essential, and could inform us about which factors may increase the risk of illegal paraphilic behaviors or clinical distress. The role of dark traits on sexual violence is well-documented (i.e., Beckett & Longpré, 2022; Longpré, Moreton, et al., 2022; Saravia Lalinde et al., 2023), and highlights that although some individuals will seek for a legal manner in which to act upon their paraphilic arousal, the presence of dark traits increases the risk of committing illegal paraphilic behaviors. In a similar vein, Robertson (2014) found that

in the BDSM community, where a high level of sexual violence is allowed under controlled circumstances, 17% of their sample reported that their partner did not respect their safeword (moving from legal to illegal paraphilic behaviors), which could in part be explained by underlying dark traits. Although we advocate for an evidence-based approach and non-judgmental study of paraphilia, it is important to note that some individuals will inevitably cross the line. Therefore, understanding which correlates can explain higher concordance between arousal and behavior, and which ones can predict illegal paraphilic behaviors is crucial.

Limitations

This study had limitations, and results should be interpreted accordingly. An obvious limitation was the use of a self-report survey. Given the sensitive nature of the subject, it may be that participants were motivated to obscure the truth or downplay their interest and engagement in various sexual practices, and the reliance on self-reported data in relation to sensitive topics might have partially impacted the results. However, prior research suggests people who score high on Dark Tetrad traits do not appear particularly motivated to answer in a socially desirable manner (Longpré, Moreton, et al., 2022; Saravia Lalinde et al., 2023). Indeed, social desirability did not seem to have an effect on any of the analyses with the exception of masochism, and base rate interest in various sexual practices did not diverge from those reported elsewhere. Furthermore, our results are overall consistent with previous studies on paraphilia.

Although this sample was lacking diversity in terms of ethnicity, it did have diversity in terms of sexual orientation and sample type. Increasingly, research on sexual interests is conducted with non-heterosexual populations, but typically as “standalone” research. This study was able to draw upon a more diverse sample in that sense. Unfortunately, the proportion of non-heterosexual participants was not big enough to include sexual orientation as a predictor variable. Furthermore, the sample used in the present study was uncommon, with a sub-sample recruited on FetLife. Although users of FetLife actively engage in consensual and non-traditional intimate behaviors, they are part of the general population, and do not present atypical psychological profiles (Robertson, 2014). Previous studies with such a sample have provided consistent results (i.e., Longpré, Burdis, et al., 2022). Future research should also explore possible differences between binary and non-binary identifying groups. Moving forward, studies should aim to increase diversity of participants. However, because the two samples differed in nearly all demographic variables, combining the samples may have introduced variability in responses. Having said that, measurement error may occur when research is conducted in an echo chamber (Longpré et al., 2020). This sampling approach has been used in previous studies (i.e., Seto et al., 2012), with reliable results. For this reason, this dual sampling methodology allows better generalization of results.

Conclusion



This study aimed to replicate and extend Joyal and Carpentier's 2022 study. We assessed concordance between arousal and behavior across various paraphilias, as well as Dark Tetrad traits, impulsivity, social desirability and demographic variables as predictors of engaging in paraphilic behavior using self-report questionnaires in a sample from the general population and FetLife. We also assessed individual differences as moderating factors in the relation between paraphilic arousal and behavior. Overall, the prevalence of paraphilic interest corresponded with previous findings. Men showed greater interest in all paraphilias except masochism. Sadism, masochism, and voyeurism were the most arousing and most engaged in paraphilias. Paraphilias that might constitute illegal behavior if acted upon and "extreme" paraphilias showed low prevalence, which is consistent with the literature. Age (younger), gender (men), group (FetLife), and dark traits (Machiavellianism, Sadism & Psychopathy) were found to be significant predictors of engaging in paraphilic behavior. Psychopathy (positive) and Machiavellianism (negative) significantly moderated the concordance between arousal and behavior for various paraphilias.

This study has provided an update on existing findings that paraphilic arousal does not always translate into behavior. These results support previous studies on engaging in paraphilic behavior and shed light on which factors can impact concordance between arousal and behavior. Future studies should focus on studying concordance among more diverse samples with non-binary participants, expand knowledge on other factors that might influence the concordance between arousal and behaviors [such as developmental factors and sexual interest level], and include physiological measures.

Disclosure Statement

No potential conflict of interest was reported by the authors.

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