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Prevalence and correlates of a lifetime cannabis use disorder among pregnant former tobacco smokers

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Abstract

Background—Following tobacco and alcohol, cannabis is the most commonly used substance during pregnancy. Given the high prevalence of concurrent cannabis and tobacco use as well as the health consequences associated with prenatal substance use, we sought to document the relative contributions of psychosocial and psychiatric factors commonly associated with cannabis use in predicting a lifetime cannabis use disorder (CUD) among women who had quit smoking tobacco as a result of pregnancy.

Methods—Pregnant former tobacco smokers ($n = 273$) enrolled in a larger randomized controlled trial for postpartum tobacco relapse prevention completed semi-structured psychiatric interviews and self-reported demographic, pregnancy, health, psychosocial, and tobacco use factors during their third trimester of pregnancy.

Results—In total, 14% ($n = 38$) of women met criteria for a lifetime CUD. The strongest predictors of a lifetime CUD were a history of having multiple psychiatric disorders ($OR = 36.44$; 95% $CI = 5.03–264.27$; $p < 0.001$) followed by a lifetime alcohol use disorder ($OR = 3.54$; 95% $CI = 1.27–9.87$; $p < 0.05$). In addition, more frequent attempts to quit smoking tobacco ($OR = 1.12$; 95% $CI = 1.01–1.25$; $p < 0.05$) and lower self-efficacy about weight management after quitting smoking tobacco ($OR = 0.78$; 95% $CI = 0.62–0.97$; $p < 0.05$) also were significantly associated with a lifetime CUD.

Conclusions—Women with a history of both cannabis and tobacco dependence may represent a subset of women who need more specialized treatment during the perinatal period to improve substance use outcomes.

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Keywords

Pregnancy; cannabis use disorder; tobacco dependence; prevalence; correlates

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1. Introduction

Cannabis is the most commonly used illicit substance in the United States and is the only illicit substance for which there have been appreciable increases in the prevalence of use across the past decade (Ansell et al., 2015; Caldeira et al., 2012). A 2013 nationwide survey conducted by the Substance Abuse and Mental Health Services Administration, found that the number of Americans 12 years of age and older reporting daily cannabis use has nearly doubled since 2002, with current prevalence rates estimated to be 7.5% (SAMHSA, 2012). Cannabis also has the highest rates of past year dependence of any illicit substance, with 1.6% of users meeting criteria for a cannabis use disorder (CUD). Several factors, including changes in legal status, perceptions of low risk associated with use, and availability have been linked to the increased rates of cannabis use (Cerdeira et al., 2012; Palamar et al., 2014). Despite the growing societal acceptance of cannabis, the long-term consequences of cannabis use remain a general public health concern, and the high prevalence of cannabis use during pregnancy is of particular interest given the adverse effects on both maternal and fetal health.

Cannabis use is associated with significant health complications (Volkow et al., 2014). The acute effects of cannabis intoxication include euphoria, tachycardia, conjunctival congestion, and anxiety as well as slowed reaction time and impaired memory (Iversen, 2009). Although the acute effects of cannabis typically subside several hours following administration, prolonged cannabis use has been linked to chronic respiratory diseases, cognitive dysfunction, and behavioral problems. Smoking cannabis exposes users to carbon monoxide, bronchial irritants, tumor promoters, and carcinogens, which in turn increase risk for respiratory diseases (Ashton, 2001), severe respiratory symptoms (Macleod et al., 2015), and cardiovascular events (Volkow et al., 2014). Cannabis use also has lasting effects on cognition and the regulatory networks of the brain (Filbey et al., 2009; Gilman et al., 2014), which can lead to memory impairments, deficiencies in attention, slowed reaction time, poor impulse control and increased hostility as well as difficulties with information processing, perceptual coordination, and motor performance (Gunn et al., 2015).

In addition to the general consequences of cannabis use, prenatal cannabis exposure presents specific problems for the developing fetus and has lasting effects on child development. Although prenatal cannabis use has been associated with reduced gestational length and a slowing of fetal growth, studies linking cannabis use during pregnancy to premature birth and low birth weight have been equivocal, with some studies reporting associations between prenatal cannabis use and decreased birth weight (El-Mohandes et al., 2003; Gray et al., 2010) and others reporting no relationship between prenatal cannabis use and low birth weight or premature birth (English et al., 1997; Fergusson et al., 2002). However, prenatal cannabis exposure consistently has been associated with disrupted sleep patterns (Dahl et al., 1995; Scher et al., 1988) and delayed cognitive development in early childhood (Day, et al., 1994) as well as with adolescent deficits in cognitive development (Fried and Watkinson,

1990; Richardson et al., 2002), attention (Fried & Watkinson, 2002), and executive functioning (Fried et al., 1998; Willford et al., 2001). Prenatal cannabis exposure also has been associated with greater delinquent behaviors (Day et al., 2011), higher rates of depression (Gray et al., 2005) and anxiety (Leech et al., 2006) and later drug abuse (Day et al., 2006) among adolescents. Thus, cannabis use during the perinatal period has adverse consequences for both maternal and child health.

Despite the consequences of prenatal substance use, prenatal cannabis use is common. Cannabis is the third most commonly used substance during pregnancy following tobacco and alcohol (El Marroun et al., 2008; Gilchrist et al., 1996; Havens et al., 2009). Although rates of cannabis use tend to decline during pregnancy (Bailey et al., 2008; Gilchrist et al., 1996), an estimated 11% of women continue to use cannabis during pregnancy, with over 16% of pregnant cannabis users reporting near daily use (Ko et al., 2015). Women who are younger, less educated, single, unemployed, socioeconomically disadvantaged, or belong to a racial or ethnic minority group are more likely to use cannabis during pregnancy (El Marroun et al., 2008; Ko et al., 2015) as are multigravid women and women with unplanned pregnancies (El Marroun et al., 2008). Importantly, women who use tobacco and cannabis concurrently are at particular risk of continuing to use both substances during pregnancy (El Marroun et al., 2008; Ko et al., 2015; Lester et al., 2001), and women with a history of CUD are nearly three times more likely to continue using cannabis during pregnancy than are women without such a history (El Marroun et al., 2008).

Given the high concurrence between cannabis and tobacco use, the rates of prenatal cannabis use, and the specific health consequences of prenatal cannabis use, we sought to document the prevalence of a lifetime CUD among women who had quit smoking tobacco as a result of pregnancy and to examine the relative contributions of psychosocial and psychiatric factors commonly associated with cannabis use in predicting a lifetime CUD. We focused on demographic, pregnancy, health, psychosocial, and tobacco use factors as well as lifetime psychiatric disorders as predictors of a lifetime CUD. We hypothesized that factors related to greater nicotine dependence and more severe psychiatric problems would be most strongly related to a lifetime CUD among pregnant former tobacco smokers.

2. Material and Methods

2.1 Participants and Procedures

The procedures for this study were approved by the University of Pittsburgh Institutional Review Board, and participants provided written informed consent. Participants were part of a larger randomized controlled trial investigating the efficacy of a postpartum tobacco relapse prevention intervention that included a specialized focus on women's postpartum concerns about mood and weight (Levine et al., 2013). Participants were pregnant women who self-reported smoking cigarettes daily for at least 1 month during the 3 months prior to pregnancy, smoked at least 5 cigarettes per day before quitting, had not smoked cigarettes during the past 2 weeks, and were motivated to remain abstinent postpartum. Women reported demographic and pregnancy-related information and also completed measures of tobacco use and psychosocial factors during their third trimester of pregnancy between 34 and 38 weeks gestation. Participants also completed semi-structured psychiatric interviews

at the time of study enrollment or after delivery. Psychiatric interviews that occurred prenatally ($n = 214$) were conducted between 34 and 41 weeks gestation ($M = 36.24$; $SD = 1.61$) and those that were conducted postpartum ($n = 62$) were completed within 55 weeks of delivery ($M = 20.07$; $SD = 17.58$).

2.2 Measures

2.2.1 Demographic factors—Women reported demographic information, including age, race, income, and education.

2.2.2 Pregnancy factors—Women reported pregnancy information, including parity, whether their current pregnancy was intentional, and whether they intended to breastfeed after delivery.

2.2.3 Health and psychosocial factors—Weight and height were measured and body mass index was calculated as weight in kilograms divided by height in meters squared. Current depressive symptoms were assessed using the Center for Epidemiological Studies-Depression Scale (CES-D)(Radloff, 1977), a 20-item measure shown to be less sensitive than other depression scales to somatic symptoms that are common during pregnancy (Coyle and Roberge, 1992). A CES-D score of 16 or greater is considered an indicator for clinically meaningful depressive symptoms (Radloff, 1977). Women also reported the degree to which they appraised situations as stressful in the past month using the 14-item Perceived Stress Scale (PSS)(Cohen et al., 1983). Past month sleep quality and disturbances were assessed using the 19-item Pittsburgh Sleep Quality Index (PSQI), for which a score greater than 5 is considered indicative of poor sleep (Buysse et al., 1989). The internal consistency coefficients for the CES-D, PSS, and PSQI in the present study were 0.77, 0.65, and 0.65, respectively.

2.2.4 Tobacco use factors—Women were asked to think back to the last time they had smoked cigarettes every day for at least one month and complete the Fagerstrom Test of Nicotine Dependence (FTND), a 6-item scale assessing the intensity of physical addiction to nicotine (Heatherton et al., 1991). The internal consistency coefficient for the FTND in the present study was 0.62. Women also provided information on the number of cigarettes they smoked daily prior to quitting, their age at smoking tobacco initiation, the age they began smoking tobacco daily, the number of years they had been smoking tobacco, the number of times they had attempted to quit smoking tobacco, and when they had quit smoking tobacco for their current pregnancy. Women further reported the extent to which they used tobacco smoking as a method for weight control using the 3-item Weight Control Smoking Scale (Pomerleau et al., 1993). Women also completed 6-item measures assessing self-efficacy about weight management after quitting smoking tobacco (Borrelli and Mermelstein, 1998) and smoking cessation-specific weight concerns (Borrelli and Mermelstein, 1998; Perkins et al., 2001).

2.2.5 Lifetime psychiatric disorders—Lifetime psychiatric disorders were assessed using the Structured Clinical Interview for DSM-IV-TR Axis I Disorders: Non-Patient Version (SCID-I/NP). Although the psychiatric diagnoses included in this study were

assessed using DSM-IV-TR criteria, the categories of psychiatric disorders were conceptualized according to the DSM-5. Specifically, obsessive compulsive disorder and posttraumatic stress disorder were treated as individual categories of psychiatric disorders rather than included with the overall anxiety disorders. In addition, women were dichotomized according to whether they met criteria for more than one category of psychiatric disorder (i.e., mood disorders, anxiety disorders, obsessive compulsive disorder, posttraumatic stress disorder, eating disorders, or substance use disorders). That is, women were divided into those who met criteria for one or fewer categories of psychiatric disorders and those who met criteria for more than one category of psychiatric disorders. For example, women who met criteria for both lifetime cannabis and alcohol use disorders but did not meet criteria for any additional psychiatric disorders were classified as having a history of one category of psychiatric disorder (i.e., substance use disorder).

3. Statistical Analysis

Differences in the study variables of interest were compared between women who completed the SCID-I/NP during pregnancy or postpartum. Women were categorized according to the absence or presence of a lifetime CUD. Independent samples t-tests and chi-square analyses initially were used to assess differences in demographic, pregnancy, health, psychosocial, and tobacco use factors as well as lifetime psychiatric disorders between women with and without a lifetime CUD. To correct for multiple comparisons, a Bonferroni correction was applied.

The relative importance of each set of risk factors in predicting a lifetime CUD was assessed using hierarchical binary logistic regression models with forced entry. Each set of factors was stepped into the model in order of hypothesized strength of association with a lifetime CUD, beginning with the weakest association. Demographic factors were entered first (Step 1) followed by pregnancy factors (Step 2), health and psychosocial factors (Step 3), tobacco use factors (Step 4), and lifetime psychiatric disorders (Step 5). At each step, the improvement in model fit given the addition of the set of risk factors was assessed through a chi-square analysis of the difference in likelihood ratio statistics. Nagelkerke's R^2 statistic was obtained at each step to assess the proportion of total variance explained by each set of risk factors (Nagelkerke, 1991). Odds ratios (OR) with 95% confidence intervals (CI) were computed for each predictor by exponentiation of the logit coefficients.

4. Results

Of the 300 women enrolled, 273 completed the SCID-I/NP and were included in the current analysis. Women included ($n = 273$) did not differ from those excluded ($n = 27$) on any of the psychosocial or psychiatric factors of interest ($ps > 0.11$). Moreover, women who completed the SCID-I/NP during pregnancy ($n = 214$) and those who completed the SCID-I/NP postpartum ($n = 62$) did not differ in demographic factors ($ps > 0.10$), pregnancy factors ($ps > 0.39$), health and psychosocial factors ($ps > 0.06$), tobacco use factors ($ps > 0.13$), or rates of psychiatric disorders ($ps > 0.29$).

In total, 14% ($n = 38$) of women met criteria for a lifetime CUD. Descriptive characteristics among women with and without a lifetime CUD are displayed in Table 1. As shown, women

with a lifetime CUD were more educated, began smoking tobacco at an earlier age, attempted to quit smoking tobacco more frequently, were more likely to use smoking tobacco as a method of weight control, and had lower self-efficacy about weight management after quitting smoking tobacco relative to women without a lifetime CUD ($ps < 0.05$). In addition, women with a lifetime CUD reported greater depressive symptoms and higher levels of perceived stress during their third trimester of pregnancy than did women without a lifetime CUD disorder ($ps < 0.04$). Finally, women with a lifetime CUD were more likely to have a lifetime alcohol use disorder and to have met criteria for additional categories of psychiatric disorders than were women without a lifetime CUD ($ps < 0.0001$). Specifically, only 17% ($n = 39$) of women without a lifetime CUD met criteria for multiple lifetime psychiatric disorders whereas 53% ($n = 20$) of women with a lifetime CUD met criteria for at least one additional psychiatric disorder beyond a substance use disorder. Indeed, nearly half of women with a lifetime CUD (45%; $n = 17$) met criteria for a mood disorder and one quarter (24%; $n = 9$) met criteria for an anxiety disorder. After adjusting for multiple comparisons using the Bonferroni correction ($p = 0.002$), a lifetime alcohol use disorder and a history of multiple lifetime psychiatric disorders were the only factors to remain significantly different between women with and without a lifetime CUD.

Results from the hierarchical binary logistic regression analysis are shown in Table 2. Demographic factors (Step 1) explained 4.6% ($R^2 = 0.046$) of the total variance in the model, which was not statistically significant ($p = 0.25$). Education was the only factor in Step 1 significantly related to a lifetime CUD, such that women with more years of education were more likely to have a lifetime CUD than were less educated women ($OR = 2.32$; 95% $CI = 1.05$ – 5.15 ; $p < 0.05$). Although the inclusion of pregnancy factors (Step 2), health and psychosocial factors (Step 3), and tobacco use factors (Step 4) explained an additional 1.1% ($R^2 = 0.057$), 5.5% ($R^2 = 0.112$), and 8.8% ($R^2 = 0.200$) of the total variance, respectively, the proportion of the total variance explained was not statistically different from that explained by demographic factors alone ($ps > 0.09$). In addition, there were no statistically significant predictors of a lifetime CUD disorder in Steps 2 through 4.

As predicted, a history of multiple categories of psychiatric disorders and a lifetime alcohol use disorder were strongly associated with a lifetime CUD. Lifetime psychiatric disorders (Step 5) explained an additional 18.9% ($R^2 = 0.389$) of the total variance ($p < 0.0001$), and four individual risk factors were shown to be predictive of a lifetime CUD in the final step. Specifically, women who met criteria for more than one category of psychiatric disorder and women with a lifetime alcohol use disorder respectively were 36.44 (95% $CI = 5.03$ – 264.27 ; $p < 0.001$) and 3.54 (95% $CI = 1.27$ – 9.87 ; $p < 0.05$) times more likely to have a lifetime CUD than were women without such histories. In addition, having a greater number of tobacco quit attempts ($OR = 1.12$; 95% $CI = 1.01$ – 1.25 ; $p < 0.05$) and lower self-efficacy about weight management after quitting smoking tobacco ($OR = 0.78$; 95% $CI = 0.62$ – 0.97 ; $p < 0.05$) also were predictive of a lifetime CUD.

5. Discussion

Women with a history of CUD as well as those who use cannabis and tobacco concurrently are at elevated risk of continuing to use both substances during pregnancy and postpartum

(El Marroun et al., 2008; Ko et al., 2015; Lester et al., 2001). Given the adverse effects of prenatal cannabis use, we aimed to document rates of CUD and to identify characteristics of women who may be likely to use cannabis during the perinatal period by examining psychosocial and psychiatric correlates of a lifetime CUD among pregnant former tobacco smokers. The lifetime prevalence of cannabis dependence in the present sample was nearly double that of the national average for similarly aged individuals (Haberstick et al., 2014), with 14% ($n = 38$) of women meeting criteria for a lifetime CUD. Consistent with prior research (Peters et al., 2014), the strongest predictors of a lifetime CUD were a history of multiple categories of psychiatric disorders beyond substance use disorder followed by a lifetime alcohol use disorder. In addition, more frequent attempts to quit using tobacco and lower self-efficacy about weight management after quitting smoking tobacco also were significantly associated with a lifetime CUD.

These results indicate that a history of problematic cannabis use among pregnant former tobacco smokers is associated with several characteristics that may themselves have implications for treatment efforts aimed at reducing substance use during the perinatal period. It is well established that individuals with a greater incidence of psychiatric illness (Ball et al., 2006) as well as those with polysubstance dependence (Dutra et al., 2008; Haney et al., 2013; Stapleton et al., 2009) have poor treatment outcomes during substance use interventions. Moreover, women who concurrently use cannabis, tobacco, and alcohol are among those at highest risk of continuing to use at least one substance during pregnancy (Passey et al., 2014). Thus, the finding that women with a history of cannabis and tobacco dependence were also likely to have met criteria for a lifetime alcohol use disorder and to have a history of additional psychiatric disorders beyond substance use disorders suggests that women with these characteristics may have greater difficulty quitting substances during pregnancy and may be vulnerable to relapse postpartum. Indeed, the history of polysubstance dependence in conjunction with the high number of failed attempts to quit using tobacco among pregnant former tobacco smokers with a lifetime CUD is indicative of a tendency toward addictive behavior and difficulties remaining abstinent.

Women with lower weight management self-efficacy also had a greater likelihood of having a lifetime CUD than did those with higher weight management self-efficacy. Although it remains unclear how weight management self-efficacy relates to a lifetime CUD generally, it has been well documented that concern about postcessation weight gain prevents many women tobacco smokers from initiating quit attempts and is commonly related to relapse following tobacco cessation (Clark et al., 2006; Jeffery et al., 2000; Veldheer et al., 2014). Thus, the low weight management self-efficacy found among women with a lifetime CUD may have specific implications for treatment efforts aimed at reducing tobacco use. Although we did not find additional psychosocial or psychiatric factors predictive of a lifetime CUD in the final adjusted model, it is worth noting that initial group comparisons showed that women with a lifetime CUD were more educated, began smoking tobacco at an earlier age, were more likely to use tobacco as a method of weight control, and had poorer psychological adjustment at the end of their pregnancy, as evidenced by high levels of depressive symptoms and perceived stress, than did women without such a history.

However, differences in these factors were not as robust as those related to psychiatric disorders as these group differences did not persist after adjusting for multiple comparisons.

Despite being associated with characteristics commonly related to poor substance use outcomes, women with a lifetime CUD in the present study successfully quit smoking tobacco before or during their third trimester of pregnancy. Thus, pregnancy may offer a unique window of opportunity for substance use treatment to capitalize on women's natural motivation to stop using substances for healthy fetal development. However, substance use interventions focused on reducing the use of cannabis (Eisen et al., 2000; Elk et al., 1998; Haug et al., 2004; Mullins et al., 2004; O'Neill et al., 1996; Schuler et al., 2002; Svikis et al., 1997; Yonkers et al., 2012) or tobacco (McBride et al., 1999; Ratner et al., 2000; Reitzel et al., 2010; Severson et al., 1997) during the perinatal period largely have been ineffective at promoting sustained abstinence. Among the general population, individuals who use both cannabis and tobacco report more severe symptoms of dependence for both substances (Agrawal and Lynskey, 2009; Patton et al., 2005; Timberlake et al., 2007) and are at risk for additional substance use problems (Allsop et al., 2012). In addition, concurrent cannabis and tobacco use is associated with poor treatment outcomes during both cannabis (Haney et al., 2013; Moore and Budney, 2001) and tobacco interventions (Patton et al., 2005; Stapleton et al., 2009), with some evidence suggesting that individuals may compensate for abstinence from one substance by increasing their use of the other (Allsop et al., 2012). Although interventions adapted to address concurrent cannabis and tobacco use have shown initial efficacy (Becker et al., 2014; Becker et al., 2013; Gulliver et al., 2015), there is a need for more effective treatment approaches. The current data suggest that a focus on other psychosocial and psychiatric issues may further improve interventions targeted at reducing comorbid tobacco and cannabis use, particularly among women who quit smoking tobacco during pregnancy.

There are several limitations to this study. First, no information on cannabis use at the time of assessment was collected, making it impossible to determine whether women continued to use cannabis during pregnancy or used cannabis and tobacco concurrently. Second, a subset of women completed psychiatric interviews postpartum rather than during pregnancy. However, the psychosocial and psychiatric factors of interest were not affected by the timing of this assessment. Third, information on lifetime psychiatric disorders and tobacco use were collected retrospectively, which prevents conclusions to be drawn regarding the directionality of these associations. Fourth, data were drawn from women seeking treatment to prevent tobacco relapse who also were motivated to remain abstinent postpartum. Thus, these findings may only pertain to a selective subset of pregnant women and may not be generalizable to other populations of pregnant women.

In summary, the present study documents a high rate of lifetime CUD among pregnant former smokers and provides insight into psychosocial and psychiatric correlates of a lifetime CUD among this population. Findings demonstrate that women with a history of both cannabis and tobacco dependence tend to have a high incidence of psychiatric disorders, a history of alcohol dependence, more frequent attempts to quit using tobacco, and lower self-efficacy to manage their weight without smoking tobacco. Given that each of these factors is independently related to poor treatment outcomes during substance use

interventions among the general population, women with a history of cannabis and tobacco dependence may represent a subset of women who need more specialized treatment during the perinatal period to improve substance use outcomes.

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Highlights

- In total, 14% of women met criteria for a lifetime cannabis use disorder (CUD).
- A history of multiple psychiatric disorders and alcohol use disorder predicted CUD.
- Greater quit attempts and lower weight management self-efficacy also predicted CUD.

Table 1

Differences in psychosocial and psychiatric factors between women with and without a lifetime cannabis use disorder (CUD)

<i>Demographic Factors</i>	No CUD	CUD	p[*]
Age	24.89 ± 5.89	25.47 ± 4.65	0.56
% Black (n)	54% (127)	58% (22)	0.67
% Income \$30,000 (n)	78% (184)	84% (32)	0.46
% Education high school degree (n)	49% (114)	32% (12)	0.05
% Single (n)	29% (68)	32% (12)	0.74
<i>Pregnancy Factors</i>			
% Nulliparous (n)	39% (90)	37% (14)	0.85
% Unintended pregnancy (n)	72% (169)	74% (28)	0.82
% Intend to breastfeed (n)	66% (156)	76% (29)	0.22
<i>Health and Psychosocial Factors</i>			
Body mass index	33.11 (7.68)	33.04 ± 7.67	0.96
Mood	14.76 (9.61)	19.47 ± 10.15	0.006
Stress	22.09 (8.38)	25.03 ± 6.50	0.04
Sleep	7.59 (4.08)	8.78 ± 3.45	0.09
<i>Tobacco Use Factors</i>			
Nicotine dependence	3.22 ± 2.04	3.16 ± 2.12	0.86
Age at first cigarette	15.18 ± 3.31	14.03 ± 2.49	0.04
Age daily smoker	16.91 ± 3.74	16.01 ± 2.38	0.16
Years smoking	8.25 ± 5.89	9.57 ± 4.61	0.19
Cigarettes smoked daily	10.90 ± 9.86	10.70 ± 7.64	0.90
Quit attempts	3.27 ± 3.39	5.21 ± 4.38	0.01
Weight control smoker	1.76 ± 2.20	2.84 ± 2.33	0.006
Weight self-efficacy	6.48 ± 5.58	5.58 ± 2.16	0.02
% Quit prior to second trimester (n)	68% (159)	71% (27)	0.68
<i>Lifetime Psychiatric Disorders</i>			
% Alcohol use disorder (n)	18% (42)	55% (21)	< 0.0001
% Obsessive compulsive disorder (n)	2% (4)	3% (1)	0.69
% Posttraumatic stress disorder (n)	7% (17)	11% (4)	0.49
% Mood disorders (n)	31% (73)	45% (17)	0.10
% Anxiety disorders (n)	18% (43)	24% (9)	0.43
% Eating disorders (n)	1% (3)	5% (2)	0.09
% History of >1 category of psychiatric disorder (n)	17% (39)	53% (20)	< 0.0001

Note: Bolded values are significant.

* After adjusting for multiple comparisons using the Bonferroni correction ($p = 0.002$), the only findings to remain significant were a history of alcohol use disorder and a history of >1 category of psychiatric disorder.

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Table 2

Hierarchical binary logistic regression analysis assessing psychosocial and psychiatric correlates of a lifetime cannabis use disorder

<i>Demographic Factors</i>	Step 1	Step 2	Step 3	Step 4	Step 5
Age	1.02 (0.95–1.09)	1.02 (0.95–1.09)	1.02 (0.95–1.10)	1.06 (0.93–1.21)	1.07 (0.92–1.24)
Black	1.43 (0.64–3.18)	1.44 (0.63–3.28)	1.36 (0.59–3.17)	2.07 (0.76–5.63)	2.42 (0.76–7.70)
Income \$30,000	0.55 (0.18–1.67)	0.55 (0.18–1.70)	0.52 (0.16–1.65)	0.52 (0.15–1.75)	0.43 (0.10–1.78)
Education high school degree	2.32 (1.05–5.15)*	2.16 (0.97–4.83)	2.06 (0.91–4.67)	2.15 (0.88–5.27)	1.57 (0.58–4.26)
Single	0.87 (0.40–1.88)	0.80 (0.37–1.77)	0.74 (0.33–1.67)	0.77 (0.32–1.86)	0.56 (0.20–1.56)
<i>Pregnancy Factors</i>					
Nulliparous		1.17 (0.51–2.66)	1.16 (0.49–2.74)	1.05 (0.42–2.66)	0.92 (0.31–2.79)
Unintended pregnancy		1.02 (0.45–2.30)	1.21 (0.52–2.84)	1.07 (0.43–2.65)	1.83 (0.67–5.00)
Intend to breastfeed		1.74 (0.73–4.18)	1.84 (0.76–4.47)	1.54 (0.59–4.03)	2.75 (0.89–8.54)
<i>Health and Psychosocial Factors</i>					
Body mass index			0.99 (0.94–1.04)	0.98 (0.93–1.04)	0.96 (0.90–1.03)
Mood			1.05 (1.00–1.11)	1.03 (0.97–1.09)	1.02 (0.95–1.09)
Stress			0.99 (0.93–1.06)	1.00 (0.93–1.08)	0.98 (0.90–1.07)
Sleep			1.04 (0.94–1.15)	1.03 (0.92–1.14)	1.04 (0.92–1.18)
<i>Tobacco Use Factors</i>					
Nicotine dependence				1.03 (0.81–1.31)	0.95 (0.73–1.24)
Age at first cigarette				0.88 (0.72–1.08)	0.87 (0.71–1.08)
Age daily smoker				0.96 (0.81–1.14)	0.95 (0.80–1.13)
Years smoking				0.97 (0.84–1.11)	0.89 (0.76–1.05)
Cigarettes smoked daily				0.99 (0.94–1.03)	1.01 (0.95–1.06)
Quit attempts				1.08 (0.98–1.18)	1.12 (1.01–1.25)*
Weight control smoker				1.17 (0.99–1.40)	1.15 (0.93–1.42)
Weight self-efficacy				0.85 (0.70–1.02)	0.78 (0.62–0.97)*
Quit prior to second trimester				0.76 (0.30–1.91)	0.58 (0.19–1.72)

<i>Demographic Factors</i>	Step 1	Step 2	Step 3	Step 4	Step 5
<i>Lifetime Psychiatric Disorders</i>					
Alcohol use disorder					3.54 (1.27–9.87) *
Obsessive compulsive disorder					0.19 (0.01–5.06)
Posttraumatic stress disorder					0.53 (0.08–3.75)
Mood disorders					0.21 (0.04–1.03)
Anxiety disorders					0.23 (0.04–1.37)
Eating disorders					1.70 (0.08–34.52)
History of >1 category of psychiatric disorder					36.44 (5.03–264.27) **

Note: Bolded values are significant;

* $p < 0.05$;

** $p < 0.001$