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Anxiety Sensitivity and Cannabis Use-Related Problems: The Impact of Race

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Abstract

Background and Objectives—Cannabis is the most widely used illicit substance among young adults. Anxiety sensitivity (AS; i.e., fear of anxiety-related symptoms) is positively related to coping motives for cannabis use (which are robustly positively linked to cannabis-related problems). However, AS is unrelated to cannabis use-related problems. Yet, extant studies have been conducted on primarily White samples. It may be that among Black students, AS-physical concerns (i.e., fear of physical anxiety-related sensations) are related to cannabis problems given that Black individuals are more likely than White individuals to report experiencing greater and more intense somatic symptoms when experiencing anxiety. Black individuals may rely on cannabis to cope with fear of these somatic symptoms, continuing to use despite cannabis-related problems.

Methods—The current study tested whether race moderated the relation between AS-physical concerns and cannabis problems among 102 (85.3% female) current cannabis using undergraduates who were either non-Hispanic Black (n= 51) or non-Hispanic White (n= 51).

Results—After controlling for frequency of cannabis use, income, and gender, race significantly moderated the relation between AS-physical concerns and cannabis use-related problems such that AS-physical concerns significantly predicted cannabis-related problems among Black and not White individuals.

Discussion and Conclusions—Findings highlight the importance of considering race in identifying psychosocial predictors of cannabis-related problems.

Scientific Significance—Intervention strategies for Black cannabis users may benefit from examining and targeting AS-physical concerns.

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Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

Given the violation of normality, moderation hypotheses were also tested using maximum likelihood bootstrapping analyses (1000 samples were drawn), which is robust against violations of assumptions of normality. Three separate models were tested using the SPSS PROCESS macro with bootstrapping with bias corrected confidence intervals. As predicted, AS-physical concerns X race interaction was the only significant interaction.

Keywords

anxiety sensitivity; cannabis; marijuana; race; racial differences

Background and Objectives

Cannabis is the most widely used illicit substance amongst college students in the United States, with 34.1% having used cannabis in the past year.[1] High rates of cannabis use are particularly problematic given that individuals who report more cannabis use are at an increased risk for chronic medical conditions (e.g., chronic bronchitis, increased rates of pneumonia[2]), risky behavior (e.g., unprotected sexual intercourse[3]), and psychopathology (e.g., anxiety[4] and psychotic symptoms[5,6]). In fact, 67% of cannabis using undergraduates report experiencing problems related to their use[7] and 24.6% of cannabis-using first-year undergraduates have problems that are substantial enough to meet Diagnostic and Statistical Manual-IV (DSM-IV) criteria for a cannabis use disorder.[8] Therefore, understanding potentially malleable cognitive vulnerabilities influencing cannabis-related problems could further inform efforts to reduce the prevalence of cannabis use-related problems.

Anxiety sensitivity (AS; i.e., a cognitive vulnerability which reflects individual differences in the fear of anxiety and arousal-related symptoms[9]) has been theorized to be related to cannabis use.[10,11] Individuals with elevated AS may rely on cannabis to cope with fear of anxiety and related symptoms, increasing their risk of continuing to use cannabis despite experiencing cannabis-related problems. In partial support of this hypothesis, AS is positively related to cannabis use to cope with negative affect and severity of self-reported cannabis withdrawal symptoms.[11,12] Yet, AS is unrelated to cannabis problems[13] and unrelated[14] or even negatively related[15] to frequency of cannabis use. However, AS is composed of a global higher order factor with three correlated lower order factors that are differentially related to cannabis related behaviors: AS-physical concerns (related to the belief that palpitations lead to cardiac arrest), AS-cognitive concerns (related to the belief that concentration difficulties lead to insanity), AS-social concerns (related to belief that publicly observable anxiety reactions will result in social rejection[16]). AS-cognitive concerns was associated with severity of cannabis-related problems[14] and was incrementally associated with cannabis withdrawal symptoms.[12] Additionally, AS-cognitive concerns and AS-social concerns significantly interacted with cannabis cravings to prospectively predict subsequent cannabis use.[14]

A major limitation of this corpus of work is that it has been conducted with primarily White samples[10,11,14,17,18] with little attention to race other than reporting demographic variables. Yet Black individuals are more likely to report experiencing greater and more intense somatic symptoms when experiencing anxiety than White individuals.[19–21] Thus, Black individuals may use cannabis to cope with fear of these anxiety-related somatic symptoms. Reliance on cannabis to cope with anxiety-related somatic symptoms may result in continued use despite experiencing cannabis-related problems. In fact, race moderated the relation between cannabis use motives and cannabis problems such that among Black cannabis users, coping motives were positively associated with cannabis-related

impairment.[22] However, to our knowledge, there are no studies that examine how AS relates to cannabis problems amongst Black individuals. Further, substance use researchers have questioned whether factors that are associated with cannabis use among White individuals can generalize amongst Black individuals [23] and emerging data indicate that results that have been found in predominantly White samples do not always generalize to Black individuals.[23–25]

Thus the current study tested whether the relations between the AS subscales (i.e., AS-social concerns, AS-physical concerns, AS-cognitive concerns) and cannabis use-related problems varied as a function of race (non-Hispanic Black, non-Hispanic White). First, given that Black individuals often report greater and more intense somatic symptoms when experiencing anxiety,[19–21] we tested whether Black participants would report significantly more AS-physical concerns than White participants. Second, we tested whether race would moderate the relation between AS-physical concerns and cannabis-related problems such that Black individuals with greater AS-physical concerns would report more cannabis-related problems. Third, we tested the specificity of this moderational effect by testing whether race moderated the relations between AS-social concerns and cannabis problems and between AS-cognitive concerns and cannabis problems.

Methods

Participants and Procedure

The sample was drawn from two larger studies examining substance use behaviors among college students who were recruited from the Department of Psychology research participant pool at a large public university in the southern U.S.[26] Of the 1698 participants who completed the surveys, data from 11 were discarded due to questionable validity (detailed below). Of the remaining participants, 388 endorsed current cannabis use (i.e., past three-month cannabis use). Of those, 51 self-identified as non-Hispanic Black and 304 as non-Hispanic White. Given the substantially unequal *ns* between the groups, a random selection of 51 individuals identifying as non-Hispanic White were selected for inclusion in the current study. Thus, the current sample consisted of 102 current cannabis using undergraduate students (85.3% female). Of the White participants, 45.1% (n = 23), 37.3% (n = 19), and 17.6% (n = 9) reported high (above $150,000), middle (between $149,999 and $32,000), and low (below $32,000) estimated family incomes, respectively. Additionally, of the Black participants, 21.6% (n = 11), 41.2% (n = 21), and 37.3% (n = 19) reported high, middle, and low estimated family incomes, respectively. Further descriptive information by racial group is presented in Table 1.

The university's Institutional Review Board approved the studies and all participants provided informed consent prior to data collection. In both studies, participants completed computerized self-report measures using a secure, on-line data collection website (surveymonkey.com). Computerized versions of self-report measures have been found to produce scores that are highly correlated with paper-and-pencil versions.[27] All participants received referrals to university-affiliated psychological outpatient clinics and research credit for completion of the survey.

Measures—*Anxiety Sensitivity Index-III*, ASI-III[16]; Participants rated their concern about the potential consequences of anxiety symptoms for each of the 18 items on a scale ranging from 0 (*very little*) to 4 (*very much*). The ASI is comprised of three 6-item subscales that correspond to a specific factor of AS: physical concerns, cognitive concerns, and social concerns. The AS subscale scores have shown good internal consistency in prior work[28] and in the current study (among White participants: AS-physical concerns α = .84, AS-cognitive concerns α = .89, AS-social concerns α = .80; among Black participants: AS-physical concerns α = .91, AS-cognitive concerns α = .93, AS-social concerns α = .84).

Marijuana Problems Scale, MPS[29]; Cannabis-related problems in the past 90 days was assessed with the MPS which asks participants to rate 19 items from 0 (*no problem)* to 2 (*serious problem)*. Consistent with prior work,[30] items scored either 1–2 were counted to create a sum of number of cannabis-related problems. This measure has demonstrated adequate internal consistency in prior work[7,29] and in the present sample (among White participants: α = .82, among Black participants: α = .88).

Marijuana Use Form, MUF[13]; The MUF examined cannabis use frequency of the sample and was included as covariate in analyses. Participants rated their frequency of using cannabis in the past three months on a scale ranging from 0 (*never*) to 10 (*21 or more times a week*). The MUF has shown convergent validity with ecological momentary assessments of cannabis use.[31]

Infrequency Scale[32]; To identify responders who provided random or grossly invalid responses, we included four questions from this scale. As in prior online studies,[33] individuals who endorsed three or more infrequency items (n = 11) were excluded from this study.

Demographics Measure; Individuals were asked to report a series of demographic information (e.g., age, gender, estimated family income). Participants were asked to report information such as their family's annual income.

Results

Sample descriptives

As presented in Table 1, Black and White participants did not differ on age, gender (dummy coded: male = 0 and female = 1), or current (e.g., within the past three months) alcohol or tobacco use (dummy coded: not using in the past three months = 0 and current use = 1). However, as observed in other studies,[34] there was a significant difference in estimated family income, with White participants reporting significantly greater family income than Black participants. Thus, family income was included as a covariate in subsequent analyses. Black and White participants did not differ on cannabis use frequency or use-related problems. Contrary to expectation, Black and White participants also did not differ on AS-physical concerns; however White participants did report significantly greater AS-social concerns than Black participants (Table 1).

Moderation Analyses

Inspection of the data (Table 2) revealed that some variables were not normally distributed (skew > 3; kurtosis > 10[35]). Three separate hierarchical linear regression analyses were conducted to examine whether race moderated the relationship between the AS subscales and cannabis-related problems after controlling for frequency of past-month cannabis use, estimated family income, and gender. For each model, the criterion variable was number of cannabis-related problems, and predictor variables were entered into three steps: Step 1: covariates; Step 2: the main effects of each AS subscale and race (race was dummy coded such that White individuals = 0 and Black individuals = 1); and Step 3: AS subscale X race interaction. This strategy ensured that observed effects at Step 3 could not be attributed to variance shared with the variables in Steps 1–2. [36] AS subscales were centered to reduce multicollienarity.

AS-physical concerns X race interaction was the only significant interaction (Table 3). Covariates accounted for 20.1% variance in cannabis problems, main effects accounted for an additional 4.5% of the variance, and the interaction accounted for an additional 3.4% of the unique variance. The form of the significant interaction (Figure 1) was examined by inserting ratings of AS-physical concerns (one standard deviation above and below the AS-physical concerns mean) for Black and White participants. [36] The nature of the significant interaction was probed by testing whether each simple slope was significantly different from zero.[37,38] Among Black participants, the simple slope was significant, $\beta = 0.38$, $p < .05$, indicating that AS-physical concerns were positively related to cannabis-related problems. However, among White participants, the simple slope was not significant, $\beta = 0.01$, $p = .915$.

Discussion and Conclusions

Findings support our theory that, given that Black individuals report experiencing greater and more intense somatic symptoms when experiencing anxiety than White individuals (e.g., [20]), Black individuals may experience fear of these somatic symptoms and use cannabis to cope despite experiencing cannabis-related problems. Race moderated the relation between AS-physical concerns and cannabis-related problems such that AS-physical concerns were positively related to cannabis-related problems among Black individuals. Consistent with prior work with predominantly White samples[13,14] AS was unrelated to cannabis problems among White participants. Importantly, this moderational effect was observed after controlling for family income, cannabis use frequency, and gender.

Presumably, the observed moderational effect occurred because Black students use cannabis to cope with AS-physical concerns. Coping motivated use is especially risky given that individuals who report coping motivated cannabis use are at a higher risk for more frequent and heavy use, and cannabis use disorders.[42,43] In fact, race moderated the relation between cannabis use motives and cannabis problems such that among Black cannabis users, coping motives were positively associated with cannabis-related problems.[22] Testing whether cannabis use to cope with AS-physical concerns specifically plays a causal or protective role in the development of cannabis-related impairment among Black individuals will be an important next step in this line of research.

Notably, low AS-physical concerns appears to work as a protective factor against cannabis-related problems among Black cannabis users. Black cannabis users who deny experiencing fear of their somatic symptoms may have other, more adaptive coping skills than Black cannabis users with high AS-physical concerns. It may also be that Black cannabis users with low AS-physical concerns use cannabis for motives that have previously been found not to be associated with cannabis use-related problems among Black cannabis users (i.e., enhancement motives[22]) more often than Black individuals with high AS-physical concerns.

The present study should be considered in light of limitations that suggest future directions for work in this area. First, the cross-sectional nature of the data hinders our ability to determine causal relations and prospective work will be an important next step. Second, data were collected via self-report and future studies may benefit from experimental designs. Third, the sample consisted of a relatively small, mostly female non-treatment seeking undergraduates. Although this population was chosen given that college students experience greater cannabis-related problems than their same-age, non-college peers[44] and that the vast majority of students with cannabis-related problems are not interested in seeking treatment,[7] future work with larger samples is necessary to determine whether findings generalize to clinical populations and other samples of non-treatment seekers. Further given that problematic cannabis use is greater among males,[45] future research is necessary to ascertain whether findings generalize to samples with greater representation of men.

Fourth, emerging data indicate that AS may manifest differently among Black and White adults[46,47] and future research is necessary to examine the impact of these differences on cannabis-related behaviors. Fifth, studies with international samples find that migration is associated with cannabis use.[48] Unfortunately, the current study did not assess migration and future work testing whether migration and other culturally relevant variables (e.g., acculturation) will be important next steps. Sixth, race significantly moderated the relation between AS-physical concerns and cannabis-use related problems and the interaction accounted for an additional 3.4% of the unique variance. The total model accounted for 28.0% of variance in cannabis problems, which suggests a large effect of the overall model on cannabis problems. Although the moderational effect of race on the AS-physical concerns-cannabis problems relation was small, smaller effect sizes can be clinically meaningful (see [49]). Despite this, future work is necessary to identify the impact of culturally relevant factors on cannabis problems among Black individuals (e.g., migration status).

Scientific Significance

Findings of the current study have important clinical implications. Therapists may consider assessing for AS-physical concerns among Black patients who present for cannabis use disorder treatment. Those with elevated AS-physical concerns may benefit from incorporating a brief intervention to reduce anxiety sensitivity such as Anxiety Sensitivity Amelioration Training (ASAT). Further, efforts to prevent the development of cannabis-related problems may benefit from targeting AS.

Results highlight the importance of considering race in the study of psychosocial vulnerability factors associated with cannabis-related problems. Specifically, although AS-physical concerns tend to be unrelated to cannabis-related problems among predominantly White samples[14] and among the White participants in the current study, AS-physical concerns were positively related to cannabis related problems among Black individuals. The current study adds to a growing body of research that examines the impact of race on vulnerability factors (e.g., cannabis use motives, ethnic identity, economic deprivation) that have been shown to influence cannabis-related behaviors among Black adults.[22,50,51]

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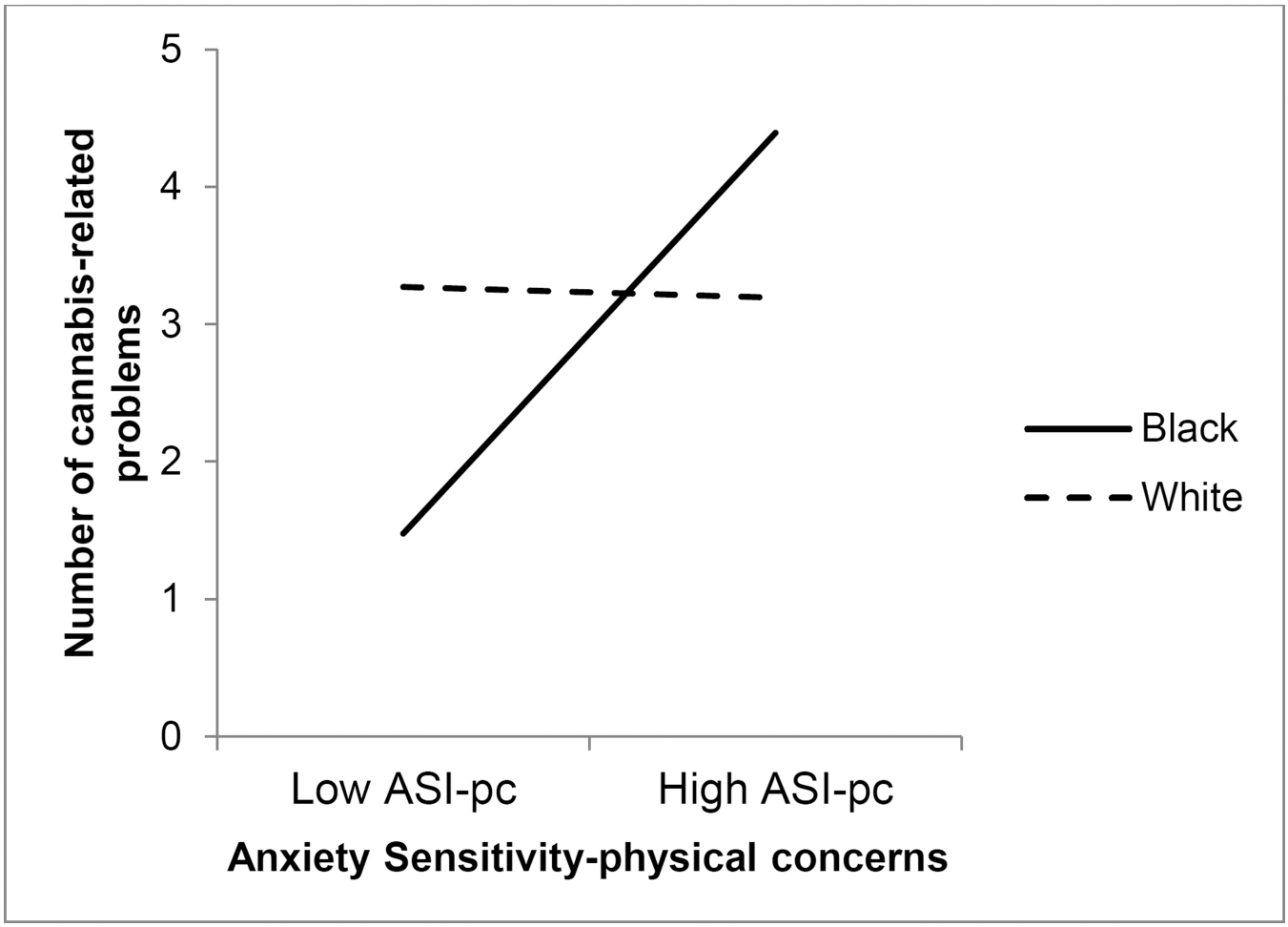

Figure 1.
Note. ASI-pc = Anxiety sensitivity-physical concerns.

Table 1

Descriptive information by race

	Black students (*n* = 51)	**White students (*n* = 51)**			
Variables	***M* (*SD*) or %**		***F* or X^2**	***p***	***d* or φ**
1. Age	19.82 (2.39)	20.33 (2.24)	1.24	.269	0.22
2. Gender (% female)	43.1%	42.2%	0.08	.500	−0.04
3. Family income	**$90,376 (125,985)**	**$154,828 (160,385)**	**5.09**	**.026**	**0.45**
4. AS-social concerns	**3.57 (3.68)**	**5.27 (4.45)**	**4.08**	**.046**	**0.42**
5. AS-physical concerns	2.67 (4.08)	3.43 (3.59)	0.60	.440	0.20
6. AS-cognitive concerns	2.27 (3.63)	3.22 (3.49)	1.35	.248	0.27
7. Cannabis use frequency	2.45 (2.19)	2.55 (2.63)	0.01	.910	0.04
8. Number of cannabis-related problems	2.82 (4.16)	3.20 (3.70)	0.41	.522	0.10
9. % Current alcohol users	84.3%	86.3%	0.29	.592	−0.05
10. % Current tobacco users	9.8%	13.7%	0.38	.539	−0.06

Note. Significant group differences are presented in bold. AS = Anxiety sensitivity.

Table 2

Descriptive statistics by race.

Black Students (*n*=51)		
Variables	**Skew**	**Kurtosis**
Cannabis use frequency	1.01	0.08
Cannabis-related problems	2.70	**10.19**
Anxiety Sensitivity-Physical Concerns	1.44	1.64
Anxiety Sensitivity-Cognitive Concerns	1.58	2.02
Anxiety Sensitivity-Social Concerns	1.22	1.07
White Students (*n*=51)		
Variables	Skew	Kurtosis
Cannabis use frequency	1.17	0.75
Cannabis-related problems	1.58	2.43
Anxiety Sensitivity-Physical Concerns	1.49	2.59
Anxiety Sensitivity-Cognitive Concerns	1.65	2.88
Anxiety Sensitivity-Social Concerns	0.97	0.83

Note. Significant group differences are presented in bold.

Table 3

Interaction of anxiety sensitivity and race in the prediction of cannabis use related problems.

Predictor variable	ΔR^2	ΔF	f^2	β	*t*	*p*	sr^2
Step 1: Covariates	.201	8.24	.25			**<.001**	
Cannabis use frequency				**0.37**	**4.09**	**<.001**	**0.14**
Family Income				−0.10	−1.11	.270	0.01
Gender				**−0.26**	**−2.85**	**.005**	**0.07**
Step 2: Main Effects	.045	2.89	.33			**.061**	
AS-physical concerns				**0.21**	**2.32**	**.023**	**0.04**
Race				−0.04	−0.46	.650	0.00
Step 3: Interaction Effect	.034	4.49	.39			**.037**	
AS-physical concerns X Race				**0.32**	**2.12**	**.037**	**0.03**
Step 1: Covariates	.201	8.24	.25			**<.001**	
Cannabis use frequency				**0.37**	**4.09**	**<.001**	**0.14**
Family Income				−0.10	−1.11	.270	0.01
Gender				**−0.26**	**−2.85**	**.005**	**0.07**
Step 2: Main Effects	.060	3.90	.35			**.023**	
AS-social concerns				**0.24**	**2.72**	**.008**	**0.06**
Race				−0.01	−0.09	.931	0.00
Step 3: Interaction Effect	.026	3.45	.40			.066	
AS-social concerns X Race				0.26	1.86	.066	0.03
Step 1: Covariates	.201	8.24	.25			**<.001**	
Cannabis use frequency				**0.37**	**4.09**	**<.001**	**0.14**
Family Income				−0.10	−1.11	.270	0.01
Gender				**−0.26**	**−2.85**	**.005**	**0.07**
Step 2: Main Effects	.093	6.31	.41			**.003**	
AS-cognitive concerns				**0.30**	**3.49**	**.001**	**0.09**
Race				−0.02	−0.25	.804	0.00
Step 3: Interaction Effect	.020	2.82	.26			.096	
AS-cognitive concerns × Race				0.23	1.68	.096	0.02

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Note. AS = Anxiety Sensitivity.