Drug and Alcohol Dependence 174 (2017) 39–46

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Full length article

Sex-related substance use and the externalizing spectrum

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ARTICLE INFO

Article history:
Received 9 May 2016
Received in revised form 4 January 2017
Accepted 5 January 2017
Available online 28 February 2017

Keywords:
Drug and alcohol use
Substance use
Externalizing
Transdiagnostic factors
Risky sexual behaviors

ABSTRACT

Background: Substance use before and during sexual activity is associated with many negative health outcomes. Estimates suggest that at least 4.3 million American adults annually engage in *regular sex-related alcohol consumption*, indicating that the intersection of substance use and sexual behavior is of public health concern. However, it is likely that when considering broader *sex-related substance use*, estimates would be notably higher. While substance use disorders and antisocial personality disorder have been associated with sex-related alcohol consumption, no study has investigated how regular sex-related substance use is associated with the broader transdiagnostic externalizing spectrum. Further, no studies have assessed whether or not sexual risk-taking behaviors can be integrated into the externalizing spectrum.
Methods: In a large internet sample ($N = 936$), we used confirmatory factor analysis, item response theory, and logistic regression to link sex-related alcohol and drug use to an externalizing latent variable; identified psychometric characteristics of these behaviors; and determined the extent to which one's externalizing level was associated with changes in odds of regular sex-related substance use. We then replicated these findings in a nationally representative sample ($N = 34{,}653$).
Results: Results highlighted the close association between sex-related substance use and externalizing, with externalizing increases being associated with significantly increased odds of regular sex-related substance use.
Conclusions: These findings bear notable implications for conceptualization and treatment of sex-related substance use. Transdiagnostic intervention can be an efficient means of addressing this problematic behavior as well as other comorbid presentations. Results expand the current conceptualization of the externalizing spectrum.

1. Introduction

Approximately 4.3 million American adults regularly drink alcohol prior to sex (Eaton et al., 2015a). While no similar national studies of regular sex-related drug use exist, smaller studies indicate that many individuals use substances other than alcohol for sex-related purposes (Calsyn et al., 2010a; Colfax et al., 2004; Hirshfield et al., 2004).

Although a wealth of research has been conducted on the negative associations of *general* substance use, less focus has been paid to *sex-related* substance use specifically—which is associated with risk for negative health outcomes. Pre-sex alcohol use is associated with increased engagement in unprotected sex (Caldeira et al., 2009; Colfax et al., 2004); decreased intention to use, and decreased consistency of using, protection during sex (Rehm et al., 2012; Zablotska et al., 2006); reduced effectiveness of safer sex practices (Fisher et al., 2010); and increases in general number of sexual partners and incidence of casual sex (Caldeira et al., 2009; Cooper, 2002). Similar associations have been reported for sex-related drug use (Caldeira et al., 2009; Hirshfield et al., 2004; Leigh et al., 2008). Given these associations with unsafe sexual behaviors, sex-related substance use is associated with increased risk of sexually

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http://dx.doi.org/10.1016/j.drugalcdep.2017.01.008
0376-8716/

transmitted infection, including HIV (Kim et al., 2013; Koblin et al., 2006; Stall et al., 1986; Zablotska et al., 2006).

While no studies to our knowledge have examined individual differences variables in relation to sex-related alcohol or drug use per se, previous studies have demonstrated that personality traits such as disinhibition, sensation seeking, and impulsivity; general substance use; and other risky sexual behaviors are positively interrelated (e.g., Caspi et al., 1997; Cooper et al., 2000; Cooper, 2002; Donahew et al., 2000; Hendershot et al., 2007; Justus et al., 2000). Hoyle et al. (2000) found the variables sensation seeking, impulsivity—and to a lesser extent hostility/aggression—positively associated with various risky sexual practices. Similarly, other empirical evidence has found these personality constructs are positively associated with problematic substance use (e.g., Verdejo-Garcia et al., 2008). Not only do personality variables appear to explain the associations between substance use and risky sexual behaviors (Kalichman et al., 1996; Justus et al., 2000), but they also prospectively predict them (e.g., Caspi et al., 1997). Thus, individual differences variables appear to be important foci for investigation in attempts to account for the observed link between substance use and risky sexual behavior. Considering the significant number of American adults who engage in regular sex-related substance use, understanding these behaviors becomes a matter of notable public health importance

1.1. The externalizing spectrum and sex-related substance use

A key individual-differences construct that may underlie sex-related substance use is the externalizing spectrum, which has been linked to disinhibition-related personality traits like sensation seeking, impulsivity and aggression (Krueger et al., 2001, 2002, 2007). The externalizing spectrum accounts for comorbidity among substance use disorders and impulsivity- and antisociality-related disorders, like antisocial personality disorder (ASPD), oppositional defiant disorder, and attention-deficit/hyperactivity disorder (Carragher et al., 2015; Eaton et al., 2015a,b,c; Krueger and Eaton, 2015; Krueger and Markon, 2006).

Several externalizing disorders have been previously associated with regularly drinking alcohol before sex (Eaton et al., 2015a; Thompson et al., 2014). Though it is unsurprising that the presence of an alcohol (or other substance) use disorder has been associated with increased odds of regular pre-sex drinking, it is noteworthy that ASPD—a non-substance externalizing disorder—has also been associated with increased odds of regularly drinking before sex. Such a finding suggests that it is the shared externalizing core that may account for the associations of these heterogeneous disorders with regular pre-sex drinking, and this finding also highlights the need to understand better the link between the externalizing spectrum and broader regular sex-related substance use. Furthermore, because key individual differences variables (e.g., disinhibition and sensation-seeking) have previously been associated with risky sexual behaviors and substance use in general, investigation of how risky sexual behaviors associate with this externalizing core may help coalesce distinct literatures on psychiatric and SUDs, risky sexual behaviors, and individual differences variables.

1.2. The current study

The current study investigated the associations between sex-related substance use and the externalizing spectrum by addressing four questions: (1) Do individuals who regularly use substances in sexual contexts display higher externalizing levels than individuals who do not? (2) How are individuals' externalizing levels associated with the odds of reporting regular sex-related substance use? (3) Can regular sex-related substance use be modeled as indicators of the externalizing spectrum? (4) What are the psychometric properties of these variables within externalizing? We address these questions in two samples and using two different variations of externalizing. Finally, we investigated potential gender differences in the above associations, given that women and men generally differ in latent transdiagnostic externalizing levels (Eaton et al., 2013; Hicks et al., 2007; Kramer et al., 2008).

2. Method

2.1. Participants

2.1.1. Internet sample. Data were from a sample of 1001 individuals who completed an Internet survey about sexuality on Amazon Mechanical Turk (MTurk) for compensation of a small fee in 2014. The study was approved by the Stony Brook University Institutional Review Board.

The current study, after exclusion rules were applied,[1] utilized an analytic sample of $N = 936$, 49.0% of whom were women. Only cisgender (i.e., non-transgender) individuals were included. Gender for individuals who self-identified as neither cisgender male or female ($n = 12$) was coded as missing. Participants' ages ranged from 18 to 82 (median = 31). Participants self-identified as 80% White, 10% Black, 8% Asian, 6% Hispanic, and 2% Native American, with the ability to choose more than one race/ethnicity category. Participants self-identified as 79% heterosexual, 13% bisexual, and 4% lesbian/gay. The remaining 4% reported they were asexual, did not know their sexual orientation, or made a free response to the sexual orientation question (e.g., pansexual). Participants were included in the analysis regardless of sexual orientation.

2.1.2. Nationally representative sample. Data were from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC; see Grant et al., 2009), which comprised two waves: Wave 1 ($N = 43{,}093$; fielded 2001–2002), and a Wave 2 follow-up of Wave 1 participants ($N = 34{,}653$; fielded 2004–2005). The current study used Wave 2 data only, because this is when sex-related alcohol use was assessed. We conducted analyses using both the full NESARC Wave 2 sample, as well as a subsample of only sexually active drinkers—defined as those participants who had sex or consumed alcohol in the past year (n = 17,491; Eaton et al., 2015a)—with results remaining largely unchanged. We present the analyses using the full sample herein. Participant ages ranged from 20 to >90 years and were 58% female. They self-identified into race/ethnicity categories: non-Hispanic White (70.9%), Hispanic/Latino (11.6%), non-Hispanic Black (11.1%), Asian/Pacific Islander (4.3%), and Native American (2.2%). Both NESARC waves were weighted to be representative of the age, racial/ethnic, and gender distributions of the adult United States population based on the 2000 Census. The NESARC research protocol, including informed consent, received full ethical review and

[1] We used three methods to ensure quality of the data and derive an analytic sample. First, we removed subjects who completed the task in fewer than seven minutes ($n = 46$), which was suggestive of careless responding (median completion time = 13 min). Second, we repeated two items (about appealingness of two sexual behaviors; not included in the current study) scored on a seven-point Likert-type scale throughout the survey, and we removed participants whose responses to both item pairs differed by three or more scale points ($n = 5$), consistent with Tellegen's variable response inconsistency (VRIN) used in other measures (e.g., the Minnesota Multiphasic Personality Inventory-2 [MMPI-2], Butcher et al., 1989); the Multidimensional Personality Questionnaire [MPQ], Tellegen and Waller, 2008) to minimize inconsistent and random responding (see Tellegen, 1988). Third, participants were queried at the end of the study about the degree of honesty with which they responded to items, noting that this would not impact payment, and we removed any participants who reported being "somewhat honest" or less ($n = 20$). Some participants met more than one exclusion criterion.

approval from the Census Bureau and Office of Management and Budget.

2.2. Measures

2.2.1. Sex-related substance use. Drinking before sex was assessed in both samples using the question: "How often do you use alcohol shortly before having sex?" Response options on a 5-point Likert-type scale were (1) "never," (2) "rarely," (3) "sometimes," (4) "usually" (internet sample) or "most of the time" (NESARC), and (5) "always." In accordance with previous research on alcohol use before sex that established an empirical cut-point in this variable (Eaton et al., 2015a; Thompson et al., 2014), responses were dichotomized to reflect those who regularly drank alcohol prior to engaging in sexual activity (responses more frequent than "sometimes"), yielding 43 regular sex-related drinkers in the internet sample and 615 in the NESARC sample.

In the internet sample, sex-related drug use was assessed using the question: "How often do you use drugs (not including caffeine, alcohol, or a medication prescribed to you, but including cannabis, cocaine, methamphetamine, poppers, etc.), shortly before or during sex?" Response options were the same as those for the sex-related alcohol use question and were similarly dichotomized to reflect regular sex-related drug use, yielding 47 regular sex-related drug users. Sex-related drug use was not assessed in the NESARC. Although there were similar frequencies of regular sex-related alcohol users and drug users in the internet sample, only six individuals endorsed both regular sex-related alcohol and drug use. Furthermore, respondent endorsement of the reasons for regular sex-related substance use revealed that for a minority of individuals ($n = 2$ for alcohol; $n = 6$ for drugs), sex-related substance use was coincidental (i.e., unrelated to the sexual context).

2.2.2. Externalizing spectrum. In the internet sample, the externalizing spectrum was assessed using the general disinhibition scale (ESI_{DIS}) of the Externalizing Spectrum Inventory—Brief Form (Patrick et al., 2013). The ESI_{DIS} consists of 20 items—two of which are reverse-scored—scored on a 4-point Likert-type scale ("false," "somewhat false," "somewhat true," "true"). Sample items include, "I have a hard time waiting patiently for things I want" and "I often get bored quickly and lose interest." Scores are summed; higher scores indicate higher levels of externalizing. The ESI-BF is a shorter version of the longer Externalizing Spectrum Inventory (ESI; Krueger et al., 2007). The ESI_{DIS} measures the general tendency for externalizing and impulsive behavior; items were intentionally created to exclude substance use, mental disorder diagnoses, or aggression (Patrick et al., 2013).

In NESARC, the externalizing spectrum was estimated using latent variable modeling of diagnostic data for ASPD and past-year abuse/dependence of alcohol, nicotine, cannabis, and "other" drugs. Diagnoses were assessed with the AUDADIS-IV (Grant et al., 1995, 2003; Ruan et al., 2008), a structured interview designed for administration by highly trained lay interviewers. Diagnoses were 12-month diagnoses, with the exception of ASPD, which was only assessed as a lifetime disorder in keeping with *DSM-IV* and *DSM*-5 conceptualizations of personality disorders. As has been done previously, the "other" drug category comprised endorsement of past-year abuse/dependence of sedatives, tranquilizers, opioids, amphetamines, hallucinogens, cocaine, inhalants/solvents, and heroin as well as any other drugs—demonstrating good internal consistency (Cronbach's $\alpha = 0.77$; Eaton et al., 2011). The AUDADIS-IV demonstrates good to excellent diagnostic reliabilities for alcohol, drug, nicotine, and personality disorders ($\kappa = 0.60–0.91$; Grant et al., 1995, 2003; Hasin et al., 2005). The AUDADIS-IV demonstrates test-retest estimates similar to other structured interviews (Wittchen, 1994), with the benefit of additionally assessing clinically significant distress and impairment and using this information to inform the diagnosis (Hasin et al., 2005).

Thus, the current study examined two different samples using two different conceptualizations of externalizing, in efforts to determine the generalizability of our results. The first sample (internet) included a standardized measure of general externalizing disinhibition (ESI_{DIS}) that assesses the externalizing construct without any substance use- or mental disorder-related content. The second sample (NESARC) estimated externalizing from mental and SUD diagnoses.

2.3. Statistical analyses

Analyses were conducted primarily in Mplus version 7.11 (Muthén and Muthén, 2013) with some analyses (e.g., *t*-tests) conducted in SPSS (version 20; Nie et al., 2011). All analyses of NESARC data incorporated the NESARC's complex design features (i.e., sample weights, primary sampling units, and stratification variables). Dichotomous variables (e.g., diagnoses in latent factor models, outcomes in logistic regression analyses) and polytomous variables (i.e., ESI_{DIS} items in the externalizing latent variable measurement model) were treated as categorical and ordered categorical respectively in Mplus.

2.3.1. Confirmatory factor analysis. In both samples, we first investigated the latent structure of the externalizing spectrum using confirmatory factor analysis (CFA), given previous research indicating a one-factor model for the 20 ESI_{DIS} items (Patrick et al., 2013) and for the five externalizing disorders from the NESARC (e.g., Eaton, 2014; Eaton et al., 2012, 2013; Keyes et al., 2012, 2013; Kim and Eaton, 2015; Latack et al., 2015; Magidson et al., 2014). Fit was evaluated using the Tucker-Lewis index (TLI), comparative fit index (CFI), and the root mean squared error of approximation (RMSEA). Bentler and Bonett (1980) suggested that models with indices such as CFI $\geq$ 0.90 were acceptable; other studies support interpretational benchmarks for good fit of CFI and TLI $\geq$ 0.95 and RMSEA $\leq$ 0.06 (Hu and Bentler, 1999). Latent factor means were fixed to zero and variances to one. In both samples, a weighted least squares estimator with means and variances adjusted (WLSMV) was used. Once an acceptable measurement model for the externalizing spectrum was parameterized, we investigated how sex-related substance use items functioned as indicators of externalizing. When it was found that sex-related substance use variables functioned as significant indicators of externalizing, we constrained the externalizing indicator parameters (factor loadings and thresholds) to the values from the initial measurement model that excluded the sex-related substance use variables, and then examined the parameters of the sex-related substance use items as simultaneous indicators of externalizing.

2.3.2. Item response theory. Using an item response theory (IRT) approach, we explored the characteristics of the sex-related alcohol and drug use variables as indicators of externalizing using a two-parameter logistic model (2PL), separately in women and men. The parameters investigated were the item discriminations (a) and item difficulties (b). Low a values indicate that changes in externalizing level are associated with small changes in the probability of endorsing regular sex-related substance use, whereas high a would indicate that relatively small changes in externalizing would be associated with appreciably higher probability of endorsement. b values indicate the level of latent externalizing associated with a 0.5 probability of endorsing regular sex-related substance use. We then tested potential differential item functioning (DIF) with respect to gender for the a and b parameters using a two-group CFA, wherein we constrained the factor loadings and thresholds for the original externalizing indicators (ESI_{DIS} items, NESARC diagnoses) to

equality across gender; sex-related substance use indicators were freely estimated. We then compared whether constraining the latter parameters to equality worsened model fit, using chi-square difference testing for nested models. DIF in the *a* parameter would suggest that the item differentially measures changes in externalizing for men and women (i.e., the same change in externalizing level is associated with distinct likelihoods of endorsing regular sex-related substance use for men compared with that for women). DIF in the *b* parameter would indicate that endorsement of regular sex-related substance use would reflect different levels of externalizing in women and men.

2.3.3. Logistic regression. Finally, we tested how the probability of reporting regular sex-related substance use was associated with externalizing levels (modeled solely using ESI_{DIS} items or NESARC diagnoses), while controlling for the effects of age, separately for women and men, in a logistic regression framework. These analyses used a maximum likelihood estimator with robust standard errors (MLR).

3. Results

3.1. Externalizing level and sex-related substance use

3.1.1. Internet sample. Individuals reporting regular pre-sex alcohol use had significantly higher ESI_{DIS} scale scores ($M = 41.16$, $SD = 12.27$) than those who reported not engaging in regular pre-sex alcohol use ($M = 34.73$, $SD = 9.64$), $t(921) = 4.22$, $p < 0.001$ (Fig. 1). Similarly, participants who reported regular sex-related drug use ($M = 46.09$, $SD = 11.58$) had significantly higher ESI_{DIS} scale scores than those who did not report regular sex-related drug users ($M = 34.45$, $SD = 9.44$), $t(924) = 8.14$, $p < 0.001$.

3.1.2. NESARC. To examine potential mean differences in externalizing levels for regular versus non-regular sex-related drinkers in the NESARC, we parameterized a fully invariant two-group externalizing model, constraining the mean externalizing level to zero in the non-regular drinkers and freely estimating that mean for regular pre-sex drinkers. We then constrained the mean externalizing level to zero for regular pre-sex drinkers, which significantly worsened model fit, $\chi^2 = 108.38$, $p < 0.001$. Individuals who endorsed regular pre-sex drinking were, on average, 1.10 *SD* units higher on externalizing than those who did not.

3.2. The association between regular sex-related substance use and externalizing

3.2.1. Internet sample. We next examined odds ratios resulting from logistic regression of the sex-related substance use items on the externalizing latent variable. A one-standard deviation increase in externalizing was associated with 3.5 ($p < 0.001$) times the odds of being a regular sex-related alcohol user in women and 3.6 ($p < 0.001$) times the odds in men; it was also associated with 2.2 ($p < 0.05$) times the odds of being a regular sex-related drug user in both women and men.

3.2.2. NESARC. In the NESARC, a one-standard deviation increase in externalizing was associated with 4.3 ($p < .001$) times the odds of being a regular sex-related alcohol use in men and 3.8 ($p < .001$) times the odds in women.

Table 1
Comparison of factor loadings for models utilizing ESI_{DIS} items, and sex-related substance use variables, as indicators of EXT.

EXT Indicators	Factor Loadings
ESI1	0.756
ESI2	0.727
ESI3	0.875
ESI4	0.547
ESI5	0.648
ESI6	0.777
ESI7	0.520
ESI8	0.618
ESI9	0.566
ESI10	0.312
ESI11	0.706
ESI12	0.680
ESI13	0.535
ESI14	0.893
ESI15	0.659
ESI16	0.553
ESI17	0.749
ESI18	0.478
ESI19	0.574
ESI20	0.481
Sex-Related Alcohol Use	0.319
Sex-Related Drug Use	0.502

Note: EXT: externalizing. Factor loadings are standardized. ESI variables are ESI_{DIS} items. ESI item factor loadings are constrained to values from the initial ESI-only measurement model, and sex-related substance use variables' loadings are freely estimated. All loadings are significant at $p < 0.001$.

3.3. Expansion of externalizing to include sex-related substance use

We next examined the possible incorporation of the sex-related substance use variables as indicators of the latent externalizing spectrum.

3.3.1. Internet sample. We parameterized a CFA measurement model for the ESI_{DIS} that initially demonstrated unacceptable fit to the data (CFI = 0.886, TLI = 0.873, RMSEA = 0.094). Investigation of the residual correlation matrix suggested the need for correlated residuals between two pairs of items with highly similar content: (1) inability to delay gratification ("I often act on immediate needs" and "I have a hard time waiting patiently for things I want") and (2) reliability ("I keep appointments I make" and "I've often missed things I've promised to attend"). The resulting measurement model demonstrated acceptable fit with the observed data (CFI = 0.916, TLI = 0.905, RMSEA = 0.081). We then constrained the ESI_{DIS} item parameters to the values from the original measurement model, and included the sex-related alcohol and drug use variables—separately—as freely estimated indicators of externalizing. Both sex-related substance use variables were found to relate more strongly to externalizing than some standard ESI_{DIS} items (Table 1). Examination of R^2 values indicated that 10.2% of the variance in sex-related alcohol use, and 25.2% of the variance in sex-related drug use, was shared with the latent externalizing spectrum.

3.3.2. NESARC. We repeated our analyses in the NESARC data, parameterizing a CFA externalizing measurement model that demonstrated excellent fit to the data (CFI = 0.991, TLI = 0.983, RMSEA = 0.012). Inclusion of sex-related alcohol use in the model with the original externalizing indicator parameters constrained to the values from the measurement model resulted in minimal change in the fit of the model to the data (CFI = 0.990, TLI = 0.992, RMSEA = 0.007; Table 2). Overall, 25% of the variance in the sex-related alcohol variable was shared with the latent externalizing spectrum.

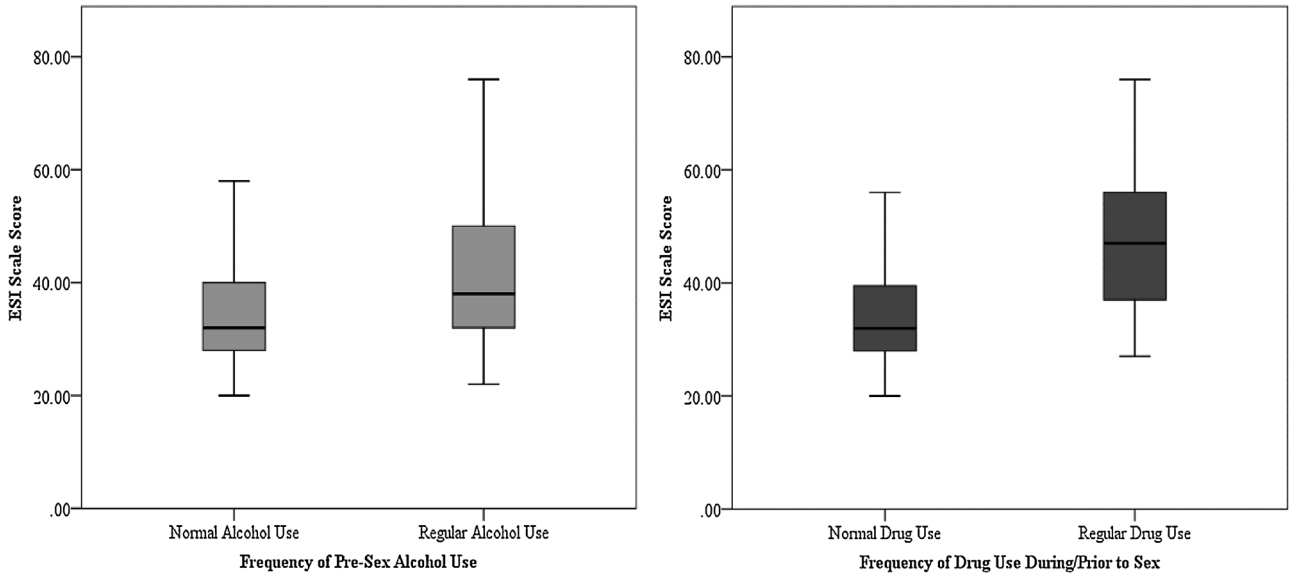

Fig. 1. Boxplot showing average EXT level for regular versus non-regular sex-related alcohol (left) and drug (right) use.

Table 2
Comparison of factor loadings for models utilizing NESARC psychiatric and substance use data, as well as sex-related alcohol use, as indicators of EXT.

EXT Indicators	Factor Loadings
ASPD	0.506
Alcohol	0.671
Nicotine	0.537
Marijuana	0.857
Other Substance	0.767
Sex-Related Alcohol Use	0.500

Note: EXT: externalizing. Factor loadings are standardized. ASPD = antisocial personality disorder. Disorder factor loadings are constrained to values from the initial disorder-only measurement model, and sex-related alcohol use's loading is freely estimated. All loadings are significant at $p < 0.001$.

3.4. Psychometric properties of sex-related substance use indicators of externalizing

3.4.1. Internet sample. No DIF was seen in the *a* and *b* parameters: The associations between the externalizing spectrum and sex-related alcohol use ($\chi^2 = 0.296$, $p = 0.59$) and drug use ($\chi^2 = 0.012$, $p = 0.91$) were not significantly different for men and for women (Fig. 2). Similarly, the levels of externalizing associated with a 0.5 probability of endorsement of regular sex-related alcohol ($\chi^2 = 3.319$ $p = 0.08$) and drug ($\chi^2 = 0.003$ $p = 0.96$) use were not significantly different (Table 3).

3.4.2. NESARC. DIF was found in *b* but not *a* parameter (Table 3). For both men and women, regular sex-related alcohol use's association with externalizing (*a*) did not differ ($\chi^2 = 1.162$, $p = 0.28$), but the endorsement of regular sex-related alcohol use (*b*) in women indicated higher externalizing levels than in men ($\chi^2 = 9.096$, $p < 0.001$) (Fig. 3).

4. Discussion

The present study examined the relationships among regular sex-related alcohol and drug use and the transdiagnostic externalizing spectrum. Our results reflect four major findings. First, regular sex-related substance use was associated with significantly higher externalizing levels than non-regular use. Second, sex-related substance use variables were significant indicators of the externalizing spectrum. Third, endorsement of regular sex-related alcohol use in women was indicative of higher externalizing levels than that in men; no such gender difference was apparent for sex-related drug use. Fourth, for both women and men, increases in externalizing level were associated with higher odds of endorsing regular sex-related alcohol and drug use. These findings were further supported by the convergence of the results from a large internet sample as well as a nationally representative sample using distinct assessments of externalizing

To our knowledge, this is the first study to explicitly relate risky sexual behaviors with transdiagnostic factors. Our findings indicate that both sex-related alcohol and drug use serve as significant indicators of externalizing—more so than some standard indicators. Given that externalizing has not been assessed previously with any sexuality-related items, our results suggest that such content may represent important reflections of this transdiagnostic spectrum. This relationship with the externalizing core might explain the myriad empirical findings of positive associations between substance use and risky sexual behaviors in general. Further research is necessary to unearth the associations of other risky sexual practices—which do not explicitly include substance-related content—with the externalizing core. Evidence suggests that common transdiagnostic variance is responsible for the patterns of associations with disorders and important predictors and outcomes (e.g., Latack et al., 2015; Rodriguez-Seijas et al., 2015a). Research to clarify the importance of the relative contributions of variance specific to problematic substance use and risky sexual behaviors versus that in common with the externalizing core is warranted. Furthermore, while both sex-related alcohol and drug use were associated with externalizing, further study is required to determine what variables may predict choosing one substance over the other for sex-related purposes.

Our finding of a gender difference also represents an important area for further study. In both samples, women's endorsement of regular sex-related alcohol use was associated with notably higher levels of externalizing. Although these differences were only significant in the NESARC sample, likely given differences in sample size between the two studies, the magnitude of the observed difficulty parameters is striking. In the NESARC sample, a 0.5 probability of being a regular sex-related alcohol user occurred at 3.4 *SDs* above the mean in men and a full *SD* higher (4.8) in women. When indicated by the ESI_{DIS}, which had no substance use-related content, this 0.5 probability occurred at nearly five *SDs* above the mean in

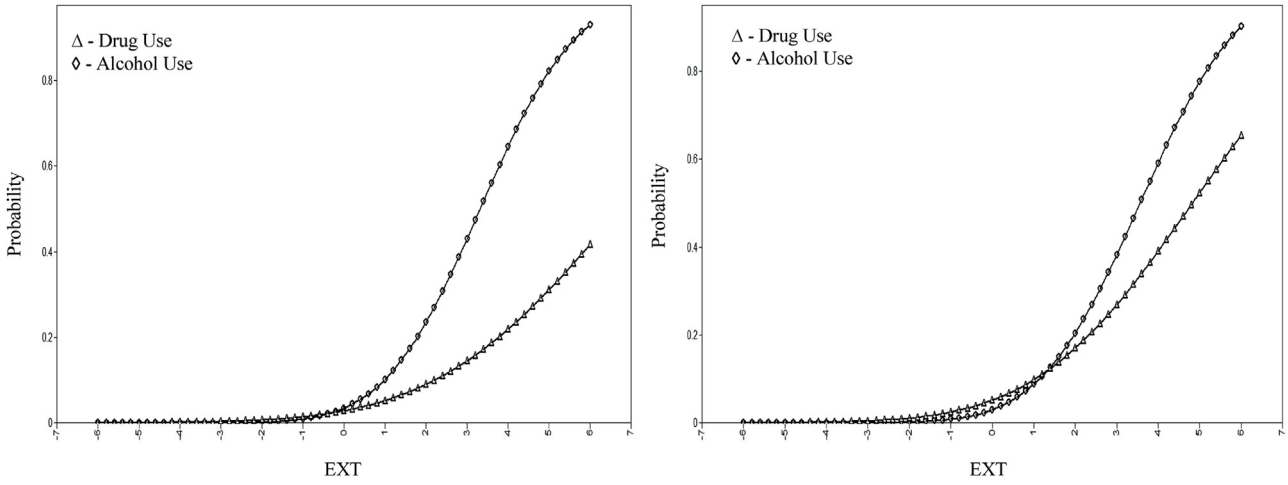

Fig. 2. Item characteristic curves (ICCs) for sex-related alcohol and drug use items for women (left) and men (right) in internet sample.

Table 3
IRT parameters for sex-related substance use variables from internet and NESARC samples .

Indicator	IRT Parameters			
	Internet Sample		NESARC Sample	
	a	*B*	*a*	*b*
	Men			
Alcohol Use	0.338	4.825	0.597	3.364*
Drug Use	0.529	3.567	–	–
	Women			
Alcohol Use	0.283	6.837	0.461	4.811*
Drug Use	0.548	3.460	–	–

* $p < 0.001$; indicating significant DIF across gender.

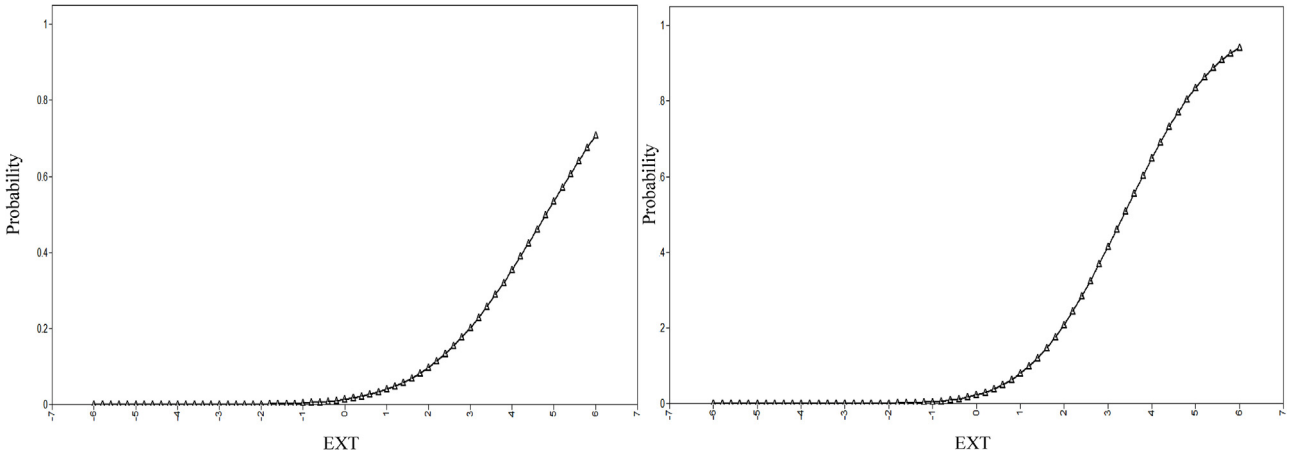

Fig. 3. Item characteristic curves (ICCs) for sex-related alcohol use for women (left) and men (right) in NESARC sample.

men and nearly seven in women. This suggests that for women to engage in regular sex-related alcohol use, on average they will show very high levels of externalizing—notably higher than men who exhibit this behavior.

Previous research suggests that the associations between different SUDs and latent externalizing do not differ by gender (Markon and Krueger, 2005). However, there was a notable gender difference in the *b* parameter for alcohol dependence. That is, endorsement of the alcohol dependence disorder represented notably higher levels of externalizing when occurring in women than in men; further, the magnitude of this gender difference was larger than observed for dependence on any particular drug. These results suggest that women who endorse alcohol dependence—and, by extension, potentially regular sex-related alcohol use—have a higher latent externalizing level than do men, but the same is not true for other substances. Future research to clarify potential gender differences in these behaviors is warranted. Because this is the first study to our knowledge to investigate the externalizing associations of sex-related drug use, such a finding must be interpreted as preliminary. Irrespective of gender, though, regular sex-related drug use reflected a notably higher level of externalizing than regular sex-related alcohol use, also congruent with previous studies (e.g., Markon and Krueger, 2005).

These results have potentially important implications. The finding that sex-related substance use is indicative of the externalizing spectrum corroborates previous evidence that some underlying characteristic of these risky sex practices might explain their associations with negative outcomes (e.g., Hendershot et al., 2007; Justus et al., 2000). However, treatment paradigms aimed at sex-related substance use are often highly tailored: Individuals who report regular sex-related substance use typically receive interventions targeting that specific substance use behavior. Because sex-related substance use appears to be an indicator of the externalizing spectrum, individuals who report regular sex-related substance use likely exhibit other comorbid externalizing conditions. As such, tailored interventions, while effective at reducing specific sex-related substance use (e.g., Calsyn et al., 2010b), might be improved through the development of interventions that explicitly target the transdiagnostic externalizing core. Such transdiagnostic interventions might be beneficial by targeting the core dysfunction that spans multiple presentations/behaviors and also by reducing the burden on treatment providers to learn multiple distinct interventions.

Empirical evidence further supports the notion that focusing intervention at the transdiagnostic level can be more beneficial than focusing on specific types of dysfunction (Barlow et al., 2010; Rodriguez-Seijas et al., 2015b; Sunderland et al., 2015). Indeed, treatments aimed at the transdiagnostic level have been developed for common mood and anxiety disorders (Barlow et al., 2010, 2014). As such, development of intervention strategies that target the broader externalizing spectrum, rather than specific behavioral manifestations, may diminish the frequency of sex-related substance use and show diffuse effects to reduce related problematic behaviors.

4.1. Limitations

This study has several limitations. First, the comparatively small number of specific sexual orientation identities (e.g., lesbian women, gay men), particularly in the Internet sample, did not permit us to examine differences across fine-grained sexual orientation groups. Focused investigation of sex-related substance use in sexual minorities is a critical question for future research (see Eaton et al., 2015c; Gilbert et al., 2015). Furthermore, our sex-related drug use variable was also not sufficient to investigate differences in externalizing related to different types of drugs used. The current study used retrospective data, which may be subject to memory biases, though evidence suggests that such retrospective estimates are likely underestimates (Moffitt et al., 2010). While the NESARC used *DSM-IV* SUD diagnoses, it should be noted that these SUD diagnostic criteria were updated for *DSM-5*. Comparison of our results across samples must consider the approximate 10-year collection gap between the two datasets, with resulting societal change impacting the comparability of our results. Finally, our Internet sample represents a convenience sample, wherein participants self-selected into the study, thus raising potential issues (e.g., sampling bias) that limit the generalizability of the results from this sample. For instance, convenience samples may not adequately represent high risk groups for sex-related substance use behaviors (e.g., individuals with low socioeconomic status; see Eaton et al., 2015a,b,c).

5. Conclusion

Millions of American adults engage in regular use of alcohol and drugs in a sexual context. Understanding this phenomenon is of significant public health importance. Using two independent samples with distinct measures, results from the current study reveal that sex-related substance use is significantly reflective of the broader transdiagnostic externalizing spectrum. Furthermore, regular sex-related alcohol use reflects different levels of externalizing in women and men. Sex-related substance use, therefore, may be related to negative outcomes directly or indirectly through its association with the underlying externalizing spectrum, which itself confers risk for myriad psychiatric disorders and negative outcomes.

6. Conflict of interest

No conflict declared.

7. Role of funding source

Nothing declared.

8. Contributors

Authors Rodriguez-Seijas and Eaton were responsible for analysis and initial conceptualization of the manuscript. Author Rodriguez-Seijas wrote the initial draft of the manuscript. All authors contributed to and have approved of the final manuscript.

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