



A transdiagnostic examination of affective motivations for drug use

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ABSTRACT

Introduction: Substance use often co-occurs with both internalizing and externalizing disorders, highlighting the importance of understanding reciprocal relations among problematic drug use and psychopathology. We examined affective (approach and avoidance) motivations for drug use as potential transdiagnostic constructs that relate to symptoms of common clinical disorders.

Methods: 175 community adults with a lifetime history of drug use reported on their motivations for use, frequency of use, and DSM-5 lifetime psychopathology symptoms. Linear regression was used to examine associations between drug use motivations and psychopathology.

Results: Avoidance motivations for drug use (e.g., using to cope with distress) correlated positively with symptoms of both internalizing and externalizing disorders, borderline personality disorder, and psychiatric comorbidity. In contrast, approach motivations for drug use (e.g., using to get a thrill) correlated only with substance use disorder symptoms. Notably, motivations for drug use continued to show these transdiagnostic associations after accounting for general approach-avoidance motivational tendencies.

Conclusion: These findings suggest that affective motivations for drug use provide a useful framework for conceptualizing substance problems that cuts across traditional dimensions of psychopathology.

1. Introduction

Each year, 25 million people in the U.S. use illicit or non-prescribed drugs, and 22 million individuals need treatment for a substance use disorder (SAMHSA, 2019). Among individuals who have a mental disorder, the prevalence of a co-occurring substance use disorder (SUD) is almost 20%, compared to 7.4% of the general population (SAMHSA, 2019), and co-occurring SUDs among individuals with severe mental illness are associated with more negative outcomes, including homelessness (Fries, Fedock, & Kubiak, 2014) and incarceration (Baillargeon et al., 2010). Due to the high rates of drug use across mental disorders, a greater understanding of the reciprocal relationship between drug use and mental illness is an important step towards improving intervention strategies.

One factor that may explain patterns of drug use across mental disorders is affective motivation for drug use. Prominent models of motivation posit the existence of two primary systems: approach motivation, which involves the pursuit of rewarding outcomes, and avoidance motivation, which involves the prevention of aversive outcomes (Carver & White, 1994). Consistent with this framework, substance use has been associated with variation in the tendency to activate one or both of these systems. For instance, drug use has been

positively associated with a bias towards approach tendencies, such as the propensity to seek out novel rewards (Voigt et al., 2009) or the tendency to approach thrilling or pleasurable states, often despite negative outcomes (i.e., sensation seeking; Donohew et al., 1999; Lang, Shin, & Lee, 2005). On the other hand, avoidance tendencies, such as the need to cope with negative affect, have also been identified as primary motives for drug use (Cooper, Kuntsche, Levitt, Barber, & Wolf, 2016). Notably, these motivations are not mutually exclusive and, for certain individuals, both approach and avoidance goals may initiate or maintain risky behaviors (Kemp, Sadeh, & Baskin-Sommers, 2018). This pattern of findings points to important individual differences in the affective motivations that may underlie problematic drug use.

Cooper et al. (2016) summarizes a wealth of literature related to motivations for substance use, and describes a framework for substance use motivations that includes approach and avoidance, drawing on work from Cox and Klinger's motivational model of alcohol use (Cox & Klinger, 1988). However, much of the work that has tested this framework is limited since substance use motivation research usually considers different types of drug use separately, and does not consider general substance use motivations across multiple types of drugs. Additionally, the majority of work has focused on marijuana, alcohol, and tobacco use motives, and most studies of this nature consist of non-

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ethnically diverse samples or restrict their study to college students (Cooper et al., 2016; Simons, Gaher, Correia, Hansen, & Christopher, 2005). However, to our knowledge, despite their potential utility for understanding drug use that co-occurs with psychopathology, affective motivations *specific to drug use, across drug types*, have not been systematically studied to date.

Relationships between general affective motivations and psychopathology have received significant study, and revealed the tendency to approach desired stimuli is related to externalizing psychopathology (e.g., antisocial personality disorder, substance use disorders; Beauchaine & Zisner, 2017), whereas the propensity to avoid undesirable stimuli is related to internalizing pathology, such as Major Depressive Disorder (MDD) (Sherratt & MacLeod, 2013). Drawing on these findings, the motivations *specific to drug use* may also vary in meaningful ways with psychopathology symptoms. For instance, the tendency to use drugs to cope with or avoid distress may be more strongly related to MDD, whereas the tendency to use drugs for a thrill may be more related to antisocial personality disorder (APD) symptoms (Young, McCabe, Cranford, Ross-Durow, & Boyd, 2012). However, it is also possible that certain forms of psychopathology are characterized by both approach and avoidance drug use motivations. For example, based on evidence that drug use associated with substance use disorders is motivated by both the desire to cope and the desire to seek a thrill (Schlauch, Breiner, Stasiewicz, Christensen, & Lang, 2013), SUD symptoms may relate to both approach and avoidance substance use motivations, in contrast to the findings for general motivational tendencies (e.g., Beauchaine & Zisner, 2017). Additionally, there is evidence that borderline personality disorder (BPD) loads on both the externalizing and internalizing spectrums (Eaton et al., 2011), making its associations with drug use motivations less predictable, though some research has shown associations between borderline symptoms and both enhancement and coping motives for cannabis use in adolescents and young adults (Chabrol, Ducongé, Casas, Roura, & Carey, 2005).

Further evaluation of affective motivations for drug use as relevant transdiagnostic constructs that cut across multiple forms of psychopathology may hold promise for identifying new treatment targets and etiological mechanisms. For example, there is significant support for the self-medication hypothesis, which posits that individuals who experience psychological distress engage in substance use to relieve negative emotions and cope with symptoms of mental illness (Khantzian, 1997). This theoretical framework links with the transdiagnostic conceptualization of the current study through avoidance-based motivations for drug use. Studying affective motivations for drug use could help identify a method of coping with psychological symptoms that cuts across disorders, and thus, may help maintain them. Affective motivations for drug use could also serve as etiological mechanisms that increase risk for psychological disorders. For example, using drugs to seek a thrill could lead to increased disregard for safety or repeatedly performing unlawful acts, symptoms of APD. Further study of affective motivations for drug use could also identify shared psychological processes that are common across frequently comorbid disorders that cut across different spectra of psychopathology, such as MDD and AUD. Identifying such shared psychological processes could inform a greater understanding of how to treat problems at the root of both diagnoses. For example, if a patient presented with both MDD and SUD and was primarily driven by avoidance motivations for drug use, you could potentially leverage this information to focus on treatments that target negative affect and improve coping skills. An individual with comorbid MDD and SUD whose motivations for drug use are approach-based might instead benefit from an intervention that focuses on replacing old rewards with new ones, such as contingency management.

Here, we propose that affective motivations for drug use may represent important transdiagnostic constructs relevant to a range of psychopathology among drug-using populations that may not be fully explained by measures of general motivational tendencies. Consistent with other emerging work on transdiagnostic constructs (Sauer-Zavala

et al., 2017), we use the term transdiagnostic to suggest affective motivations for drug use are associated with multiple forms of psychopathology, aside from just substance use disorders. The notion that individuals' *drug use-specific* motivations may differ from their more general motivational tendencies is consistent with a host of work showing that approach and avoidance motivations may vary across domains (e.g., pleasure, safety, accomplishment) for a particular individual (Roseman, 2008). Motivations can also operate separately at different levels, such that within an individual there may be different motivations employed at different levels of self-regulation. In other words, there may be different motivations associated with certain goals compared to the motivations associated with strategies to attain goals (for a review see Scholer & Higgins, 2008). For example, recent work in the achievement domain found that the reasons for goal pursuit and the manner in which the goal is pursued each predicted individual variance in the outcomes of such pursuit, both with regard to success (whether they attained the goal) and affect (how they felt after attaining or not attaining the goal) (Sommet & Elliot, 2017). Therefore, motivations specific to drug use may provide novel information for conceptualizing co-occurring drug use and psychopathology that is distinct from general approach and avoidance tendencies. This enhanced understanding of the drug-use specific motivations common to certain types of mental disorders could lead to new potential prevention and intervention targets for clinicians.

The primary aim of the current study was to examine whether motivations for drug use, independent of the type or frequency of drug use, relate to clinical symptomatology. Because polysubstance use is common among individuals with psychopathology (Connor, Gullo, White, & Kelly, 2014; Traube, Dorian, Yarnell, & Schrage, 2016) and frequently observed among individuals with drug addictions (Kedia, Sell, & Relyea, 2007; Navaratnam & Foong, 1990), we did not restrict our focus to a particular type of drug use. A secondary aim was to test the unique contribution of drug use motivations above and beyond general motivational tendencies and severity of lifetime drug use. Given the dearth of previous research addressing these research questions, our hypotheses regarding drug-specific motivations and psychopathology were primarily exploratory. However, we expected drug use motivations to explain unique variance in psychopathology symptoms not accounted for with general motivational tendencies or lifetime drug use frequency.

2. Methods

2.1. Participants

The sample consisted of 240 adults recruited from the community through flyers and online advertisements (e.g., Craigslist). Adults aged 18–55 who were fluent in English were eligible to participate. Individuals were excluded for current psychosis, serious medical or neurological conditions, or any MRI contraindications (as data collection was part of a larger MRI study). Relevant Institutional Review Boards approved all protocols and procedures. Written and oral consent was obtained from all individuals prior to participation. There was a high rate of lifetime illicit drug use in the sample, with approximately 85% of participants endorsing some illicit use of substances. Participants who denied prior drug use were excluded from further analyses, because data on motivations for substance use was not available for these individuals.

The final sample consisted of 175 participants (50.9% male). The average age of the sample was 33.4 years old ($SD = 10.2$; min/max = 18/55). The sample was diverse in terms of race and ethnicity (53% White, 36% Black, 4% Asian, 15% Latinx), and employment status (30% full time, 40% part time, 19% unemployed, 11% other). The median household income in the sample was \$32,500 for the last year, and the majority of participants came from communities with high rates of violent and non-violent crime

(www.neighborhoodscout.com/de/wilmington/crime on 12/2/19). Approximately half of the participants reported some criminal justice system involvement and about one third reported a history of mental health treatment. These characteristics suggest that the current sample may be at relatively higher risk for both mental health and substance use problems.

2.2. Measures

2.2.1. Drug use motivations and frequency

The Risky, Impulsive, and Self-Destructive Behavior Questionnaire (RISQ; Sadeh & Baskin-Sommers, 2017) was used to assess the frequency of lifetime drug use and affective drug use motivations. Total lifetime drug use was calculated by summing frequencies of use of five types of illicit drugs (sedatives, stimulants (cocaine/crack), marijuana, heroin, hallucinogens) and misuse of prescription drugs (assessed with the item “How many times in your life have you abused prescription medication?”, which would include drugs the individual has a prescription for as well as prescription medications purchased illegally). Consistent with previous work (Sadeh & Baskin-Sommers, 2017), responses were categorized into five bins that constrained the range of possible responses at the high end of the distribution (0, 1–10, 11–50, 51–100, > 100 times) to reduce positive skewness. The inter-item reliability for the lifetime drug use questions was good (Cronbach's $\alpha = 0.86$).

For each substance participants endorsed, participants were asked to rate the extent to which they use that substance to satisfy approach motivations (e.g., “to get a thrill or pleasure”) and avoidance motivations (e.g., “to alleviate stress”) using a 0 (“Strongly Disagree”) to 4 (“Strongly Agree”) Likert scale. Approach and avoidance ratings were averaged, with higher scores on these scales conveying a greater likelihood of using a substance for each motivation. The inter-item reliabilities for drug use approach and avoidance motivation scales were acceptable (Cronbach's $\alpha = 0.75, 0.73$, respectively).

2.2.2. Psychopathology Symptoms.

Psychopathology symptoms were assessed using the Structured Clinical Interview for DSM-5 (SCID-5; First, Williams, Karg, & Spitzer, 2015). Clinical interviews were administered by a Clinical Psychologist or trained graduate student, and reliability among raters was high (Intraclass Correlation Coefficients = 0.95–0.98). The following disorders were examined: Major Depressive Disorder (MDD), Alcohol Use Disorder (AUD), Substance Use Disorders (SUD) (including cannabis, stimulants, opioids, sedatives), Antisocial Personality Disorder (APD), Borderline Personality Disorder (BPD), and Generalized Anxiety Disorder (GAD). SUD symptoms were assessed for the drug each participant experienced the most problems with in their lifetime (“most problematic drug”). Lifetime symptom severity for each diagnosis was indexed by summing threshold and subthreshold symptoms for the most severe lifetime episode (where applicable).

2.2.3. General motivational tendencies

The Behavioral Inhibition System/Behavioral Activation System Scales (BIS/BAS; Carver & White, 1994) is a 24-item self-report measure that assesses general motivational tendencies. The BIS subscale measures activation of the avoidance motivational system (e.g., negative affect in response to threat), while the BAS subscales measure activation of the approach motivational system (e.g., positive affect in response to reward). Subscales were created by summing items, with higher scores indicating greater activation of the motivational system. The inter-item reliabilities for the BIS and BAS subscales were good (Cronbach's $\alpha = 0.75, 0.82$, respectively).

2.3. Statistical analysis

Age and biological sex (0 = Female, 1 = Male) were included as

covariates in all analyses. Our primary analysis examined whether affective motivations for drug use were related to symptom severity across a range of common psychiatric disorders. Given the exploratory nature of this study, we applied a Bonferroni multiple-comparison correction based on the number of diagnoses examined in separate regression analyses ($p < 0.05/5 = p < 0.01$). Only results that survived correction for multiple comparison are reported in the Results section.

To follow up on these primary analyses, we then tested whether affective motivations for drug use explained unique variance in psychopathology symptoms above (i) general approach and avoidance tendencies on the BIS/BAS scale and (ii) lifetime frequency of drug use. All continuous predictor variables were z-scored to aid interpretation of beta (β) coefficients, which are presented for all regression analyses. All of the variables met the distributional assumptions for regression models. More specifically, the self-report and psychopathology variables were normally distributed and did not evidence excessive skewness or kurtosis (all values were between 1.2 and -1.5). No bivariate or multivariate outliers were present. We tested for, and did not find, multicollinearity problems in the regression analyses, as evidenced by tolerance levels all above 0.20 (Gaur & Gaur, 2006). There were three participants missing BPD symptom data and two participants missing BIS/BAS data. Missing values were replaced with the sample mean.

3. Results

3.1. Descriptive statistics

Cannabis was the most frequently used drug (86.3%), followed by stimulants (e.g., cocaine, 43.5%), opioids (e.g., heroin, pain killers; 38.3%), hallucinogens (32.0%), and sedatives (e.g., Xanax, Valium, 26.9%). It should be noted that participants were primarily recruited from Delaware, Maryland, and Pennsylvania, which allow the use of medical cannabis, but have not fully legalized cannabis use at the time of data collection.

Approach and avoidance motivations for drug use were moderately intercorrelated with each other ($r = 0.30, p < 0.001$) and total lifetime drug use ($r_s = 0.34$ and $0.34, p_s < 0.001$, respectively). Drug motivations were only weakly correlated with general motivational tendencies, with avoidance drug use motivation and the BIS scale evidencing the only significant association ($r = 0.21, p = 0.005$) and approach drug use motivation and the BAS scale showing a trend towards significance ($r = 0.19, p = 0.014$). Bivariate correlations of all study variables can be found in [Supplementary Table 1](#).

We found that 76.6% of the sample met criteria for at least one lifetime diagnosis, and approximately 56.6% of the sample met criteria for two or more diagnoses. As shown in [Table 1](#), approximately half of the sample (51.4%) met criteria for lifetime MDD ($M/SD = 4.3/3.7$ symptoms), and just over half (53.1%) met criteria for a SUD ($M/SD = 4.5/4.4$ symptoms). A substantial proportion of the sample

Table 1

Number of participants who met criteria for each DSM-5 diagnosis by type of comorbid substance use disorder.

DSM-5 Diagnosis	Type of substance use disorder				No Substance Use Disorder	Total (N/ %)
	Sedative	Cannabis	Stimulant	Opioid		
SUD	2	41	9	41	0	93/ 53.1
MDD	0	24	6	24	36	90/ 51.4
AUD	2	23	8	23	19	75/ 42.9
APD	1	4	0	12	0	17/ 9.7
BPD	0	7	2	11	10	30/ 17.1

Note. Substance use disorder was assessed based on the drug each participant experienced the most problems with in their lifetime. SUD = Substance Use Disorder. MDD = Major Depressive Disorder. AUD = Alcohol Use Disorder. APD = Antisocial Personality Disorder. BPD = Borderline Personality Disorder.

Table 2
Psychopathology symptoms regressed on affective motivations for drug use.

	MDD (β)	SUD (β)	AUD (β)	APD (β)	BPD (β)
Step 1					
Age	-0.04	0.22*	0.18	0.27**	0.06
Biological Sex	-0.16	0.16	0.07	0.12	-0.32**
Step 2					
Drug Approach Motivations	-0.18	0.24**	0.05	0.16	-0.01
Drug Avoidance Motivations	0.34**	0.29**	0.34**	0.35**	0.36**

Note. $N = 175$. MDD = Major Depressive Disorder: Step 1 $R^2 = 0.02$; Step 2 $\Delta R^2 = 0.11^{**}$.

SUD = Substance Use Disorder: Step 1 $R^2 = 0.08^{**}$; Step 2 $\Delta R^2 = 0.18^{**}$. AUD = Alcohol Use Disorder: Step 1 $R^2 = 0.04$; Step 2 $\Delta R^2 = 0.13^{**}$. APD = Antisocial Personality Disorder: Step 1 $R^2 = 0.09^{**}$; Step 2 $\Delta R^2 = 0.18^{**}$. BPD = Borderline Personality Disorder: Step 1 $R^2 = 0.11^{**}$; Step 2 $\Delta R^2 = 0.12^{**}$. * $p < 0.01$, ** $p < 0.001$.

(42.9%) met criteria for alcohol use disorder (AUD) ($M/SD = 3.0/3.6$ symptoms), and 26.9% of the sample met criteria for either APD or BPD ($M/SD = 6.1/5.7$ symptoms). Preliminary analyses revealed that individuals with GAD symptoms reported low levels of substance use. Therefore, symptoms of GAD were not examined due to restricted variance of concurrent anxiety symptoms and substance use.

Table 1 shows the number of people who met criteria for each psychiatric disorder as a function of SUD diagnostic status and type of SUD. Diagnostic criteria for SUD was only assessed for one type of drug for each participant, which was determined by asking participants to select the drug that has caused the most problems in their lifetime. The most common forms of SUD in this sample were Opioid Use Disorder and Cannabis Use Disorder.

3.2. Affective motivations for drug use: transdiagnostic associations

We examined associations between approach and avoidance motivations for drug use and psychopathology symptoms using a series of hierarchical linear regressions. Results are presented in Table 2. A greater tendency to use drugs for avoidance motivation (e.g., using to cope) was associated with more symptoms of MDD, SUD, AUD, APD, and BPD. In contrast, drug use to satisfy approach motivations (e.g., using to get a thrill) was only positively related to SUD symptoms.

Total number of diagnoses for each individual was entered as the dependent variable in a model to examine whether drug use motivations predict psychiatric comorbidity. Consistent with the findings for individual diagnoses, we found that using drugs for avoidance motivations was significantly, positively associated with total number of diagnoses ($\beta = 0.43$, $p < 0.001$), above and beyond age and biological sex. In contrast, approach motivations for drug use did not explain significant variation in comorbidity among these disorders ($\beta = 0.09$, $p = 0.22$).

Next, we tested whether the observed associations between drug use motivations and psychopathology could be accounted for by general approach and avoidance tendencies on the BIS/BAS scale. Results of these analyses are displayed in Table 3. BAS was positively associated with symptoms of APD, and BIS was positively associated with symptoms of BPD. Notably, avoidance motivations for drug use remained positively related to symptoms of all five disorders with BIS/BAS subscales in the model. Similarly, approach motivations for drug use remained a significant positive predictor of SUD symptoms, after accounting for general motivational tendencies.

Given the moderate correlation between lifetime drug use and affective motivations for drug use, we also examined whether the associations between drug use motivations and psychopathology could be accounted for by severity of lifetime drug use. Across all the disorders, lifetime history of drug use was significantly and positively associated with psychopathology symptoms (β s = 0.28–0.69, p s < 0.001), with

Table 3
Psychopathology symptoms regressed on general motivational systems and drug-use specific motivations.

	MDD (β)	SUD (β)	AUD (β)	APD (β)	BPD (β)
Step 1					
Age	-0.04	0.22*	0.18	0.27**	0.06
Biological Sex	-0.16	0.16	0.07	0.12	-0.32**
Step 2					
Behavioral Approach System	-0.09	0.14	0.11	0.28**	0.13
Behavioral Inhibition System	0.11	0.13	0.18	0.05	0.28**
Step 3					
Drug Approach Motivations	-0.16	0.23**	0.04	0.13	-0.03
Drug Avoidance Motivations	0.34**	0.27**	0.31**	0.34**	0.29**

Note. $N = 175$. Only the new variables that were added at each step are shown. MDD = Major Depressive Disorder: Step 1 $R^2 = 0.03$; Step 2 $\Delta R^2 = 0.02$; Step 3 $\Delta R^2 = 0.10^{**}$. SUD = Substance Use Disorder: Step 1 $R^2 = 0.08^{**}$; Step 2 $\Delta R^2 = 0.04$; Step 3 $\Delta R^2 = 0.15^{**}$. AUD = Alcohol Use Disorder: Step 1 $R^2 = 0.04$; Step 2 $\Delta R^2 = 0.04$; Step 3 $\Delta R^2 = 0.10^{**}$. APD = Antisocial Personality Disorder: Step 1 $R^2 = 0.09^{**}$; Step 2 $\Delta R^2 = 0.08^{**}$; Step 3 $\Delta R^2 = 0.15^{**}$. BPD = Borderline Personality Disorder: Step 1 $R^2 = 0.10^{**}$; Step 2 $\Delta R^2 = 0.08^{**}$; Step 3 $\Delta R^2 = 0.08^{**}$. * $p < 0.01$, ** $p < 0.001$.

the exception of MDD, which was unrelated to it ($\beta = 0.11$, $p = 0.13$). With frequency of lifetime drug use in the model, avoidance drug use motivations continued to positively relate to psychopathology symptoms for MDD ($\beta = 0.32$, $p < 0.001$), AUD ($\beta = 0.24$, $p = 0.001$), APD ($\beta = 0.24$, $p = 0.001$), and BPD ($\beta = 0.29$, $p < 0.001$), but it was no longer related to SUD ($\beta = 0.11$, $p = 0.06$). In contrast, approach motivation for drug use was unrelated to symptom severity across the disorders, although a trend emerged for MDD in the inverse direction ($\beta = -0.19$, $p = 0.01$).

We followed-up these analyses by conducting supplementary regressions that examined age, biological sex, substance use diagnosis (present/absent), and the interaction of approach and avoidance drug use motivation as moderators of the above findings. These analyses produced no new significant findings at $p < 0.01$. However, uncorrected results for $p < 0.05$ are provided in Supplemental Materials.

4. Discussion

The goal of this study was to examine whether affective motivations for drug use, independent of the type or frequency of drug use, relate to broader clinical symptomatology. To our knowledge, this is the first study to directly examine the unique associations between affective motivations specific to drug use, across multiple forms of drugs, and a spectrum of clinical symptoms. Approach motivations for drug use (e.g., using to seek pleasure or a thrill) were positively associated with substance use disorder (SUD) symptoms, and the tendency to use drugs to alleviate negative emotions (avoidance motivation) was linked to increased levels of internalizing (MDD) and externalizing (SUD, AUD, APD) psychopathology, borderline personality disorder (BPD), and psychiatric comorbidity. Notably, motivations for drug use continued to show these transdiagnostic associations after accounting for general motivational tendencies. These results introduce *motivations for drug use* as a transdiagnostic construct relevant to a range of internalizing, externalizing, and personality pathology among drug-using populations that explains unique variance in psychopathology that is only partially captured by general motivational tendencies.

Approach motivations for drug use were positively and selectively related to symptoms of substance use disorder, suggesting the tendency to use drugs to obtain a thrill or seek pleasure is a trigger for pathological substance use. Interestingly, approach motivations for drug use were not significantly related to other externalizing disorders, namely symptoms of alcohol use disorder or antisocial personality disorder. This finding suggests some specificity in the drug use motives reported

by individuals who present with substance use disorder compared to alcohol use and antisocial personality disorders. Externalizing disorders such as SUD are often characterized by high sensitivity to reward (Hundt, Kimbrel, Mitchell, & Nelson-Gray, 2008), which may drive both the initiation of drug use and risk for more severe symptoms of SUD. However, the finding that SUD symptoms were also associated with avoidance motivations for drug use indicates there is heterogeneity present in the motivational triggers for this disorder and suggests key motivation-based differences exist among individuals with this diagnosis. Investigating mechanisms of goal-directed behavior that may link drug use motivations with psychopathology symptoms, like reward sensitivity or threat reactivity, will be important for understanding the translational relevance of drug use motivations. Clinically, these findings suggest identifying reinforcers (positive or negative) to replace the use of substances to seek excitement or avoid distress might be a useful treatment target for individuals with pathological substance use.

In contrast to approach motivations, avoidance motivations for drug use were positively related to both internalizing (MDD) and externalizing psychopathology (SUD, AUD, APD), as well as borderline personality disorder (BPD). The transdiagnostic relevance of this construct was underscored by its association with psychiatric comorbidity, such that greater endorsement of using drugs to decrease unpleasant or distressing emotions was positively related to the total number of psychiatric diagnoses. These findings suggest that individuals who present with a variety of mental health disorders also have a greater tendency to use drugs to cope with negative affect, including those classically associated with a general approach motivation, such as antisocial personality disorder (e.g., Newman, MacCoun, Vaughn, & Sadeh, 2005). Importantly, these results suggest that drug use motivations may diverge from the general approach-avoidance motivational mechanisms that drive risk for psychopathology, a novel finding that converges with research suggesting motivations for goal-directed behavior may vary across domains for a particular individual (Scholer & Higgins, 2008). Taken together, results suggest that affective motivations for drug use are not redundant with general tendencies associated with risk for drug use and psychopathology, but rather provide unique information about patterns of clinical problems among drug-using individuals.

This study provides initial evidence that individual differences in affective motivations for drug use can be conceptualized as a transdiagnostic construct. Past research has identified emotion dysregulation (Fairholme et al., 2013), abnormal reward functioning (Baskin-Sommers & Foti, 2015), and psychological inflexibility (Levin et al., 2014) as transdiagnostic processes related to a range of disorders that often co-occur with drug use problems. The promise of the current approach lies in its potential to harness the affective motivational conceptual framework to advance clinical substance use research. For example, focusing on drug use motivations regardless of drug type could reveal mechanisms that serve to initiate and maintain problematic drug use over time, rather than substance-specific risk processes and etiological mechanisms. Given that substance users typically engage with a range of illicit drugs, potentially differentially over the lifespan, drug use motivations could be used to identify distinct trajectories or subtypes of problematic drug use across the lifespan.

It is important to note that the aim of the present study was not to infer causality between drug use-specific motivational tendencies and psychopathology. Rather, the primary focus was to understand whether individual differences in motivations for drug use explain co-occurrence between drug use and various forms of clinical presentations. This type of research has the potential to identify important targets for future intervention efforts. For example, if an individual's drug use is primarily avoidance-motivated, it may be useful to treat emotion regulation during negative mood experiences, which may have downstream effects on the problematic drug use. Clinical outcome research has suggested targeting cognitions associated with thoughts related to avoidance motivations generally by using cognitive reappraisal

strategies. For example, clarification of an individual's motives and mastery- coping ("the concrete experience of learning to cope with situations experienced in the past as very difficult or anxiety provoking") have been proposed as two primary mechanisms of change in psychotherapy (Grawe, 1997). Based on the present findings, targeting avoidance motivations for drug use may be similarly beneficial, as clinicians can use motivational interviewing techniques in conjunction with cognitive reappraisal to increase feelings of mastery in the context of dreaded situations and to re-evaluate situations as more manageable (Grosse Holtforth, 2008). The implementation of these types of treatment strategies may be particularly useful for individuals with poly-substance use and comorbid psychopathology.

Present findings should be interpreted in light of the study's limitations. We did not separate participants on the basis of drug use severity (e.g., recreational users vs. those who meet criteria for a substance use disorder), which may be viewed as a limitation. However, taking this type of dimensional approach facilitates understanding of how drug use motivations relate to psychopathology, even at sub-clinical levels of drug use. It is not necessarily the case that drug use that co-occurs with other forms of psychopathology reaches the level of a substance use disorder, and subclinical drug use may still be clinically-meaningful in that it may interfere with treatment (e.g., taking benzodiazepines before a therapy session) or help perpetuate symptoms (e.g., using cocaine and getting in trouble with the law for individuals with antisocial personality disorder). We were unable to examine associations between affective motivations and symptoms of anxiety disorders, given that individuals with drug use reported low levels of anxiety in our sample. Future research should examine these associations among individuals with co-occurring anxiety and substance use problems. Similarly, although we excluded individuals with psychosis, individuals with schizophrenia and other forms of psychosis are known to engage in high rates of substance use (Hartz et al., 2014); therefore, these associations should be examined within this high-risk population. Our results are also limited by the lack of available information regarding duration of drug use, which may have important associations with motivational systems driving drug use (Koob & Volkow, 2016). Future work should expand our findings by examining how drug use motivational tendencies relate to symptomatology between individuals with recent-onset drug use versus those with chronic drug use. Lastly, the cross-sectional nature of the data limits our ability to test temporal patterns of these associations. To further understand the impact of drug-specific motivations, it will be necessary to longitudinally explore whether certain affective motivations precede drug use, or vice versa, as well as to identify changes in motivations after the onset of clinical symptomatology. Given the episodic nature of certain mental disorders, it will also be important to measure fluctuations in drug use motivations over time to extend on the present findings. Future research should also expand questions of motivation and psychopathology to include commonly used licit substances, such as alcohol and nicotine.

The current study also benefited from several strengths. First, the sample was highly diverse in terms of sociodemographic characteristics and psychopathology. Also, the study aims are novel to the literature by focusing on the affective motivations associated with drug use rather than the type or severity of drug use. Finally, these findings add to a growing literature seeking to identify transdiagnostic processes with potential clinical utility (Krueger & Eaton, 2015).

CRediT authorship contribution statement

Rickie Miglin: Conceptualization, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing. **Nadia Bounoua:** Investigation, Data curation, Writing - original draft, Writing - review & editing. **Jeffrey M. Spielberg:** Writing - review & editing, Supervision. **Naomi Sadeh:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing, Project administration, Resources, Funding

acquisition, Supervision.

Declaration of Competing Interest

None.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.abrep.2020.100279>.

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