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Cannabis Withdrawal Among Detained Adolescents: Exploring the Impact of Nicotine and Race

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Abstract

Rates of marijuana use among detained youths are exceptionally high. Research suggests a cannabis withdrawal syndrome is valid and clinically significant; however, these studies have mostly been conducted in highly controlled laboratory settings with treatment-seeking, White adults. The present study analyzed archival data to explore the magnitude of cannabis withdrawal symptoms within a diverse sample of detained adolescents while controlling for tobacco use and investigating the impact of race on symptom reports. Adolescents recruited from a juvenile correctional facility (N=93) completed a background questionnaire and the Marijuana Withdrawal Checklist. Analyses revealed a significant main effect for level of tobacco use on severity of irritability, and for level of marijuana use on severity of craving to smoke marijuana and strange/wild dreams. Furthermore, a significant main effect for race was found with Black adolescents reporting lower withdrawal discomfort scores and experiencing less severe depressed mood, difficulty sleeping, nervousness/anxiety, and strange/wild dreams. Although exploratory, these findings may have significant clinical implications for providers in juvenile detention facilities, allowing the execution of proper medical and/or behavioral interventions to assist adolescents presenting with problematic cannabis and/or tobacco withdrawal.

Keywords

Adolescents; Cannabis; Nicotine; Withdrawal; Race

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1. Introduction

Marijuana is the most commonly used illicit substance among adolescents, with 6.8% of 12 to 17 year-olds reporting use in the past month (SAMHSA, 2007). Rates of marijuana use are exceptionally high among incarcerated youth. A study involving 1,300 juvenile offenders reported a marijuana lifetime prevalence use rate of 85%, with 57% using marijuana in the past 6 months (Mulvey, Schubert, & Chassin, 2010). Moreover, McClelland, Teplin, & Abram (2004) found the rate of marijuana use among male juvenile detainees to be 77.3% during the past 6 months, with 90.2% reporting lifetime use.

Although not yet recognized by the Diagnostic and Statistical Manual, Fourth Edition, Text Revision (DSM-IV-TR), several studies have produced results suggesting that a cannabis withdrawal syndrome is both valid and clinically significant as experienced by many heavy cannabis users (Budney & Hughes, 2006; Budney, Hughes, Moore, & Vandrey, 2004; Budney, Novy, & Hughes, 1999; Levin et al., 2010). Symptoms commonly reported in cannabis withdrawal studies include: Anger/aggression, anxiety/nervousness, appetite change, depressed mood, irritability, restlessness, sleep difficulty, somatic complaints, strange dreams, and weight change (Vandrey, Budney, Moore, & Hughes, 2005). Furthermore, cannabis withdrawal symptoms have been found to be similar in magnitude and time course to those experienced during tobacco withdrawal, a widely accepted and firmly established withdrawal syndrome (Vandrey, Budney, Moore et al., 2005).

Most of what is known about cannabis withdrawal has been produced from studies with adult cannabis users. Vandrey, Budney, Kamon, & Stanger (2005) assessed the prevalence and magnitude of cannabis withdrawal symptoms among adolescent treatment seekers. The most commonly reported symptoms included craving to smoke marijuana, depressed mood, irritability, restlessness, sleep difficulty, increased anger, decreased appetite, increased aggression, nervousness/anxiety, and headache. Furthermore, adolescents meeting criteria for cannabis dependence reported significantly higher withdrawal discomfort scores than those who did not meet criteria for dependence. The authors concluded that these findings were similar to those found in studies with adult treatment seekers. The latter finding is also compatible with research which suggests two-thirds of cannabis-dependent adolescents report experiencing withdrawal (Crowley, Macdonald, Whitmore & Mikulich, 1997).

A common limitation of studies investigating cannabis withdrawal is that the influences of other substance withdrawal syndromes are frequently not controlled. For example, although over half of the adolescents in the study conducted by Vandrey, Budney, Kamon, et al. (2005) were tobacco users, the concurrent effects of nicotine withdrawal were not assessed and may have influenced results of the study. This is particularly concerning due to the amount of similarity that exists between cannabis and nicotine withdrawal in regards to withdrawal discomfort and symptom severity (Budney et al., 2008).

A second limitation of the literature on cannabis withdrawal pertains to the homogeneity of study participants; data have primarily been collected from White treatment-seekers. This is problematic due to racial differences that have been found in regards to withdrawal symptom severity more generally (Brown et al., 2010; Chan et al., 2009). For example,

Chan et al. (2009) found Black participants had significantly lower odds of experiencing severe alcohol withdrawal compared to non-Black participants. More specifically, Copersino et al. (2010) found a higher incidence of four withdrawal symptoms (increased anxiety, difficulty sleeping, cravings for cannabis, and depression) among White participants compared to Black participants for cannabis withdrawal, but did not control for use level.

The purpose of the present study is to investigate the magnitude of cannabis withdrawal symptoms within a racially diverse sample of detained adolescents using archival data. These efforts seek to address existing gaps within the literature on cannabis withdrawal by assessing the severity of symptoms among a heavy-using, adolescent sample abstinent from all substances, including tobacco, controlling for tobacco use, and investigating the impact of race on symptom reports. Results are particularly important because of the heavy use rates of marijuana in this underserved population of youthful offenders.

Several symptoms have been found to commonly occur during both cannabis and tobacco withdrawal syndromes (aggression/anger, anxiety/nervousness, depressed mood, irritability, restlessness, and sleep difficulty). Therefore, it is hypothesized that 1) neither marijuana nor tobacco will have a significant main effect on these symptoms due to the number of adolescents in the present study who use both substances. However, we hypothesize that 2) level of marijuana use will have a significant main effect on symptoms common in cannabis withdrawal, but not nicotine withdrawal, such as craving to smoke marijuana and strange/wild dreams (Vandrey, Budney, Moore et al., 2005). Finally, racial differences in the reported severity of cannabis withdrawal symptoms are expected; 3) Black adolescents are hypothesized to report less severe withdrawal symptoms than non-Black adolescents after controlling for substance use prior to detention.

2. Materials and methods

2.1 Participants

As part of admittance to clinical facility care, parents/guardians provided consent for adolescents to receive assessment, screening, and treatment. They also consented, and adolescents assented, for the information to be de-identified and used in research. All youth entering the facility between June 2004 and February 2005 were eligible to complete the battery unless staff determined the youth was unable (ill, at risk for violence, etc.), or if staff were unable to introduce the assessment program to the youth (no time to introduce because of competing duties, short staffed, etc.).

Participants were 93 pre-adjudicated males between 12 and 18 years of age (M = 16.4, SD = 1.1 years) who were detained at a state juvenile correctional facility in the Northeast (see Table 1). Adolescents identified with the following racial/ethnic backgrounds: 45.1% White, 21.5% Black, 26.88% Hispanic/Latino, and 6.5% other. Approximately half (50.5%) of participants reported using cannabis at least once a day during the three months prior to detention. Forty-eight percent of participants reported using nicotine almost every day in the month prior to detention, and nearly half (51.6%) reported using alcohol at least once a month.

2.2 Measures

As part of the assessment battery, adolescents completed a demographic questionnaire containing questions about socio-demographic factors and frequency of substance use prior to detention, and the Marijuana Withdrawal Checklist (MWC; Budney et al., 1999). The MWC contains symptoms frequently observed during cannabis withdrawal, as well as symptoms characteristic of other substance withdrawal syndromes. These additional symptoms were included in the development of the measure in order to assess the specificity of cannabis withdrawal (Budney et al., 1999).

Because earlier work examining cannabis withdrawal among adolescents utilized a 15-item version of the MWC (Vandrey, Budney, Kamon, et al., 2005), the present study focused only on the same 15 symptoms known to be reported with some frequency during cannabis withdrawal (shakiness/tremulousness, depressed mood, decreased appetite, nausea, irritability, sleep difficulty, sweating, craving to smoke marijuana, restlessness, nervousness/anxiety, increased aggression, headaches, stomach pains, strange/wild dreams, and increased anger) to allow for comparison. Each participant was specifically prompted to rate the severity of each symptom as he was presently experienceing it on a four-point scale (0 = not at all, 1 = mild, 2 = moderate, 3 =severe). This approach may be preferred given the finding that retrospective reports of withdrawal symptoms are often inaccurate (Preuss, Watzke, Zimmerman, Wong, & Schmidt, 2010). A composite withdrawal discomfort score (WDS) was also created by summing each adolescent's severity ratings for all 15-items. The internal reliability of the MWC was high (Cronbach's alpha= 0.90) and consistent with that reported in other studies.

2.3 Procedures

The present study consists of secondary analysis of an archival data set that was collected with approval from the detention facility's research review committee and the IRB of the partnering university. Facility workers identified newly detained adolescents to complete the battery as part of screening procedures to assist with care of detainees. Adolescents were assessed on average 5.7 (SD=12.7) days after entering the facility. A staff member working at the facility introduced and familiarized each participant with the computer terminal by which the assessments were administered. The assessment battery took approximately 20–45 minutes to complete. Adolescents then received feedback regarding their results and were flagged for further examination by the facility clinical social worker if results were suggestive of problematic tobacco, cannabis, or alcohol withdrawal.

In order to assess the effects of both tobacco and marijuana use on the magnitude of cannabis withdrawal symptoms, adolescents were classified as heavy or non/less frequent users of each substance according to their frequency of use prior to incarceration. Inclusion criteria of previous studies on cannabis withdrawal required that participants report heavy use of marijuana defined as more than 25 days per month (Budney et al., 2008; Budney, et al., 2003). Based on this and the item response options used in the present study to assess frequency of marijuana use (see Table 1), adolescents were categorized as heavy users of marijuana if they reported smoking at least once a day during the three months prior to incarceration; all others were categorized as non/less frequent users. Limited by the how the

facility assessed frequency of tobacco use, and to provide for a relatively even split among groups, adolescents who reported smoking 16 or more cigarettes a day were categorized as heavy tobacco users; all others were categorized as non/less frequent users. Based on the above categorizations, about seventeen percent (n=17) of adolescents were classified as both heavy marijuana users and heavy tobacco users. Because reports of alcohol use heavy enough to anticipate withdrawal symptoms were rare (only 5% of participants reported consuming alcohol at least once a day), frequency of alcohol use was not considered as it was too low to provide statistical power. In order to assess for racial differences within a small sample, racial classifications were defined as Black (n=20) and non-Black (White, Hispanic/Latino, Other). Similar definitions were used by Chan et al. (2009).

3. Results

Descriptive statistics regarding the prevalence and severity of withdrawal symptoms were computed. The most commonly reported symptoms were sleep difficulty, nervousness/ anxiety, depressed mood, restlessness, increased anger, decreased appetite, headache, and sweating. Three of these symptoms (sleep difficulty, depressed mood, and nervousness/ anxiety) were reported to be of at least moderate severity by 30% of participants (see Table 2).

Age and the number of days between entry and assessment were tested as potential covariates. Neither variable was found to be consistently associated with symptom severity and therefore, was not included in analyses. Two-way analyses of variance (ANOVAs) were performed to determine the effects of both substances on the reported severity of each withdrawal symptom and the composite WDS. Contrary to expectations, neither substance was found to have a significant main effect on WDS. Analyses revealed a significant main effect for level of marijuana use on the reported severity of two withdrawal symptoms: craving to smoke marijuana $F(1, 91) = 4.20$, $p = .03$; and strange/wild dreams, $F(1, 92) = 5.22$, $p = .03$. A significant main effect for level of tobacco use on the reported severity of irritability was also found, $F(1, 92) = 4.32$, $p = .04$. Sample means are displayed in Table 3. Furthermore, a significant interaction between the level of marijuana and tobacco use on sleep difficulty was found, $F(1, 92) = 4.19$, $p = .04$. Simple main effects analysis showed that adolescents reporting heavy tobacco use prior to detention reported significantly more difficulty sleeping when marijuana use was relatively low ($p = .01$), but no effect for level of tobacco use was found when marijuana use was heavy ($p = .76$).

Next, race was included in the analyses to determine if racial differences existed in the reported severity of withdrawal symptoms after accounting for frequency of substance use. As expected, significant main effects for race were found. Black adolescents had significantly lower WDS scores ($F(1, 92) = 6.96$; $p = .01$), reported significantly less severe depressed mood ($F(1, 92) = 6.62$, $p = .01$), sleep difficulty ($F(1, 92) = 5.41$, $p < .05$), nervousness/anxiety ($F(1, 92) = 5.54$, $p = .02$), and strange/wild dreams ($F(1,92) = 4.06$, $p < .05$) than non-Black adolescents. Sample means are displayed in Table 3.

4. Discussion

The present study extends the literature on cannabis withdrawal by exploring the magnitude of cannabis withdrawal symptoms within a racially diverse sample of detained adolescents. Due to the frequency with which several symptoms are commonly reported during both cannabis and nicotine withdrawal syndromes, and the number of adolescents who reported use of both substances prior to detention, it was expected that neither substance would have a significant main effect on the reported severity of aggression, anger, anxiety/nervousness, depressed mood, irritability, restlessness, or sleep difficulty. Results supported this hypothesis with one exception. Level of tobacco use was found to produce a significant main effect on the reported severity of irritability; heavy tobacco users reported experiencing more severe irritability than non/less frequent tobacco users. This finding conflicts with earlier research which found a greater prevalence of irritability among cannabis abstainers compared to tobacco abstainers (Budney et al., 2008). This contradictory finding may result from the small sample size. It may also suggest that previous findings on cannabis withdrawal symptoms produced misleading results because tobacco cessation was not simultaneously controlled.

As expected, a significant main effect for level of marijuana use on the reported severity of craving to smoke marijuana and strange/wild dreams was found. More specifically, heavy marijuana users reported experiencing more severe cravings to smoke marijuana and more severe strange/wild dreams than non/less frequent marijuana users. These findings are consistent with previous research which found these symptoms to be characteristic of cannabis, but not nicotine withdrawal (Vandrey, Budney, Moore, et al., 2005). Furthermore, these findings provide further support for the existence of withdrawal symptoms specific to the cessation of heavy marijuana use as experienced by adolescents.

Overall, race was found to have a significant impact on more symptom reports than the level of use for either substance. Black adolescents had significantly lower withdrawal discomfort scores and experienced less severe depressed mood, difficulty sleeping, nervousness/anxiety, and strange/wild dreams than non-Black adolescents. These findings are consistent with previous research which found lower subjective withdrawal scores (Brown et al., 2010) and incidence of depression, anxiety, and difficulty sleeping (Copersino et al., 2010) for Black compared to White participants among adult cannabis users. Reasons for these racial differences remain unclear and warrant further research. Genetic variations may influence the process by which substances are metabolized in the body (Chan et al., 2009, Thomasson, Crabb, Edenberg, & Li, 1993), and impact withdrawal syndromes. Furthermore, these differences may reflect a hesitation among African Americans to report unpleasant experiences (Kosten & Rayford, 1995).

Due to several methodological limitations, these findings must be interpreted with caution. As previously mentioned, the sample size was small although this is common among studies on cannabis withdrawal (Budney et al., 1999; Budney et al., 2003; Vandrey et al., 2008; Vandrey, Budney, Kamon, et al., 2005). Furthermore, the group of non-Black adolescents was ethnically diverse. Research studies with larger sample sizes and statistical power are needed to determine the severity of cannabis withdrawal symptoms between substance use

and racial and ethnic groups more precisely. Adolescents were assessed at varying times after entrance to the facility. However, peak effects from cannabis withdrawal have been found to occur between days 2–6 of abstinence and most effects last through day 14 (Budney et al., 2003). Ninety-four percent of participants in the current study were assessed within this period. Moreover, it is rare that an adolescent enters detention from another controlled environment, therefore, it is unlikely the youth experienced forced abstinence prior to being detained. Furthermore, number of days between entry and assessment was generally not found to be a significant predictor of symptom severity when investigated for use as a covariate. Although level of marijuana and tobacco use was statistically controlled, use of additional substances was not. Note that use of other substances (e.g., alcohol) heavy enough to prompt withdrawal was rare. Another limitation of the current study is that well-controlled laboratory methods were not used. However, findings are likely more ecologically valid and consistent with what providers confront in applied settings with heavy-using adolescents. Similarly, the extent to which adolescents could be classified according to their level of substance use (heavy vs. non/less frequent) was limited by the questions the facility utilized pertaining to use frequency (e.g. tobacco users were asked if they smoked 0–15, 16–25, or 26+ cigarettes per day). Although the classifications used allowed for the assessment of withdrawal symptom severity among the heaviest-using adolescents, future research is needed to more systematically control for the confounding effects of tobacco withdrawal and determine the level of marijuana use that can be expected to lead to withdrawal after cessation of use. Lastly, the generalizability of the findings is likely limited to detained male adolescents who may be more likely to report experiencing such symptoms as depression, anxiety, sleep difficulty, etc. due to situational factors related to being detained. This may also explain why differences in withdrawal discomfort scores were not found between substance use groups. This finding may also have been influenced by the proportion of adolescents (17%) who were heavy users of both marijuana and tobacco.

Despite these limitations, our findings may have significant clinical implications for providers in juvenile detention facilities. Providers may be encouraged to assess adolescents for substance withdrawal syndromes upon entry given the high and heavy rates of substance use (e.g., marijuana, tobacco) among detained adolescents. Symptoms of withdrawal syndromes may mimic symptoms of various psychiatric disorders (e.g., depressed mood, nervousness/anxiety, irritability, sleep difficulty). Assessment of withdrawal syndromes may prevent inaccurate mental health diagnoses and unnecessary psychotropic medications. Instead, proper medical and/or behavioral interventions and additional support could be employed to assist adolescents presenting with problematic cannabis and/or tobacco withdrawal. In addition to informing clinical care, these results are suggestive for future research that is better controlled, particularly among such high-using, understudied adolescent populations.

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Table 1

Participant characteristics (N=93)

Demographics	
Mean (SD) age in years	16.4 (1.2)
% Male	100
% Black	21.5
% White	45.1
% Hispanic/Latino	26.9
% Other race/ethnicity	6.5
Substance use	
Marijuana (% past 3 months)	
Never used	10.5
Less than once a month	12.6
1–2 times a month	6.3
3–4 times a month	11.6
3–4 times a week	9.5
Once a day	7.5
A few times a day	43.0
Tobacco (% per day)	
Non-smokers	37.9
0–15	32.6
16–25	21.5
26+	8.6
Alcohol (% past 3 months)	
Never used	15.8
Less than once a month	32.6
1–2 times a month	22.1
3–4 times a month	18.9
3–4 times a week	5.3
Once a day	3.2
A few times a day	2.1
Withdrawal discomfort score	24.9 (9.4)
Mean (SD) number of days between	
Entry & Assessment	5.7 (12.7)

Table 2

Percentage of participants reporting each MWC item by severity rating

	Mild rating ≥ 1	Moderate rating ≥ 2	Severe rating ≥ 3
Mood			
Depressed mood	53.76	36.56	15.05
Increased anger	35.87	22.83	11.96
Irritability	40.86	16.13	9.68
Nervousness/anxiety	55.91	30.1	10.75
Behavioral			
Craving	20.65	14.13	6.52
Decreased appetite	34.40	21.90	12.90
Increased aggression	21.74	15.22	4.35
Restlessness	49.46	25.80	10.75
Sleep difficulty	66.67	39.79	25.81
Strange dreams	25.81	16.13	6.45
Physical			
Headache	33.33	16.13	3.23
Nausea	19.36	9.68	1.08
Shakiness	24.74	15.06	3.23
Stomach pains	30.10	15.05	4.30
Sweating	34.41	16.13	10.75

Table 3

Sample means by substance and race.

			95% Confidence Level	
	Mean	**Std. Error**	**Lower Bound**	**Higher Bound**
Tobacco Use				
Irritability				
Non/less frequent	1.53	.12	1.29	1.76
Heavy	1.98	.18	1.62	2.34
Marijuana Use				
Craving marijuana				
Non/less frequent	1.28	.15	.99	1.57
Heavy	1.69	.13	1.42	1.95
Strange/wild dreams				
Non/less frequent	1.31	.15	1.02	1.61
Heavy	1.77	.14	1.50	2.04
Black				
Withdrawal Discomfort Score				
No	26.88	1.12	24.65	29.11
Yes	18.47	2.99	12.53	24.41
Depressed mood				
No	2.24	.14	1.97	2.52
Yes	1.23	.37	.49	1.96
Sleep difficulty				
No	2.50	.14	2.22	2.78
Yes	1.68	.38	.92	2.43
Nervousness/anxiety				
No	2.14	.13	1.89	2.39
Yes	1.29	.34	.62	1.96
Strange/wild dreams				
No	1.66	.11	1.44	1.87
Yes	1.04	.29	.48	1.69