Published in final edited form as:

Addict Behav. 2018 March ; 78: 216–222. doi:10.1016/j.addbeh.2017.11.041.

Negative Affectivity as a Mechanism Underlying Perceived Distress Tolerance and Cannabis Use Problems, Barriers to Cessation, and Self-Efficacy for Quitting among Urban Cannabis Users

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Abstract

Cannabis use rates continue to rise in the United States and currently cannabis is among the most widely used substances in the world. Cannabis use is associated with several mental health problems, low educational attainment, low income, and underemployment. The current study explored the tendency to experience negative affect (negative affectivity) as a factor accounting for the association between perceived distress tolerance and problems related to the use of cannabis. Participants included 203 urban adult daily cannabis users (29.2% female, $M = 37.7$ years, 63% African American). Results indicated that there was a significant indirect effect of distress tolerance via negative affectivity in terms of cannabis use problems ($b = -0.58$, 95%CI $[-1.14, -0.21]$), cannabis withdrawal ($b = -0.65$, 95%CI $[-1.36, -0.21]$), self-efficacy for quitting ($b = -0.83$, 95%CI $[-1.85, -0.22]$), and perceived barriers for cannabis cessation ($b = -0.71$, 95%CI $[-1.51, -0.24]$). The present data provide novel empirical evidence suggesting negative affectivity may help explain the relation between perceived distress tolerance and an array of clinically significant cannabis use processes. Intervention programming for daily cannabis users may benefit from targeting negative affectivity to facilitate change in cannabis use processes among users who tend to perceive that they are less capable of tolerating distress.

Keywords

cannabis; negative affectivity; distress tolerance; mechanism; urban environment

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1. Introduction

Cannabis is among the most widely used substances in the United States and worldwide (United Nations Office on Drugs and Crime, 2017; Johnston, O'Malley, Bachman, & Schulenberg, 2013). In 2015, approximately 3.8% of the world's population reported using cannabis in the past year (UNODC, 2017). In 2015, 32.2% of adults aged 18–25 and 10.6% of adults 26 and older reported using cannabis in the past year (National Institute on Drug Abuse (NIDA), 2015). Rates of cannabis use are particularly high in urban areas with cannabis use rising from 4.3% in 2001–2002 to 10.1% in 2012–2013 (Hasin et al., 2015, 2016). Additionally, cannabis use disorder is on the rise in the United States in general, doubling from 2001–2002 to 2012–2013 (Hasin et al., 2015, 2016).

Current and lifetime CUD's are associated with other substance use disorders, psychosis (Moore et al., 2007), mood disorders (Copeland, Swift, & Rees, 2001), anxiety disorders (Feingold, Weiser, Rehm, & Lev-Ran, 2016; Lev-Ran, Le Foll, McKenzie, George, & Rehm, 2013), post traumatic stress disorder (PTSD), and personality disorders (Hasin et al., 2015, 2016). In general, associations between CUD and other mental health problems become stronger as the severity of CUD increases (Hasin et al. 2015, 2016). Further, rates of cannabis use are particularly elevated among certain high-risk groups, such as tobacco users (Goodwin et al., in press), and are associated with increased incidence rates of alcohol use disorder (Weinberger, Platt, & Goodwin, 2016). Some recent work suggests young adult and adult chronic cannabis users are more likely to be unemployed and are less likely to be financially independent (Brook, Stimmel, Zhang, & Brook, 2008; NIDA, 2017). Yet, cannabis also has been shown to have positive effects on several problem behaviors. For example, recent research has found that cannabis can help reduce pain and inflammation, the occurrence of epileptic seizures, and the severity of autoimmune diseases (NIDA, 2017). Cannabis also increases appetite and reduces nausea, which is beneficial for people undergoing certain medical treatments such as chemotherapy (NIDA, 2017).

A central process in the maintenance of substance use, including CUD, is the experience of negative affect, which can elicit drug use aimed at reduction of negative mood states (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004; McCarthy, Curtin, Piper, & Baker, 2010). Indeed, coping-oriented cannabis use is associated with greater negative mood severity (Hogan, Gonzalez, Howell, Bonn-Miller, & Zvolensky, 2010), more frequent cannabis use (Johnson, Mullin, Marshall, Bonn - Miller, & Zvolensky, 2010), and more cannabis-related problems (Buckner, Heimberg, Ecker, & Vinci, 2013). Recent work in psychopathological science proposes that the underlying cause of many forms of negative emotional symptoms and disorders as well as their comorbidity with substance use and related conditions may be underpinned by a smaller set of transdiagnostic vulnerability processes (Leventhal & Zvolensky, 2015). These types of vulnerabilities play a key explanatory role in emotional experience by modulating the normative response to emotion stimuli and states, resulting in an excess or deficit, respectively, beyond typical emotional functioning.

One transdiagnostic factor that may be particularly important to cannabis-negative mood relations is distress tolerance. Distress tolerance reflects the perceived and behavioral capacity to withstand distress related to affective, cognitive, and/or physical states (e.g.,

negative affect, physical discomfort; Simons & Gaher, 2005; Zvolensky, Bernstein, & Vujanovic, 2011). Despite previous work suggesting perceived distress tolerance is a transdiagnostic individual difference factor in relation to stress responsivity and negative mood propensity (Leyro, Zvolensky, & Bernstein, 2010), relatively little research examined the role of perceived distress tolerance in the context of cannabis use. Of available studies, research has found that lower perceived distress tolerance is related to numerous facets of cannabis use, including coping motives (Buckner, Jeffries, Terlecki, & Ecker, 2016; Bujarski, Norberg, & Copeland, 2012; Farris, Metrik, Bonn-Miller, Kahler, & Zvolensky, 2016; Potter, Vujanovic, Marshall-Berenz, Bernstein, & Bonn-Miller, 2011; Zvolensky et al., 2009), more frequent cannabis use (Buckner et al., 2016), and greater severity of cannabis use problems (Buckner et al., 2016; Buckner, Keough, & Schmidt, 2007; Dvorak & Day, 2014; Farris et al., 2016). Moreover, cannabis coping motives explains the relation between perceived distress tolerance and greater cannabis problems (Buckner et al., 2016; Bujarski et al., 2012; Farris et al., 2016); in addition to greater cannabis dependence symptoms and severity of craving following overnight deprivation (Farris et al., 2016). Interestingly, these associations were not replicated when behaviorally-measured inability to tolerate physical distress is considered (Farris et al., 2016), suggesting that one's perception of his/her inability to withstand distress rather than actual capacity, may demarcate risk for coping-oriented problematic cannabis use. This perspective is consistent with findings that indicate lower perceived, but not behavioral, distress tolerance is associated with reductions in cannabis use during a quit attempt (Hasan, Babson, Banducci, & Bonn-Miller, 2015). Therefore, the current study focused on perceived distress tolerance as opposed to behavioral distress tolerance due to the body of literature suggesting that perceived distress tolerance is a better predictor of cannabis outcomes.

Although promising, existing work on perceived distress tolerance and cannabis has been limited in at least two key ways. First, no studies have examined the relevance of perceived distress tolerance among low-income daily cannabis users from urban environments. This limitation is unfortunate given rising rates of cannabis use and problems among this segment of the population (Hasin et al., 2015). Perceived distress tolerance may be especially relevant among low income daily cannabis users who face chronic stress in urban conditions (e.g., dilapidated neighborhoods, high levels of crime). Indeed, many such persons are dealing with the chronic challenges and difficulties associated with low income (e.g., transportation difficulties, quality-food purchasing power), which may reduce the perceived capacity for these individuals to effectively manage negative affect states (Zvolensky & Leventhal, 2016). Second, the tendency to experience negative affect (e.g., anger, guilt, disgust, fear, and nervousness (Watson & Clark, 1984) has not been evaluated in existing distress tolerance-cannabis work. Perceived distress tolerance is conceptualized as a cognitive vulnerability that is 'activated' in the context of negative affect (Zvolensky, Vujanovic, Bernstein, & Leyro, 2010). Thus, an individual's tendency to perceive that he/she cannot withstand distress is only pertinent to the extent to which distress is present. Given that negative affectivity is related to cannabis use problems (Buckner, Ecker, & Dean, 2016) and the maintenance of cannabis use more generally (Buckner et al., 2015), it may represent an explanatory mechanism between perceived distress tolerance and cannabis use, including problems related to use and factors that may impede cessation.

Together, the current study sought to test the hypothesis that, among urban current cannabis users, perceived distress tolerance would be significantly related to a variety of clinically significant cannabis use processes, including cannabis use problems, cannabis withdrawal severity, perceived barriers for cannabis cessation, and self-efficacy for quitting, via negative affectivity. Specifically, perceived distress tolerance would be indirectly associated with these cannabis use processes through negative affectivity (see Figure 1).

2. Method

2.1 Participants

Two hundred and three current cannabis-using adults (29.2% female, $M = 37.7$ years, $SD = 10.2$) were recruited through newspaper and community flyer advertisements targeting individuals interested in participating in research related to their current cannabis use and their past quit experiences in Houston, Texas. It is important to note that cannabis has not been legalized in Texas for medical or recreational use. Participants were eligible if they were between the ages 18–65 and reported daily cannabis use (defined as smoking at least 25 days a month for the past 6 months), and reported at least two previous self-defined cannabis quit attempts, with one of the attempts occurring in the past year. Participants were deemed ineligible if they expressed current suicidal or homicidal ideation, expressed limited mental competency (not oriented to person, place, or time), were unable to give informed, voluntary, written consent to participate, were participating in current professional treatment for cannabis use disorder or other substance use problems, had a recent legal mandate limiting cannabis use, used cannabis explicitly for a medical disorder, or were pregnancy or currently breastfeeding.

In the current sample the average age of first use was 15.4 years old ($SD = 3.7$ years). Participants indicated that they have been regular daily cannabis users for an average of 20.0 years ($SD = 12.0$) and reported currently using an average of 3 times per day ($SD = 1.29$). Most participants indicated they most commonly consumed cannabis in the form of a joint (56.2%); others reported most common use via a “bowl” (10.8%), bong (6.4%), “one-hitter” (1.5%), or other (e.g. ingesting it via tea or edibles; 24.6%). Half of participants indicated they typically smoke cannabis alone (50.5%), the other half stated a preference of smoking with two to three people (46.5%), and only 3% reported smoking cannabis with a group of more than three people. In addition, 67.0% of participants were currently smoking cigarettes and 75.3% reported drinking an alcoholic beverage at least once a month as assessed by the Fagerstrom Test for Cigarette Dependence (FTCD; Fagerström, 2012; Heatherton, Kozlowski, Frecker, & Fagerström, 1991) and the Alcohol Use Disorders Identification Test (AUDIT) respectively. See Table 1 for sample characteristics.

2.2 Measures

Demographics Questionnaire.—Participants completed a demographics form, which was used to document the age, race, ethnicity, sex, gender, sexual orientation, education level, economic status, current occupation, marital status, and current tobacco (via the FTCD) and alcohol use (via the AUDIT; Saunders, Aasland, Babor, De la Fuente, & Grant, 1993; See table 1).

Distress Tolerance Scale (DTS; Simons & Gaher, 2005).—The DTS (Simons & Gaher, 2005) is a 14-item measure that indexes perceived distress tolerance on a five-point Likert scale (1= *Strongly Agree* to 5= *Strongly Disagree*; example item: *There's nothing worse than feeling distressed or upset*). The DTS yields good internal consistency with stable measurement over a 6-month period (alpha coefficient = .89; Simons & Gaher, 2005). Internal consistency for the total score of the DTS in the present study was excellent ($\alpha = .91$).

Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988).—Negative affectivity was assessed using the 20-item Positive and Negative Affect Schedule (PANAS), which asks research participants to indicate on a Likert-type scale from 1 (*very slightly or not at all*) to 5 (*extremely*) how they generally feel according to a list of various feelings and emotions (example items: Interested, Nervous, Ashamed; Watson et al., 1988). The negative affectivity scale was used in this study and demonstrated high internal consistency ($\alpha=0.88$).

Marijuana Problems Scale (MPS; Stephens, Roffman, & Curtin, 2000).—The MPS is a psychometrically sound 19-item list of negative social, occupational, physical, and personal consequences associated with cannabis use in the past 90 days. Respondents are asked to rate the level of problems associated with their cannabis use on a Likert-type scale from 0 (*no problem*) to 2 (*serious problem*) in response to problems such as, “problems between you and your partner,” or “legal problems.” As in past work (Buckner & Schmidt, 2008), internal consistency was excellent in the current sample ($\alpha=0.90$).

Marijuana Withdrawal Checklist (MWC; Budney, Novy, & Hughes, 1999).—The MWC is a 22-item measure in which respondents indicate on a 4-point Likert scale from 0 (*none*) to 3 (*severe*) the degree to which they experienced cannabis withdrawal symptoms the last time they stopped smoking cannabis (e.g. craving, irritability). A total MWC score is calculated by adding up the individual scores for each of the 22 items. The MWC has been used successfully in past work assessing cannabis withdrawal (Bonn-Miller, Zvolensky, Marshall, & Bernstein, 2007; Budney et al., 1999). In the current sample, internal consistency was excellent ($\alpha=0.94$).

Self-efficacy for Quitting (SEQ; Marlatt & Gordon, 1985).—The SEQ is a 19-item measure based on the Marlatt and Gordon (1985) categories of relapse situations (e.g., being with others who are using) which measures the degree to which one feels confident in their ability to not use cannabis across different ‘high risk’ situations on a Likert-type scale from 1 (*not at all confident*) to 7 (*extremely confident*). The SEQ measures a single dimension of self-efficacy for quitting. In the current study, internal consistency for the SEQ was excellent ($\alpha=0.91$).

Barriers of Cannabis Cessation Scale (BCCS; Zvolensky et al., in press).—The BCCS is a 19-item measure of perceived barriers for quitting cannabis. The BCCS measures perceived barriers specific to cannabis cessation (example item: “*being addicted to marijuana*”). Respondents were asked to report the level of agreement they had with each

statement (e.g., 0 = *not a barrier/not applicable* to 3 = *large barrier*). In the current study, internal consistency was excellent ($\alpha=0.91$).

Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, De la Fuente, & Grant, 1993).—The AUDIT is a 10-item measure of alcohol consumption that determines harmful or hazardous alcohol use. In the current study, the question “How often do you have a drink containing alcohol?” was used to determine current drinking among the sample, used for descriptive information of the sample. Respondents answered this question on a 5-point Likert type scale ranging from 0 (*never*) to 4 (*4 or more times a week*).

Fagerstrom Text for Cigarette Dependence (FTCD; Fagerström, 2012; Heatherton, Kozlowski, Frecker, & Fagerström, 1991).—The FTCD is a 6-item measure that assess gradations in cigarette dependence (e.g., How soon after you wake up do you smoke your first cigarette?). Scores on this measure range from 0 to 10. In the present study, participants with a score of 1 or more were coded as current cigarette smokers for use as descriptive data of the current sample.

Marijuana Smoking History Questionnaire (MSHQ; Bonn-Miller & Moos, 2009).—The MSHQ is a self-report questionnaire used to measure respondents’ cannabis use history with questions pertaining to age of onset, years they have been regular users, average amount smoked per day, etc.

2.3 Procedure

Participants who responded to the study advertisements were telephone screened to determine eligibility. Eligible participants were then scheduled for an in-person assessment. Participants were asked not to use cannabis prior to their appointment. During the in-person appointment, participants first provided written informed consent and then completed study measures. Participants were compensated with a \$20.00 gift card. The study protocol was approved by the Institutional Review Board at the University of Houston.

2.4 Analytic Strategy

First, descriptive statistics data were computed and a series of bi-variate correlations were conducted to examine associations between the study variables. Analyses were conducted using the PROCESS macro for SPSS 20 (Hayes, 2012) to compute the indirect associations of perceived distress tolerance (DTS, X) via negative affectivity (PANAS-NA, M) with the following dependent variables: cannabis use problems (Y1), cannabis withdrawal (Y2), self-efficacy for quitting cannabis (Y3), and perceived barriers for cannabis cessation (Y4). The indirect association (‘path a*b’) was calculated as the product of the ‘a path’ (the regression weight of X in predicting M, controlling for covariates) multiplied by the ‘b path’ (the regression weight of M predicting Y, controlling for associations of X and covariates). Bootstrapping with 10,000 re-samples with replacement was performed to obtain confidence intervals (CI) around the indirect association (a*b); a CI not containing 0 indicates statistical significance (Hayes, 2013). Effect size for the indirect effect was estimated with the mediation ratio (Pm; Ditlevsen, Keiding, Christensen, Damsgaard, & Lynch, 2005; Preacher

& Kelley, 2011). Covariates included sex, marital/partner status, educational attainment, and employment status. Furthermore, for each model, a planned comparison model was also evaluated. The X and M variables were reversed such that the association of negative affectivity via distress tolerance as evaluated for each dependent measure.

3. Results

3.1 Bivariate Correlations

Perceived distress tolerance was significantly negatively correlated with cannabis problems, cannabis withdrawal, and barriers to cannabis cessation, but not self-efficacy to quit. Negative affectivity was significantly correlated with all four dependent variables. Perceived distress tolerance and negative affectivity had a significant negative correlation ($r=-0.25$) with 6.3% of the variance shared. See Table 2.

3.2 Indirect Test Models

In relation to cannabis use problems, there was a statistically significant total effect of perceived distress tolerance (See Table 3; $b=-1.17$, $t=-2.21$, $p=0.029$, 95% CI $[-2.21, -0.12]$). The total $r^2=0.03$. The indirect effect of perceived distress tolerance via negative affectivity was also significant ($b=-0.58$, 95% CI $[-1.14, -0.21]$, completely standardized point estimate ($\beta=-0.08$). After accounting for the indirect effect, the direct effect of perceived distress tolerance on cannabis use problems was not significant ($b=-0.59$, $t=-1.16$, $p=0.249$, 95% CI $[-1.60, 0.42]$). The ratio of the indirect effect of perceived distress tolerance via negative affectivity to the total effect of perceived distress tolerance on cannabis use problems was 0.50. Thus, 50% of the effect of perceived distress tolerance was accounted for indirectly via negative affectivity. Specificity tests revealed that the indirect effect of negative affectivity via perceived distress tolerance was not significant ($b=0.02$, 95% CI $[-0.01, 0.07]$). The total effect of negative affectivity on cannabis use problems was significant ($b=0.35$, $t=5.55$, $p<.001$, 95% CI $[0.23, 0.48]$). The ratio of indirect to total effect of the comparison model was 0.05.

For cannabis withdrawal, there was a statistically significant total effect of perceived distress tolerance ($b=-2.12$, $t=-2.37$, $p=0.019$, 95% CI $[-3.89, -0.35]$). The total $r^2=0.11$. The indirect effect of perceived distress tolerance via negative affectivity was also significant ($b=-0.65$, 95% CI $[-1.36, -0.21]$, completely standardized point estimate ($\beta=-0.05$). After accounting for the indirect effect, the direct effect of perceived distress tolerance on cannabis withdrawal was not significant ($b=-1.47$, $t=-1.64$, $p=0.102$, 95% CI $[-3.24, 0.29]$). The ratio of the indirect effect of perceived distress tolerance via negative affectivity to the total effect of perceived distress tolerance on cannabis withdrawal was 0.31. The indirect effect of negative affectivity via perceived distress tolerance was not significant ($b=0.04$, 95% CI $[-0.01, 0.13]$). The total effect of negative affectivity on cannabis withdrawal was significant ($b=0.42$, $t=3.72$, $p<.001$, 95% CI $[0.20, 0.64]$). The ratio of indirect to total effect of the comparison model was 0.10. See Table 3.

Regarding self-efficacy for quitting cannabis use, the total effect of perceived distress tolerance was not significant ($b=2.64$, $t=1.86$, $p=0.064$, 95% CI $[-0.16, 5.43]$). The total

$r^2=0.02$. The indirect effect of perceived distress tolerance via negative affectivity was significant ($b=-0.83$, 95% CI $[-1.85, -0.22]$, completely standardized point estimate ($\beta=-0.04$). After accounting for the indirect effect, the direct effect of perceived distress tolerance on self-efficacy for quitting was significant ($b=3.46$, $t=2.42$, $p=0.016$, 95% CI $[0.64, 6.29]$). The ratio of the indirect effect of perceived distress tolerance via negative affectivity to the total effect was -0.31 . The indirect effect of negative affectivity via perceived distress tolerance was significant ($b=-0.10$, 95% CI $[-0.23, -0.02]$). The total effect of negative affectivity on self-efficacy for quitting was significant ($b=0.38$, $t=2.11$, $p=0.036$, 95% CI $[0.03, 0.73]$). The ratio of indirect to total effect of the comparison model was -0.26 . See Table 3.

In relation to perceived barriers for quitting cannabis, there was a statistically significant total effect of perceived distress tolerance ($b=-2.97$, $t=-3.06$, $p=0.003$, 95% CI $[-4.89, -1.06]$). The total $r^2=0.13$. The indirect effect of perceived distress tolerance via negative affectivity was also significant ($b=-0.71$, 95% CI $[-1.51, -0.24]$, completely standardized point estimate ($\beta=-0.05$). After accounting for the indirect effect, the direct effect of perceived distress tolerance on perceived barriers for quitting cannabis was significant ($b=-2.27$, $t=-2.34$, $p=0.021$, 95% CI $[-4.18, -0.35]$). The ratio of the indirect effect of perceived distress tolerance via negative affectivity for perceived barriers for quitting cannabis was 0.24 . The indirect effect of negative affectivity via perceived distress tolerance was significant ($b=0.06$, 95% CI $[0.01, 0.16]$). The total effect of negative affectivity on perceived barriers for quitting cannabis was significant ($b=0.47$, $t=3.89$, $p<.001$, 95% CI $[0.23, 0.71]$). The ratio of indirect to total effect of the comparison model was 0.13 . See Table 3.

4. Discussion

The present study evaluated negative affectivity as an explanatory factor in the relation between perceived distress tolerance and an array of clinically relevant cannabis use processes. As hypothesized, negative affectivity indirectly explained the associations between perceived distress tolerance and cannabis use problems, cannabis withdrawal, self-efficacy for quitting cannabis, and perceived barriers for cannabis cessation. These indirect effects were evident over and above the variance accounted for by sex, marital/partner status, educational attainment, and employment status. In addition, the non-significant reverse models provide empirical support for the directionality of the hypothesized indirect effects of perceived distress tolerance via negative affectivity on cannabis use problems and withdrawal severity. However, self-efficacy to quit cannabis and barriers for cannabis cessation yielded significant 'reverse' indirect effects. These indirect effects could suggest that negative affectivity and distress tolerance operate transitionally over time in relation to self-efficacy to quit and barriers for cannabis cessation. Notably, both self-efficacy to quit and barriers for cannabis cessation are cognitive-based processes, and therefore, may be more closely related to distress tolerance-affect relations relative to behavioral indices (e.g., cannabis use problems). Still, examination of effect size (in this case, the ratio of the indirect effect to the total effect; P_m) for all four models yielded indirect effects (perceived distress tolerance via negative affectivity) with larger effect sizes (-0.31 – 0.50) than those in the reverse models (negative affectivity via perceived distress tolerance; -0.26 – 0.13). Thus,

there appears to be a stronger empirical relation in the hypothesized models, although bi-directionality may be operative for more cognitively-based cannabis use processes.

The current findings suggest that negative affectivity may help explain the relation between perceived distress tolerance and a variety of clinically significant cannabis use processes. Such results are in line with a large body of research that implicates negative affectivity as an underlying mechanism in the maintenance of substance use and problems associated with use (e.g., Etcheverry et al., 2016), including cannabis use (Buckner et al., 2016; Buckner et al., 2015). The current study suggests that, among daily urban cannabis users, models may need to consider negative affectivity in the context of perceived distress tolerance to better understand the nature of a relatively wide array of cannabis use processes. Clinically, the results from the present investigation suggest it may be advisable to assess and clinically address perceived distress tolerance-negative mood propensity to facilitate cannabis use behavior change. For example, it may be clinically important to employ therapeutic tactics to reduce negative mood states to promote change in cannabis use problems, perceptions of barriers for quitting, withdrawal severity, and self-efficacy for quitting among those with lower perceived distress tolerance.

Although not primary aims of the current study, two other observations warrant comment. First, perceived distress tolerance and negative affectivity were related, but distinct, constructs, sharing only 6% of variance. This finding further extends the construct validity of perceived distress tolerance relative to negative affectivity in the context of urban cannabis users. Second, perceived distress tolerance demonstrated significant bi-variate relations with the studied dependent variables with the exception of self-efficacy for quitting. Thus, perceived distress tolerance maintains a direct relation with several clinically significant cannabis use variables not heretofore previously documented. The lack of significant association between perceived distress tolerance and self-efficacy for quitting was unexpected. It may be possible that perceived distress tolerance is more apt to be related to stress-related facets of cannabis use (e.g., withdrawal, problems related to use, and perceived barriers) rather than confidence in changing cannabis use. Such a perspective would be consistent with past work linking perceived distress tolerance to stress-related events and experiences (Leyro et al., 2010).

There are several limitations of the current study. First, the data were cross sectional, preventing inferences pertaining to causal associations. Future longitudinal modeling of perceived distress tolerance-negative affectivity relations is therefore an important next research step. For example, using time sampling methods, researchers could explore the role of perceived distress tolerance in relation to negative mood complaints and isolate temporal relations between these factors in the context of cannabis use. Second, the sample was composed of relatively low-income urban cannabis users. To gauge the generalizability of the current findings to other daily cannabis using samples, future research could test the same models among other high-risk cannabis using groups (e.g., young adults). Third, the current investigation focused on perceived distress tolerance. Future work could evaluate behavioral distress tolerance along with perceived distress tolerance to further inform our understanding the individual and joint contributions of these distinct constructs for cannabis use. Fourth, participants that used cannabis for medical reasons were excluded from this

study. Future work should test this model on samples of medical cannabis users for generalizability purposes. People that are prescribed cannabis for mental health problems may see a reduction in negative affect, and therefore, may not experience the cannabis problems experienced in the current sample. Fifth, this study did not include quit attempts or attempts to reduce cannabis use in the model. These are important areas of future research as distress tolerance and negative affectivity may impact one's ability to reduce or stop using cannabis. Finally, over 70% of the sample was male and over 60% African American. Future work could benefit by testing the present model among a sample with a larger percentage of cannabis using females and persons from other racial/ethnic groups.

Together, the current study was an initial investigation into the role of negative affectivity as a potential underlying factor in the relation between perceived distress tolerance and cannabis use processes among urban daily cannabis users. There was consistent evidence of indirect associations of perceived distress tolerance via negative affectivity on cannabis use problems, cannabis withdrawal, self-efficacy for quitting cannabis, and perceived barriers for cannabis cessation. The results of this study have the potential to inform future cannabis treatment models that target negative affectivity among cannabis users with lower perceived distress tolerance to change cannabis use behavior.

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Figure 1.

Theoretical Model: Negative affectivity as a potential mediator between distress tolerance and cannabis use problems, cannabis withdrawal, self-efficacy for quitting, and barriers to cannabis cessation.

Table 1.**Sociodemographic Characteristics (N=203)**

Race/Ethnicity	
African American	63.0%
White	24.0%
Asian	2.0%
Native American	0.5%
Other	10.3%
Hispanic/Latino	16.0%
Marital Status	
Single	67.0%
Living with Partner	11.0%
Divorced	8.4%
Married	7.4%
Widowed	2.5%
Separated	3.5%
Education Level	
Graduate School	6.4%
College Graduate	12.4%
Partial College	45.5%
High School Graduate	36.7%
Partial High School	5.9%
Junior High School	2.0%
>7 Years of School	1.0%
Income Level	
>\$5,000	19.8%
\$5,000-\$9,999	10.4%
\$10,000-\$14,999	15.8%
\$15,000-\$24,999	10.9%
\$25,000-\$34,999	11.4%
\$35,000-\$49,999	8.9%
\$50,000-\$74,999	2.0%
<\$75,000	2.5%

Table 2:

Correlations among observed variables ($N = 203$)

Variable	1	2	3	4	5	6	7	8	9	10
1. Sex (female) ^a	-									
2. Partner Status ^a	-0.20**	-								
3. Degree ^a	0.14	-0.06	-							
4. Employment ^a	0.07	0.02	-0.12	-						
5. Barriers for Cessation ^c	-0.27**	0.18*	-0.01	-0.04	-					
6. Cannabis Problems ^c	0.05	-0.06	-0.07	-0.02	0.42**	-				
7. Withdrawal ^c	-0.27**	-0.02	-0.07	0.01	0.46**	0.37**	-			
8. Self-Efficacy ^c	-0.01	-0.01	-0.03	-0.02	0.00	0.15*	0.15*	-		
9. Distress Tolerance ^b	0.17*	-0.06	0.03	0.02	-0.25**	-0.15*	-0.21**	0.12	-	
10. Negative Affectivity ^d	-0.13	-0.01	-0.05	0.03	0.29**	0.36**	0.29**	0.16*	-0.25**	-
Mean/N	202	201	202	201	21.98	6.71	13.06	56.32	3.15	19.90
SD/%	29.2%	18.3%	35.6%	46.3%	12.88	6.62	11.70	17.99	0.92	7.18

Note: Sex (coded as Female = 1); Partner Status (coded as No Partner=0 and Partner=1); Degree (coded as No College degree=0 and College Degree=1); Employment (coded as Employed half of the time or less over the past 3 years=0 and Employed most of the time or more over the past 3 years=1); Barriers to Cannabis Cessation=Barriers to Cannabis Cessation Scale (BCCS); Cannabis Problems=Marijuana Problems Scale (MPS); Withdrawal=Marijuana Withdrawal Checklist (MWC); Self-Efficacy=Self Efficacy for Quitting (SEQ); DTS= Distress Tolerance Scale (DTS); Negative Affectivity (PANAS-NA).

^a Covariates.

^b Predictor.

^c Outcome.

^d Mediator.

* $p < .05$.

** $p < .01$.

Table 3.

Results of Indirect Effects, Direct Effects, and Total Effects of Perceived Distress Tolerance via Negative Affectivity on Cannabis Use Problems, Withdrawal, Self Efficacy to Quit, and Barriers for Cannabis Cessation.

Y	Model	b	SE	t	p	LLCI	ULCI
1	DT→NA (a)	-1.73	0.56	-3.10	<0.001	-2.84	-0.63
	NA→MPS (b)	0.33	0.06	5.17	0.000	0.21	0.46
	DT→MPS (c)	-1.17	0.53	-2.21	0.03	-2.21	-0.12
	DT→MPS (c')	-0.59	0.51	-1.16	0.25	-1.59	0.42
	DT→MPS (ab)	-0.58	0.23			-1.14	-0.21
2	NA→MWC (b)	0.37	0.11	3.28	0.001	0.15	0.60
	DT→MWC (c)	-2.12	0.90	-2.37	0.02	-3.89	-0.35
	DT→MWC (c')	-1.47	0.90	-1.64	0.10	-3.24	0.29
	DT→MWC (ab)	-0.65	0.29			-1.36	-0.21
3	NA→SEQ (b)	0.48	0.18	2.62	0.009	0.12	0.84
	DT→SEQ (c)	2.64	1.42	1.86	0.06	-0.16	5.43
	DT→SEQ (c')	3.45	1.43	2.42	0.02	0.64	6.29
	DT→SEQ (ab)	-0.83	0.40			-1.85	-0.22
4	NA→BCCS (b)	0.41	0.12	3.32	0.001	0.17	0.65
	DT→BCCS (c)	-2.97	0.97	-3.06	0.003	-4.89	-1.06
	DT→BCCS (c')	-2.27	0.97	-2.34	0.02	-4.18	-0.35
	DT→BCCS (ab)	-0.71	0.31			-1.51	-0.24

Note. a = Association of X with M; b = association of M with Y; c = Total association of X with Y; c' = Direct association of X with Y controlling for M; ab = indirect effects of X on Y; Path a is equal in all models; therefore, it presented only in model 1. The standard error and 95% CI for ab are obtained by bootstrapping with 10,000 re-samples. DT (Distress Tolerance) is the predictor in all models. NA (Negative Affect) is the mediator in all models. MPS (Cannabis Problems), MWC (Cannabis Withdrawal), SEQ (Self Efficacy for Quitting), BCCS (Barriers to Cannabis Cessation) are the outcome variable in models 1–4, respectively. LLCI = lower bound of a 95% confidence interval; ULCI = upper bound; → = association.