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Impulsivity Dimensions and Risky Sex Behaviors in an At-Risk Young Adult Sample

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Abstract

Impulsivity is a personality-based risk factor that has been well studied in relation to risky sexual behavior. Recent conceptualizations of impulsivity have proposed multidimensional facets comprised of premeditation, perseverance, sensation seeking, negative urgency, and positive urgency (UPPS-P model). Prior studies have found that these facets are associated with risky sexual behavior in adolescent and college student samples, but no prior studies have evaluated them in clinical samples. The current study examined how impulsivity-related traits related to two different risky sexual behaviors in a clinical sample of at-risk young adults who had both conduct disorder and substance use disorder symptoms as adolescents ($n = 529$). Lack of premeditation was also tested as a moderator of the relationship between facets of impulsivity and both risky sex outcomes. Results demonstrated that sensation seeking, negative urgency, and positive urgency were correlated with risky sex behaviors. Additionally, multiple regression analyses indicated that sensation seeking was uniquely associated with the number of sexual partners in the past 5 years, whereas positive urgency was uniquely associated with unprotected sex while under the influence. Finally, a significant interaction between lack of premeditation and negative urgency suggests that at-risk young adults with both high negative urgency and lack of premeditation were the likeliest to have the most sexual partners in the past 5 years. This study adds to the current understanding

of the relationship between reward- and affect-driven facets of impulsivity and risky sexual behaviors and may lend utility to the development of interventions for at-risk populations.

Keywords

Impulsivity; Risky sex; Clinical sample; UPPS-P

Introduction

Risky sexual behavior contributes to significant disease burden as well as unplanned pregnancy. Each year, there are approximately 20 million new cases of sexually transmitted diseases (STDs) and nearly one-half of STD incidences occur among youth aged 15–24 years of age (Centers for Disease Control and Prevention, 2015b). In addition, over one-fifth of new HIV diagnoses in the United States were among youth aged 13–24 years (Centers for Disease Control and Prevention, 2015a). A study conducted in 2008 estimated that in the U.S., direct medical services related to STDs cost $15.6 billion dollars each year (Owusu-Edusei et al. 2013).

Risky sexual behaviors are more prevalent in adults with a history of externalizing behaviors. For example, young adults with a history of childhood antisocial behavior are twice as likely to have earlier (i.e., prior to age 16 years) and risker (e.g., more than three different partners in the past year, unprotected sex) sexual experiences compared to individuals with a history of relatively low antisocial behavior (Ramrakha et al., 2007). Males with a childhood diagnosis of oppositional defiant disorder (ODD) or conduct disorder (CD) are more likely to engage in casual sex, have multiple sexual partners, and use condoms infrequently (Flory, Molina, Pelham, Gnagy, & Smith, 2006). Multiple studies have found that substance use behaviors are associated with more risky sexual behaviors during young adulthood (Cavazos-Rehg et al., 2007; Costa, Jessor, Donovan, & Fortenberry, 1995; Tubman, Windle, & Windle, 1996; Vasilenko, Kugler, Butera, & Lanza, 2015). The robust associations between antisocial behavior, substance use, and risky sex indicate that there may be underlying personality traits influencing these problem behaviors.

Impulsivity and Risky Sex Behaviors

One personality trait commonly associated with risky sexual behavior is impulsivity (Charnigo et al., 2013; Hoyle, Fejfar, & Miller, 2000). Impulsivity is associated with behaviors such as sex while using drugs or with a partner using drugs (Charnigo et al., 2013), infrequent use of condoms (Cooper, Agocha, & Sheldon, 2000; Dir, Coskunpinar, & Cyders, 2014), engagement in sex with strangers (Deckman & DeWall, 2011; Derefinko et al., 2014), multiple sex partners (Derefinko et al., 2014; Dir et al., 2014), and history of STDs (Dir et al., 2014; Sales et al., 2012).

Impulsivity as a Multidimensional Construct—A recent conceptualization of impulsivity has suggested four separate facets of impulsivity: urgency, perseverance, premeditation, and sensation seeking (UPPS; Whiteside & Lynam, 2001). A subsequent analysis found that urgency can be further divided into positive and negative facets to reflect

rash action in response to positive versus negative emotion, referred to as the UPPS-P framework (Cyders & Smith, 2008;Lynam, Smith, Whiteside, & Cyders, 2006). Collectively, this widely used UPPS-P framework (Lynam, Smith, Cyders, Fischer, & Whiteside, 2007)disaggregates trait impulsivity into five subscales indicative of unique aspects of impulsive behavior: (1) *Lack of Premeditation* defined as the tendency to act without prior thought or planning; (2) *Lack of Perseverance* defined as a failure to tolerate boredom or to remain focused despite distraction; (3) *Sensation Seeking* defined as the tendency to seek excitement and arousal; (4) *Negative Urgency* defined as the tendency to act rashly when experiencing extreme negative affect; and (5) *Positive Urgency* defined as the tendency to act rashly when experiencing extreme positive affect (Lynam et al., 2007).

Previous Research on the Association Between Impulsivity and Sexual Risk Behaviors—A meta-analysis of studies with adolescent samples revealed significant, but small, effects of the four original UPPS impulsivity traits with risky sexual behavior and no marked differences in the size of the four effects (Dir et al., 2014). In contrast, studies with college student samples show that the impulsivity-risky sex relation may be driven by specific impulsivity facets. Several studies found that urgency and sensation seeking are more consistently related to risky sexual behaviors among college students (Deckman & DeWall, 2011; Simons, Maisto, & Wray, 2010), whereas lack of perseverance may be associated with increases in risky sexual behavior during students' first year in college (Zapolski, Cyders, & Smith, 2009).

Although many studies have tested impulsivity as a multifaceted trait in relation to sexual behavior, all prior studies described previously used non-clinical samples. It is important to study these associations in clinical samples as findings from such studies can be particularly helpful in informing prevention and intervention efforts for at-risk populations. Prior research using the UPPS-P in clinical samples have shown that negative urgency and sensation seeking are most consistently associated with externalizing behaviors and psychopathology, including alcohol problems and antisocial behaviors, disordered eating, and pathological gambling (Anestis, Smith, Fink, & Joiner, 2009;Grall-Bronnec et al., 2012; Whiteside, Lynam, Miller, & Reynolds, 2005). The current study extended these studies by examining whether these same facets drove the association between impulsivity and sexual risk behaviors.

Interactive Effects of Impulsivity Facets—Impulse control is often referred to as the ability to think before acting, planning ahead, and premeditation (Coutlee, Politzer, Hoyle, & Huettel, 2014; Whiteside &Lynam, 2001). Conversely, low impulse control is related to externalizing problems (Whiteside & Lynam, 2003). Given that sensation seeking and affective urgency are also related to externalizing psychopathology (Anestis et al., 2009;Whiteside et al., 2005), it is important to explore whether the co-occurrence of poor impulse control (i.e., lack of premeditation) and other facets of impulsivity have synergistic effects on externalizing behaviors, such as risky sex. Integrating evidence from neurodevelopmental and personality literature, McCabe, Louie, and King (2015) proposed a "developmental asymmetry" hypothesis, which posits that young adults are at most likely to engage in risky behaviors when they have a strong disposition toward reward-driven

behavior (reflected in sensation seeking) paired with a not yet fully developed capacity to control such behavior (reflected in lack of premeditation). They found lack of premeditation interacted with sensation seeking in predicting drinking consequences, drug use, and drug consequences for college students. Conversely, this interaction effect did not significantly influence antisocial behaviors, the only outcome that was unrelated to substance use. Another study exploring the developmental asymmetry hypothesis examined risky driving behaviors and found that lack of premeditation moderated and strengthened the positive association between sensation seeking and driving under the influence (Luk et al., 2017). This implies that the synergistic effects of sensation seeking and lack of premeditation may be specific to substance use related outcomes. The aforementioned studies that examined the relationships between different facets of impulsivity and risky sex did not test whether there were interactions between the facets in relation to sex behaviors. Thus, another goal of this study was to determine if lack of premeditation enhanced the associations between other impulsivity facets and risky sex in an at-risk sample.

Present Study

The goals of this study were to examine five dimensions of impulsivity as unique and interactive predictors of risky sex behaviors. Our hypotheses were:

1. Following previous studies utilizing clinical samples (Anestis et al., 2009;Grall-Bronnec et al., 2012;Whiteside et al., 2005), we hypothesized negative urgency and sensation seeking are the most consistent correlates of risky sex behaviors.

2. Based on the developmental asymmetry model presented by McCabe et al. (2015), we hypothesized that lack of premeditation moderated and enhanced associations of sensation seeking and negative urgency for both risky sex outcomes.

Method

Participants

We utilized cross-sectional data from a multisite longitudinal research project on genetics of antisocial drug dependence (Derringer et al., 2015;Melroy et al., 2014). Participants in Denver and San Diego were identified via residential or outpatient treatment programs, involvement with the criminal justice system or special schools for youth with behavioral problems, who were at high risk for having a substance use disorder and conduct disorder. At the time of recruitment participants were 13–19 years old and had to meet one or more lifetime substance dependence symptom and at least one conduct disorder symptom. Given the large and difficult-to-follow sample that was geographically dispersed, there was variability in the amount of time from the baseline interview to follow-up (on average 6.5 years after the original assessment). Over half (56%) of the participant follow-up data was collected 3 to 6 years after baseline, and 95% of the follow-up data was collected by year 9. Impulsivity and risky sex behavior measures were only included in the follow-up assessment. Therefore, the current study focused only on this time point. The University of California, San Diego, and the University of Colorado, Denver institutional review boards

approved all subject recruitment and assessment procedures. Informed consent was obtained from all individual participants included in the study.

Measures

Multidimensional Impulsivity

A 35-item, modified version of the UPPS-P scale (Lynam et al., 2006; Whiteside & Lynam, 2001) was used to measure the five facets of impulsivity. The five facets of impulsivity measured were lack of premeditation (8 items; $a = .80$), lack of perseverance (6 items; $a = .68$), sensation seeking (7 items; $a = .76$), negative urgency (7 items; $a = .76$), and positive urgency (7 items; $a = .82$). Sample items include: "I usually make up my mind through careful reasoning" (lack of premeditation), "I tend to give up easily" (lack of perseverance), "I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional" (sensation seeking), "I often make matters worse because I act without thinking when I am upset" (negative urgency), and "When I get really happy about something, I tend to do things that can have bad consequences" (positive urgency). For all items, response options ranged from 1 (Strongly Disagree) to 4 (Strongly Agree).

Risky Sex Behaviors

Participants responded to two self-report items assessing number of sexual partners in the past 5 years and frequency of past-year unprotected sex under the influence. The outcome of number of partners was assessed using the item "In the past 5 years, with how many people (different partners) have you had oral, vaginal, or anal sex?" with response options: "none" (0), "one" (1), "two" (2), "3–5" (3), "6–9" (4), "10–19" (5), and "20+"(6). The frequency of past-year unprotected sex under the influence outcome was assessed using the item "In the past 12 months, I have had unprotected sex (not used a condom) because I was drinking or using drugs," using response options: "none" (0), "1 time" (1), "2 times" (2), "3–5 times" (3), "6–9 times" (4), "10–19 times" (5), and "20+" (6). Due to a skip pattern in the survey, where only individuals who endorsed having sex with two or more different sexual partners in the past 5 years were asked all the sexual risk behavior questions, 14% of the sample had missing responses to the unprotected sex under the influence item. Compared to participants with data on past-year unprotected sex under the influence, those with missing data on this item were significantly older (M age 23.2 vs. 22.6 years, $t = 2.71$, $p < .01$). There were no significant differences in risky sex behaviors across gender or race/ethnicity. Given that age differences in both impulsivity and sexual behaviors have been reported previously (Herbenick et al., 2010; Steinberg et al., 2008), and that our analyses showed that age differentiated between the analytic sample and those who had missing data, we had theoretical and statistical reasons to control for age in our analyses of risky sex behavior outcomes.

Statistical Analyses

Prior to the primary analyses, we evaluated whether there were significant multicollinearity issues using variance inflation factors (VIF), with a threshold VIF of 2 or above indicating the presence of multicollinearity. Descriptive data were analyzed to determine the optimal model for each outcome. Due to the continuous and normally distributed nature of the data,

we utilized linear regression for the sexual partners in the past 5 years outcome variable. Descriptive analyses of past-year unprotected sex under the influence data revealed overdispersion, and thus, negative binomial regression was used to analyze this count data. Age, gender (females coded as "0" and males coded as "1"), and race/ethnicity (non-Hispanic White, coded as "1," vs. all other racial/ethnic groups combined, and coded as "0") were significantly correlated with the number of partners in the past 5 years, and gender was correlated with past-year unprotected sex and was therefore included as covariates in our analyses. The study hypotheses were tested in three steps using regression analyses. First, the effects of the impulsivity dimensions and related covariates on each risky sex outcome were estimated to test for unique main effects. Second, we tested our moderation hypotheses by including interaction terms between lack of premeditation and the other four impulsivity dimensions. All independent variables were mean-centered prior to the moderation analyses to assist with interpretation of results. Third, we dropped all nonsignificant predictors in the final trimmed model to ensure that the key findings were not attributable to potential suppression effects. All analyses were conducted in SPSS 24.0.

Results

Descriptive Statistics

Sample characteristics, mean scores of UPPS-P subscales, and counts of risky sex behaviors are presented in Table 1. Bivariate correlations of UPPS-P facets and risky sex behaviors are presented in Table 2. Sensation seeking, negative urgency and positive urgency were positively correlated with number of sexual partners in the past 5 years and past-year unprotected sex while under the influence. Multicollinearity between facets of UPPS-P was not suspected given all VIF values were below 2.

Facets of Impulsivity and Risky Sexual Behaviors

Linear regression estimates predicting the number of sexual partners in the past 5 years are presented in Table 3. Age, being male, and sensation seeking were significant predictors, and there was a significant interaction between lack of premeditation and negative urgency (see Fig. 1). The trimmed model revealed that being male ($b = .42$, $SE = .16$, $p = .01$), lack of premeditation ($b = .27$, $SE = .14$, $p = .05$), sensation seeking ($b = .52$, $SE = .11$, $p < .001$), and negative urgency ($b = .16$, $SE = .11$, $p = .13$) were all significantly predictive of a greater number of sexual partners in the past 5 years, whereas being older was associated with fewer sexual partners in the past 5 years ($b = -.09$, $SE = .03$, $p = .01$). These variables accounted for 10% of the variation in number of sexual partners in the past 5 years. Inclusion of the premeditation-negative urgency interaction term explained an additional 1.1 % of variation in predicting the number of sexual partners. The interaction presented in Fig. 1 demonstrates that the association between negative urgency and number of sexual partners in the past 5 years was stronger at higher levels of lack of premeditation. This association is statistically significant for individuals who had a score on lack of premeditation that does not fall in the 95% confidence interval band around this linear association; thus, the association is significant for individuals who scored approximately 0 (which is the centered mean) or higher on lack of premeditation.

Negative binomial regression results for the frequency of past-year unprotected sex while under the influence outcome are presented in Table 4. Being male, sensation seeking, and positive urgency were associated with unprotected sex under the influence in the past year. None of the interactions between impulsivity dimensions and lack of premeditation were significant. The final trimmed model revealed that males were 1.60 (95% CI, 1.16–2.21) times as likely to have had unprotected sex under the influence in the past year than females. Additionally, for every one-unit increase on the positive urgency scale, participants were 1.38 (95% CI, 1.14—1.67) times as likely to engage in unprotected sex under the influence in the past year ($p = .001$).

Discussion

This study examined unique and interactive associations between different facets of impulsivity and risky sexual behaviors in an at-risk clinical sample of young adults with a history of conduct and substance use problems. Our hypothesis that negative urgency and sensation seeking would be the best predictors of risky sex behaviors was supported. We found that sensation seeking, negative urgency and positive urgency were all positively correlated with both number of partners in the past 5 years and unprotected sex under the influence in the past year. Given that sensation seeking and positive urgency are theoretically considered to be reward-driven facets of impulsivity, and that negative and positive urgency are defined by rash responses to extreme affect, our current study suggests that these three facets may be of particular importance among at-risk young adults. Overall, these findings confirmed that trait impulsivity measures are capable of capturing significant individual differences in relation to risky sex behaviors among young adults with a history of substance use and externalizing behaviors.

Our analyses, which included covariates, facets of impulsivity, as well as interactions between lack of premeditation and the other four facets of impulsivity revealed that sensation seeking was associated with the number of sexual partners in the past 5 years. These results were consistent with previous research, which found negative urgency and sensation seeking to have the strongest relationships with risky sexual behavior (Deckman & DeWall, 2011). Furthermore, our findings added to previous findings that consistently found negative urgency and sensation seeking to be associated with problematic behaviors, such as disordered eating in clinical samples (Anestis et al., 2009) and pathological gambling (Grall-Bronnec et al., 2012).

Examining the past-year unprotected sex while under the influence outcome more closely revealed that it was uniquely associated with positive urgency. In addition, gender, a covariate, had a significant association, showing an increased risk among males for past-year engagement in unprotected sex while under the influence. These findings were slightly different from previous research with a college sample, which found that positive urgency was positively associated with unprotected sex among women but not men (Simons et al., 2010). Our study's findings were consistent with Zapolski et al. (2009), who identified positive urgency as the strongest predictor of risky sex, and suggested that an increase in positive affect could impair cognitive ability to act on or restrain from sexual attraction

based on long-term personal and health consequences (e.g., wearing a condom to prevent STDs and unwanted pregnancies).

Finally, we tested the "developmental asymmetry" hypothesis (McCabe et al., 2015), which proposed that higher dispositions toward reward-driven behavior paired with a not well-developed capacity to control such behavior would result in risky behaviors. The present study found a unique significant interaction between lack of premeditation and negative urgency, but only for the number of sexual partners in the past 5 years outcome variable. At-risk young adults with high negative urgency and lack of premeditation were most likely to have the most sexual partners in the past 5 years. McCabe et al. found that premeditation enhanced the associations between sensation seeking and multiple substance use behaviors but this interaction did not extend to predict antisocial behaviors. Our current findings were slightly different than those of McCabe et al. (2015) in that the premeditation by negative urgency interaction was only significant for sexual partners in the past 5 years, but not for past-year unprotected sex while under the influence, which is conceptually more related to substance use. Clinically high-risk samples are particularly prone to experiencing poor emotional self-regulation (Gratz & Tull, 2010; Leadbeater, Blatt, & Quinlan, 1995), and the experience of frequent or acute negative affect increases chances of engaging in avoidant coping mechanisms (Westen, 1994), which have been linked to engagement in risky sex behaviors (Folkman, Chesney, Pollack, & Phillips, 1992). When negative urgency is combined with lack of premeditation, or giving less careful thought to potentially more adaptive coping strategies, the combination of high levels of those impulsivity facets puts individuals at higher risk for negative consequences related to having numerous sexual partners. Moving forward, exploring the underlying factors of this interaction, such as identifying risky sex related cognitions and motivations (e.g., coping with negative affect), could inform prevention and intervention efforts for at-risk young adults.

This study had several limitations. First, the UPPS-P impulsivity scale was only assessed at follow-up; as such, only cross-sectional data were available for the present study, which limited the ability to evaluate causal inference. Second, the measurement of risky sex behaviors was based on two retrospective self-reported items, which are prone to self-report and recall biases. Although utilizing single items to capture specific risky sex behaviors is a common practice (e.g., Derefinko et al., 2014; Simons et al., 2010), utilizing a scale that captures a full range of risky sex behavior might depict the relationship between facets of impulsivity and sex more comprehensively. Lastly, because of a skip pattern in our questionnaire, where only individuals who endorsed having sex with two or more different sexual partners in the past 5 years were asked about unprotected sex under the influence, 14% of the sample had missing data. As the present study was a secondary data analysis of a longitudinal study, the skip pattern was not ideal for this specific research question. We addressed this issue by controlling for it statistically; however, it is possible past-year unprotected sex under the influence may be overestimated.

Nevertheless, this study has important clinical implications with regard to the prevention of risky sex behaviors among at-risk young adults. This was the first known study to examine facets of impulsivity as they relate to risky sex behaviors among an at-risk young adult sample. It is important to underscore the associations of affective urgency and sensation

seeking facets with risky sex behaviors, which may influence conceptualizations of interventions that may have to include components that address emotion regulation and risk-taking. In addition, the current findings supported the utility of the UPPS-P impulsivity measure as a clinical or screening tool to identify individuals who might be at elevated risk for risky sex behaviors. Moreover, this study supported the developmental asymmetry theory proposed by McCabe et al. (2015), further expanding the research to include risky sex behaviors. These findings underscored the importance of personality factors as they relate to risky sex behaviors and the importance of incorporating such factors into prevention and intervention programs specifically tailored for young adults with a history of externalizing psychopathology.

Acknowledgements

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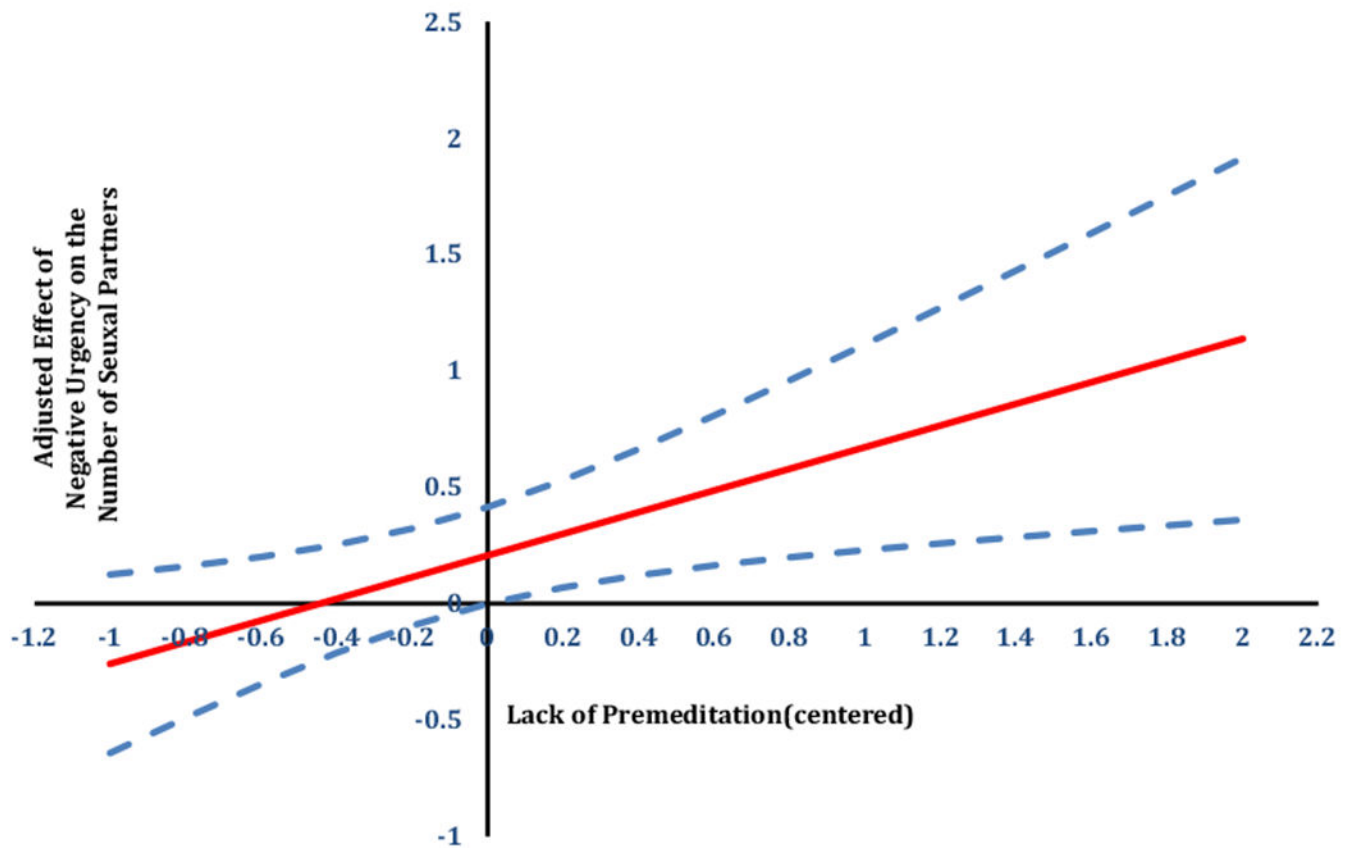
Fig. 1. Interaction between lack of premeditation and negative urgency in predicting number of sexual partners in the past 5 years. This figure illustrates the Johnson-Neyman plot of the Final Trimmed Model of the negative urgency and lack of premeditation interaction. The *straight, solid plot line* represents values of the adjusted effect of negative urgency on number of sexual partners in the past 5 years that correspond to all observed (mean-centered) values of lack of premeditation. The *dashed, curved lines above* and *below* the *solid plot line* represent 95% confidence bands around the adjusted effect of negative urgency on the number of sexual partners in the past 5 years

Table 1.

Sample characteristics ($n = 529$)

Mean (SD)	
Age (in years)	22.7 (2.04)
% Male	73%
% Non-hispanic white	51%
UPPS-P	
(Lack of) premeditation	1.86 (.51)
(Lack of) perseverance	1.76 (.51)
Sensation seeking	2.96 (.64)
Negative urgency	2.43 (.66)
Positive urgency	2.20 (.66)
Risky sex	
Sexual partners in the past 5 years[a]	3.58(1.60)
Past-year unprotected sex under the influence[a,b]	1.44 (1.94)

[a] Reflects 0–6 scale described in the "Methods" section

[b] Reduced ($n = 453$) due to skip pattern

Table 2.

Bivariate correlations among UPPS-P facets and risky sex behaviors

	1.	2.	3.	4.	5.	6.	7.
1. (Lack of) Premeditation	–						
2. (Lack of) Perseverance	49[**]	–					
3. Sensation seeking	−.09[*]	−.19[**]	–				
4. Negative urgency	.27[**]	.33[**]	.15[*]	–			
5. Positive urgency	.16[**]	.21[**]	.33[**]	.62[**]	–		
6. Sexual partners in the past 5 years[a]	.07	.02	.25[**]	.12[*]	.16[**]	–	
7. Past-year unprotected sex under the influence[a]	.07	.07	.17[**]	.10[*]	.21[**]	.30[**]	–

[*]
$p < .05$;

[**]
$p < 01$

[a]Reflects 0–6 scale described in the "Methods" section

Table 3.

Hierarchical regression models for sexual partners in past 5 years ($n = 529$)

	Model 1: main effects			Model 2: premeditation as moderator			Model 3: final trimmed model		
	b	SE	*p* value	*b*	SE	*p* value	*b*	SE	*p* value
Age	−.09	.03	.004	−.10	.03	.002	−.09	.03	.01
Male gender	.41	.16	.01	.41	.16	.01	.44	.16	.01
Non-hispanic white	.18	.14	.21	.19	.14	.18	–	–	–
(Lack of) premeditation	.24	.15	.12	−.14	.15	.36	.20	.14	.15
(Lack of) perseverance	−.002	.16	.99	.06	.16	.71	–	–	–
Sensation seeking	.47	.12	<.001	.45	.12	<.001	.51	.11	<.001
Negative urgency	.13	.14	.35	.15	.14	.26	.21	.11	.05
Positive urgency	.07	.14	.62	.10	.14	.47	–	–	–
L. premed × l. perseverance	–	–	–	−.26	.26	.32	–	–	–
L. premed × sensation seeking	–	–	–	−.23	.22	.30	–	–	–
L. premed × negative urgency	–	–	–	.44	.24	.05	.47	.18	.01
L. premed × positive urgency	–	–	–	.28	.26	.28	–	–	–

L. premed lack of premeditation, *l. perseverance* lack of perseverance

Table 4.

Negative binomial regression models for unprotected sex under the influence in past year ($n = 453$)

	Model 1: main effects			Model 2: premeditation as moderator			Model 3: final trimmed model		
	IRR	95% CI	*p* value	IRR	95% CI	*p* value	IRR	95% CI	*p* value
Age	.96	0.90–1.02	.15	.96	0.90–1.02	.15	–	–	–
Male gender	1.63	1.17–2.27	.004	1.63	1.17–2.27	.004	1.60	1.16–2.21	.004
Non-hispanic white	.94	0.73–1.22	.65	.94	0.73–1.22	.66	–	–	–
(Lack of) premeditation	1.18	0.89–1.57	.25	0.97	0.21–4.37	.96	–	–	–
(Lack of) perseverance	1.07	0.80–1.44	.63	1.19	0.42–3.34	.74	–	–	–
Sensation seeking	1.29	1.03–1.61	.03	1.17	0.53–2.58	.69	1.22	0.99–1.52	.07
Negative urgency	.95	0.74–1.22	.67	0.82	0.32–2.08	.67	–	–	–
Positive urgency	1.35	1.05–1.73	.02	1.44	0.55–3.77	.46	1.38	1.14–1.67	.001
L. premed × l. perseverance	–	–	–	0.95	0.57–1.58	.84	–	–	–
L. premed × sensation seeking	–	–	–	1.05	0.70–1.59	.81	–	–	–
L. premed × negative urgency	–	–	–	1.08	0.67–1.76	.75	–	–	–
L. premed × positive urgency	–	–	–	0.97	0.59–1.60	.90	–	–	–

L. Premed lack of premeditation, *IRR* incidence rate ratio, *l. perseverance* lack of perseverance