

Assessing Marijuana Use, Anxiety, and Academic Performance Among College Students

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This article examines the relationship between marijuana use and anxiety symptoms among college students, with a secondary focus on marijuana use and grade point average (GPA). A secondary analysis was conducted on data obtained from the American College Health Association–National College Health Assessment. Results indicated that marijuana use was negatively associated with GPA among students with current anxiety and no formal treatment. The relationships between these variables may be more complex than previously thought.

Keywords: marijuana, anxiety, grade point average, academic performance, mental health

A paradigm shift is currently under way in the United States regarding the cultural and legal attitudes toward marijuana use. Currently, 33 states along with the District of Columbia allow for medical marijuana, whereas 10 states along with the District of Columbia allow for its recreational use (GOVERNING, 2018). This shift invites more formal research opportunities to investigate numerous aspects related to marijuana use and its effects.

Mental health problems are a growing concern across college and university settings as increasing numbers of students seek services for significant mental and emotional distress (Reetz, Krylowicz, & Mistler, 2014). In 2014, anxiety-related problems were the top presenting concern at college counseling centers, with 54% of students at public universities reporting feelings of overwhelming anxiety at some point within the past 12 months (American College Health Association [ACHA], 2014; Reetz et al., 2014). However, only about 20% of college students with anxiety disorders receive treatment (Blanco et al., 2008).

Many college students who refrain from seeking counseling for their anxiety may attempt to cope with their symptoms via other means. One frequently endorsed method is marijuana use (Buckner, Bonn-Miller, Zvolensky, & Schmidt, 2007; Johnson, Mullin, Marshall, Bonn-Miller, & Zvolensky, 2010; Moitra, Christopher, Anderson, & Stein, 2015; Semcho, Bilsky, Lewis, & Leen-Feldner, 2016). Marijuana is currently the most commonly used illicit substance in the United States; college students and college-age adults use it at notably higher rates than the general U.S. population (Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2014; Substance Abuse and Mental Health Services Administration, 2014).

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Although Yurasek and Hadley (2016) noted that findings appear mixed at this time, multiple studies point to the detrimental effects of marijuana use on mental health later in life. Despite this, Krumm (2016) argued for marijuana use as a treatment for posttraumatic stress disorder. However, Patton et al. (2002) found that marijuana use significantly predicted later symptoms of depression and anxiety, especially among women. Hayatbakhsh et al. (2007) found similar results, suggesting that early onset marijuana use predicted anxiety and depression later in young adulthood.

There seems to be weaker consensus in the literature regarding the effects of marijuana use among adults. Similar to Patton et al. (2002), van Laar, van Dorsselaer, Monshouwer, and de Graaf (2007) found that marijuana use among adults was associated with an increased frequency of depressive episodes; however, they did not find a direct association between marijuana use and anxiety symptom presentation. In contrast, Allen and Holder (2014) found no relationship between frequency of marijuana use and well-being, although they did note that other negative consequences due to marijuana use were associated with decreases in well-being. Examples of potential negative consequences included “having an argument with a friend or family member, or not being able to do homework or study for a test” (Allen & Holder, 2014, p. 304). Other studies have found positive relationships between problems related to marijuana use (e.g., social or occupational difficulties and negative expectancies) and anxiety (Buckner et al., 2007; Buckner & Schmidt, 2008), as well as marijuana use in the past month and being diagnosed or treated for anxiety (Keith, Hart, McNeil, Silver, & Goodwin, 2015). Among college-age adults, there is evidence of a relationship between anxiety sensitivity and marijuana dependence that is mediated by coping motives (Johnson et al., 2010). Similarly, Semcho et al. (2016) found that lower distress tolerance was related to coping-related motives for marijuana use, which in turn mediated the relationship between marijuana use and internalizing disorders. Specific facets of anxiety sensitivity, such as mental incapacitation and social concerns, have a significant interaction with cravings for marijuana that may predict its future use (Buckner et al., 2011). Because of such mixed findings, and given the combination of a high prevalence of anxiety disorders with marijuana use among college-age students, research focused on improving counseling services for this specific population is particularly salient at present.

Because there appears to be a significant negative relationship between marijuana use and academic performance (Bates, Accordino, & Hewes, 2010; Buckner, Ecker, & Cohen, 2010; Phillips, Phillips, Lalonde, & Tormohlen, 2015; Suerken et al., 2016), college students’ experiences of disruptive anxiety symptoms and their possible self-medication attempts with marijuana should be of special concern to universities and other higher education institutions. One 25-year longitudinal study found that increasing long-term marijuana consumption was associated with elevated risk either for not pursuing postsecondary education or for early attrition among those who otherwise do attend (Fergusson, Horwood, & Beaudrais, 2003). Furthermore, Fergusson et al. (2003) noted that marijuana use actually predicted worsening academic performance. Other studies have shown a relationship between marijuana use and delayed graduation rates among students (Arria, Caldeira, Bugbee, Vincent, & O’Grady, 2015; Suerken et al.,

2016). Phillips et al. (2015) noted specifically that marijuana cravings were negatively related to study time as well as academic motivation.

Because of the disparity between the lack of any actual efficacy data supporting marijuana use as a treatment for anxiety (McDonald, Schleifer, Richards, & de Wit, 2003) and the apparently strong belief among college students in marijuana's utility as an anxiety management tool (Buckner et al., 2007), it is important to examine the extent to which college students use marijuana as a potential strategy for coping with anxiety. Our first aim was to assess for evidence consistent with a potential relationship between anxiety symptoms and marijuana use among a college student sample. We hypothesized that students who reported experiencing anxiety symptoms within the past 30 days would be significantly more likely to endorse marijuana use within the same time frame than those without anxiety (Hypothesis 1). Our second aim was to assess for evidence consistent with the idea that college students with anxiety may use marijuana in lieu of more formalized treatments for anxiety (e.g., psychotherapy, medication, or a combination thereof). More specifically, we wanted to ascertain if there was a disproportionate amount of marijuana use among anxious individuals who did not seek treatment compared with those who did. Therefore, we hypothesized that among students who acknowledged having anxiety symptoms within the past 30 days, those who had not received any formal anxiety treatment would be significantly more likely to endorse marijuana use within the past 30 days than those who did receive such formal treatment (Hypothesis 2). Our third and final aim was to assess for a potential relationship between marijuana use and academic performance among students who reported symptoms of anxiety but who were not receiving official treatment. We hypothesized that a significant negative correlation would occur between current marijuana use and grade point average (GPA) among students with anxiety who were not receiving formal anxiety treatment (Hypothesis 3).

Method

Participants

Participants were graduate and undergraduate students at a midsized public university in the Rocky Mountain region. Altogether, a total of 3,477 participants completed the survey between 2009 and 2012 and thus were eligible for inclusion in this secondary analysis. Of the sample, 3,301 students (94.9%) were undergraduates, 46 (1.3%) were graduate students or other, and 130 (3.7%) did not respond. (Percentages may not total 100 because of rounding.) The participants' mean age was 20.77 years ($SD = 3.75$). Ages ranged from 18 to 57 years; 3,093 (89.0%) were age 18 to 25, 185 (5.3%) fell under other ages, and 199 (5.7%) did not answer. For gender, 2,153 (61.9%) were women, 1,173 (33.7%) were men, five (0.1%) were transgender, and 146 (4.2%) did not respond. For ethnicity, participants self-identified as White/non-Hispanic ($n = 2,669$, 76.8%), Hispanic or Latina/o ($n = 331$, 9.5%), Black ($n = 168$, 4.8%), multiracial ($n = 138$, 4.0%), Asian/Pacific Islander ($n = 98$, 2.8%), and American Indian/Native Hawaiian/Native Alaskan ($n = 52$, 1.5%); 84 (2.4%) participants identified as other. Some participants (149 total) marked more than one race.

Measure

The American College Health Association National College Health Assessment (ACHA-NCHA) is “a national research survey organized by [ACHA] to assist college health service providers, health educators, counselors, and administrators in collecting data about their students’ habits, behaviors, and perceptions on the most prevalent health topics” (ACHA, 2018, p. 2). Participants take approximately 20 to 30 minutes to complete the 65 multiple-choice items.

The ACHA-NCHA has been compared with other national databases to assess its reliability and validity (ACHA, 2019). The National College Health Risk Behavior Survey, conducted by the Centers for Disease Control and Prevention in 1995, and the National College Women Sexual Victimization Study, conducted by the U.S. Department of Justice in 2000, are examples of these comparison databases. Through these comparisons, the ACHA (2019) determined that “the ACHA-NCHA appears to be both reliable and valid” (Reliability and Validity Analysis section, para. 3). Precise values for reliability and validity have not been made available.

Procedure

The ACHA-NCHA typically is administered in either the fall or the spring semester of each academic year. University officials randomly choose the courses in which to have their students participate, although the actual schools that participate are self-selected (ACHA, 2019). Because of the lack of random selection of schools, caution should be used when generalizing these results to other schools. Informed consent was collected during the respective initial administrations of the ACHA-NCHA survey and therefore was not necessary to be collected for this secondary analysis. Approval was obtained from the university’s institutional review board prior to data analysis.

Data Analysis

Current anxiety was assessed via one ACHA-NCHA survey item that asked if participants had ever experienced “overwhelming anxiety” and, if so, when they had experienced it. Item response options were as follows: (a) *Never*; (b) *Not in the last 12 months*; (c) *Yes, in the last 2 weeks*; (d) *Yes, in the last 30 days*; and (e) *Yes, in the last 12 months*. For the purposes of this study, item responses were dichotomized between endorsement of current anxiety (Options c and d) and nonendorsement (Options a, b, and e). No further operational definition was given to the participants about anxiety. Therefore, this item gives insight into the participants’ personal experiences with anxiety as they understand it; however, such subjectivity does not align itself well with any specific symptom criteria, for example, as listed in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association [APA], 2013).

Current marijuana use was assessed via one survey item that asked participants to indicate the extent to which they had used marijuana within the past 30

days. Item response options were (a) *Never used*; (b) *Have used, not in the last 30 days*; (c) *Yes, in the last 1–2 days*; (d) *Yes, in the last 3–5 days*; (e) *Yes, in the last 6–9 days*; (f) *Yes, in the last 10–19 days*; (g) *Yes, in the last 20–29 days*; and (h) *Yes, used daily*. For this analysis, item responses were dichotomized between those who acknowledged current marijuana use (Options c through h) and those who did not (Options a and b).

Information about current treatment for anxiety was provided via one survey item that asked participants to indicate which, if any, anxiety treatment they had received over the past 12 months. Item response options were as follows: (a) *No*; (b) *Yes, diagnosed, not treated*; (c) *Yes, treated with medication*; (d) *Yes, treated with psychotherapy*; (e) *Yes, treated with psychotherapy and medication*; and (f) *Yes, other treatment*. Responses were dichotomized between those who indicated the receipt of formal treatment (Options c, d, and e) and those who did not (Options a and b). Students who reported receiving other treatment (Option f) were not included in the analyses because of the inherent nonspecific nature of this particular response.

Information regarding GPA was assessed via one survey item that asked participants to indicate their current approximate GPA. Item response options were (a) *A*, (b) *B*, (c) *C*, (d) *D/F*, and (e) *N/A* for not applicable. Students who responded with option (e) were not included in the analyses. GPA was recoded to an ordinal scale (*D/F* = 1 through to *A* = 4).

We cleaned the data through pairwise deletion of missing data or data that were not included in the specific tests after the variables involved in the specific hypothesis being tested were pulled from the data set. Chi-square analyses were used to test Hypotheses 1 and 2, and Kendall's tau-b was used to test Hypothesis 3. All tests were interpreted at the .05 level of significance.

Results

Anxiety and Marijuana Use

For Hypothesis 1, it was hypothesized that students with current anxiety ($n = 979$) would be significantly more likely to endorse current marijuana use than would those without anxiety ($n = 2,355$). Results from the chi-square analysis were not significant, $\chi^2(1) = 0.98$, $p = .323$. The statistical power for this test was .99 when examining for an effect size of at least 0.1. This hypothesis was not supported; among the student sample, those with current anxiety were no more likely to have recently used marijuana than those without anxiety.

Post hoc analyses were performed to explore for unique relationships between the specific item response options. Students who reported having never used marijuana ($n = 1,928$) were significantly more likely to report having never experienced overwhelming anxiety than those who acknowledged ever using marijuana ($n = 1,406$), $\chi^2(1) = 56.89$, $p < .001$, $\phi = .13$. Students who used marijuana daily ($n = 165$) were no more likely to have current anxiety than were all other students ($n = 3,169$), $\chi^2(1) = 0.39$, $p = .534$. The statistical power for this test was .99 when looking for an effect size of at least 0.1.

Marijuana and Treatment for Anxiety

For Hypothesis 2, it was hypothesized that among students with current anxiety ($n = 944$), those not currently receiving formal anxiety treatment ($n = 816$) would be significantly more likely to endorse current marijuana use than those receiving formal treatment ($n = 128$). Results from the chi-square analysis were not significant; this hypothesis was not supported, $\chi^2(1) = 1.28, p = .258$. The statistical power for this test was .87 when examining for an effect size of at least 0.1. Students who were not receiving formal treatment for their anxiety were no more likely to currently use marijuana than those receiving formal treatment.

We conducted post hoc analyses of individual item responses to investigate this question further. Of note was that, among students with current anxiety, those who had used marijuana within the past 1 to 2 days ($n = 63$) were significantly more likely to report receiving formal anxiety treatment than all others (both other marijuana users and nonusers; $n = 881$), $\chi^2(1) = 6.05, p = .014, \phi = .08$. Also in this subsample, those who had used marijuana within the past 1 to 2 days were significantly more likely to be receiving medication management for their anxiety than were other students, $\chi^2(1) = 6.98, p = .008, \phi = .09$.

Marijuana Use and GPA

For Hypothesis 3, among students with current anxiety who were not receiving formal treatment ($n = 816$), it was hypothesized that a significant negative relationship would occur between marijuana use and GPA. To test this hypothesis, we performed a bivariate correlational analysis on these two variables using Kendall's tau-b. This was done with marijuana use coded as a binary variable and GPA coded as a value of 1, 2, 3, or 4. A significant negative correlation was found, $r(780) = -.14, p < .001$. This hypothesis was supported. Among students with current anxiety yet without any such formal treatment, marijuana use was negatively correlated with GPA.

To examine this further, we performed additional post hoc bivariate correlational analyses assessing the same two variables among two other disparate student groups. First, for those students with anxiety who had been receiving formal treatment ($n = 129$), no significant relationship was found between current marijuana use and GPA, $r(123) = -.10, p = .248$. The statistical power for this test was .21 when exploring for an effect size of at least 0.1 and .93 when exploring for an effect size of 0.3. Second, among those students without current anxiety ($n = 2,373$), current marijuana use and GPA were significantly negatively correlated, $r(2,254) = -.14, p < .001$. Among nonanxious students, those who had used marijuana more recently were more likely to report a lower GPA than those without such recent marijuana use.

Discussion

The aims of this study were threefold. Our first aim was to assess for evidence consistent with a potential relationship between anxiety symptoms and marijuana use among a college student sample. Our second aim was to assess

for evidence consistent with the idea that college students with anxiety may use marijuana in lieu of more formalized treatments for anxiety; more specifically, we wanted to see if there was a disproportionate amount of marijuana use in anxious individuals who did not seek treatment compared with those who did. Our final aim was to assess for a potential relationship between marijuana use and academic performance for students who expressed anxiety symptoms but who were not receiving official treatment. Ideally, this is meant to represent students who may be at risk of using marijuana to cope with anxiety; however, it must be noted that the variables used here were proxy variables with an extremely tenuous connection. Marijuana use that occurs under these conditions (symptoms of anxiety but without formal treatment) is not guaranteed to be because of its use as a coping mechanism.

We first hypothesized that students who endorsed current anxiety symptoms would be significantly more likely to report marijuana use in the past 30 days than those without anxiety. In all, 988 students (29.4%) reported experiencing overwhelming anxiety within the past 30 days. These students were no more likely to report marijuana use within that time frame than were those without anxiety. This finding counters results from previous studies, which suggested that frequency of marijuana use—as opposed to marijuana use problems—in undergraduate students was not correlated to social anxiety (Buckner et al., 2007) or to state anxiety (Tournier, Sorbara, Gindre, Swendsen, & Verdoux, 2003). This also seems to run contrary to Buckner et al. (2010), who found that marijuana use was more closely associated with other forms of psychological distress in college students. Although these results might suggest that the endorsement of anxiety does not appear to increase one's likelihood for using marijuana in the past month, it is important to keep in mind the possibility that this may not be the case. If students are effectively self-medicating with marijuana, their frequent marijuana use may mask or prevent overwhelming feelings of anxiety and thus skew the findings.

At the same time, these findings may be inconsistent with previous self-reports from undergraduate students and young adults suggesting that they use marijuana to cope with anxiety (Buckner et al., 2007; Johnson et al., 2010; Moitra et al., 2015; Semcho et al., 2016). However, the data are only evidence that those with anxiety are no more likely to have used marijuana in the last month than are nonanxious persons. There are numerous other possible motivations for using marijuana, often occurring simultaneously (Bonn-Miller, Zvolensky, & Berstein, 2007). It is possible that the range of potential motivations and coping mechanisms that any one person uses may make any direct pattern difficult to parse out. There may be a small number of students who use marijuana solely to cope with anxiety, but if that is the case, then this percentage may be too small to be significant. Moreover, it may be that students who initially began using marijuana to cope with anxiety now continue to use it beyond the point at which their anxiety has dissipated, which makes the results even more difficult to interpret.

There is also the possibility that existing patterns are not visible because of limitations in the study. In the ACHA-NCHA survey, marijuana use responses were dichotomized—use within the past 30 days or not—prior to analysis.

Thus, relevant patterns may have been oversimplified in such a way that crucial information regarding the relationship between marijuana use and anxiety may have been overlooked. As a secondary analysis, the current study was unable to assess for marijuana use problems, which may be uniquely related to anxiety and use of marijuana as a coping mechanism. Additionally, further studies have proposed various other factors that may complicate the pattern between marijuana use and anxiety, including parental attitudes and tension reduction expectancies (Foster, Ecker, Zvolensky, & Buckner, 2015), an individual's temperament in terms of harm avoidance versus novelty seeking (Grunberg, Cordova, Bidwell, & Ito, 2015), distress tolerance (Semcho et al., 2016), and behavioral avoidance (Buckner, Zvolensky, Farris, & Hogan, 2014). Thus, the relationship between marijuana use and anxiety remains quite complex, and these findings certainly add further complexity to our current understanding of this dynamic.

The second hypothesis was that among students with current anxiety, those not currently receiving formal treatment for their anxiety would be significantly more likely to endorse current marijuana use than those with formal treatment. Again, the results here were not significant; the receipt of formal anxiety treatment did not mitigate marijuana use among anxiety-laden students. This lack of statistical significance appears contrary to prior research suggesting that marijuana is used to cope with anxiety (Buckner et al., 2007; Foster et al., 2015; Zvolensky, Schmidt, Bernstein, & Keough, 2006). Other research has found that one's perceived ability to handle stress may moderate the relationship between marijuana use problems and social anxiety (Buckner, Schmidt, Bobadilla, & Taylor, 2006), whereas distress tolerance has been shown to be negatively related to coping motives for marijuana use (Semcho et al., 2016). A tentative explanation for this is that we were unable to find any research examining the efficacy of marijuana use in lieu of formal treatment for anxiety. Although Buckner et al. (2007) suggested that some individuals may be using marijuana as a coping mechanism for anxiety, there is no substantial research indicating that this coping mechanism is as effective as is formal treatment.

Other research that has suggested marijuana may attenuate the risk for depression and anxiety has noted that this relationship was largely subject to individual temperament (Grunberg et al., 2015). Also, individuals may seek out more formal anxiety treatment regardless of whether or not they are using marijuana to cope. This would be consistent with Buckner and Schmidt (2008), who found that socially anxious students did not expect marijuana to directly lower their anxiety. If marijuana is being used as a coping tool for anxious students, its use for this purpose may be more strongly tied to state-based anxiety related to particular stressful events or transitions rather than to more pervasive trait-based anxiety, which might indicate a greater need for counseling-based interventions (Buckner et al., 2011).

The third and final hypothesis was that GPA would negatively correlate with marijuana use among those students with current anxiety but without formal treatment. This hypothesis was supported, which is in line with previous research. In one study of college students, Suerken et al. (2016) reported that nonusers of marijuana had higher GPAs than users, regardless of frequency, with more

frequent users having the lowest GPAs compared with both infrequent users and nonusers. This finding supports the notion that using marijuana does not appear to be an effective way to self-medicate for overwhelming anxiety, at least in terms of achieving potential optimal academic success.

Post Hoc Findings

We also conducted several post hoc analyses for other relationships between some specific item responses (as opposed to the original dichotomized groupings). It appeared that although marijuana use in the past 30 days was found to be unrelated to anxiety, participants who endorsed never having used marijuana were significantly less likely to report overwhelming anxiety in the past 30 days. One possible explanation for this may be that the presence of anxiety may increase one's chances of inevitably trying marijuana. However, such an explanation is not possible to explore with our current data; a longitudinal study could be used to properly examine for such causation. It is also possible that even infrequent marijuana use may increase one's risk for experiencing anxiety. Further research is also recommended here. Additional post hoc findings indicated that those who endorsed daily marijuana use were no more likely to have current anxiety than those who did not endorse daily marijuana use. This provides further support for previous studies that found no relationships between frequency of marijuana use and various types of anxiety (Buckner et al., 2007; Tournier et al., 2003). Post hoc findings also suggested that individuals who used marijuana within the past few days were more likely than those who did not use marijuana within that time frame to be receiving formalized anxiety treatment, including medication. However, the low effect size for this finding limits practical application.

Upon further examination of the relationship between GPA, marijuana use, and anxiety, some interesting findings came to light. Whereas marijuana use was negatively associated with GPA for students without formalized anxiety treatment, no relationship occurred between GPA and current marijuana use for students with such formalized treatment. For nonanxious students, a significant negative correlation was found between current marijuana use and GPA. Arguably, the relationship between marijuana use and academic success appears to be more complex than previously suggested. We refrain from further interpretation of this post hoc finding other than to encourage additional exploration.

Implications for College Counseling

The findings from this study have several implications for clinical work. The significance in the various relationships found between differing aspects and circumstances of anxiety, marijuana use, and academic success provides further support for counselors to routinely assess for marijuana use during screening procedures as well as potentially new ways to incorporate the information. As a more practical application of this, frequent marijuana use may be a nonobvious indicator that a client is experiencing a distressing amount of anxiety. It is important to note that the varying impact of marijuana use means that

counselors should be aware of the significance, if any, of the relationship when incorporating it into practice. Anxiety (or a lack thereof) may give counselors some indication about how a person's marijuana use may be related to her or his academic functioning. This research also provides a place for counselors to begin discussing the impact of marijuana use with their clients as a coping tool or otherwise. However, counselors should keep in mind that marijuana does not appear to replace formalized treatment for anxiety.

College counselors clearly engage in a wide variety of job tasks and roles, including but certainly not limited to individual counseling, group counseling, crisis intervention, and liasionship with numerous campus and other local organizations (e.g., cultural advocacy centers, Greek organizations). Moreover, college counselors are encouraged to continue to normalize college students' experiences of anxiety, particularly given the unique developmental, social, and academic rigors students commonly face. When counselors perform outreach, for example, offering further psychoeducation on this salient and transitional phase of life may help to soothe concerns that initially were not thought of as universal. A continued effort to provide psychoeducation about anxiety can assist with destigmatization and encouragement of counseling services as natural and acceptable for college students; this may also help fight the stigma associated with other mental health concerns. Additionally, it would be helpful for counselors to distinguish state anxiety from trait anxiety, perhaps prompting the benefit of formal treatment for more severe presentations of anxiety.

Counselors who are involved with outreach will want to incorporate these findings when addressing student populations that may not otherwise seek counseling. This is particularly salient given the negative association between marijuana use and GPA for students with anxiety who are not receiving formal treatment, and even more so given that this negative association did not appear for students with anxiety who were receiving formal treatment.

Having a nonjudgmental conversation with clients and outreach participants may contribute to lessening any stigma around discussing marijuana use. Providing concrete information for these students to help dispel myths and rumors regarding marijuana use may also contribute to this goal. Because only 10 states and the District of Columbia currently permit recreational use of marijuana (GOVERNING, 2018), students in most states may be hesitant to share that they are using marijuana even when it is clinically relevant. This suggests that destigmatization efforts are important to ensure that counselors can provide effective and appropriate services for their clients.

Limitations and Future Directions

This study has several limitations. The data obtained for this secondary analysis were collected at a single university in one of the 10 states (along with District of Columbia) that allow for legalized recreational marijuana use, which may limit the study's generalizability to other regions of the United States. Additionally, although the data were collected prior to legal recreational use being enacted in this one particular state, results could echo viewpoints that

are not necessarily reflective of other states with more pejorative views toward marijuana. Therefore, future research should compare marijuana use in college students between states with and without recreational and/or medical marijuana laws. Another limitation is that we were unable to draw conclusions on the cause or the direction of relationships found because of the study's cross-sectional design. Future research should focus on the longitudinal effects of marijuana use, anxiety, and help-seeking behaviors among college students.

The survey used for this study (ACHA-NCHA) also presented some unique limitations. One such limitation is that marijuana use, anxiety, and GPA relied on student self-report, which arguably is subject to inaccuracy, purposeful or otherwise. In addition, both GPA and anxiety were assessed with a single self-report item each. Future research should examine these constructs in more objective and multidimensional ways, such as by using a well-normed formal anxiety diagnostic tool or symptom survey. It should be specifically noted that the present study did not assess for anxiety disorders such as those described in the *DSM-5* (APA, 2013), but rather examined self-reported feelings of overwhelming anxiety. Future studies should attempt to replicate these findings with more robust assessment tools to more reliably examine nuances of the relationships between marijuana use, treatment-seeking behaviors, and specific anxiety-related disorders. More specific and targeted survey items would allow for better insight into the nature of these relationships. For example, we wanted to know if students were using marijuana as a substitute for formal anxiety treatments; however, we were able to use only proxy variables to assess for this, such as rate of marijuana use in the past 30 days among those who had or had not accessed formal anxiety treatment. Thus, observed differences may not be entirely due to the reasons we are hypothesizing.

Although only one of the current study's hypotheses was supported, the post hoc findings may point to some tentative patterns that could be more formally addressed in future studies. For example, future research could further examine the possible relationship between never having experienced overwhelming anxiety and never having used marijuana. Additional patterns found between anxiety, marijuana use, and GPA should also be examined in future studies. One idea would be to evaluate the mediating influences of various anxiety coping methods (e.g., formal treatment or habitual marijuana use) on GPA among anxious students. The gravity of these findings would be enhanced when considering the prevalence of anxiety disorders along with the frequency of marijuana use among college students.

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