Opinion Article

The Marijuana Behavior Change Determinant Model (MBCDM): Measuring Marijuana Use and Comorbidity of Mental Health Disorders

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Abstract

Marijuana is frequently a steppingstone that bridges the gap between cigarette and alcohol use and the use of other more powerful and dangerous substances like cocaine, heroin, and opioids. This stage-like progression of substance abuse, known as the gateway phenomenon, is common among youth and young adults from all socioeconomic and racial backgrounds. Marijuana use has generally increased among young people since 2007, corresponding with both its increased availability through widespread legalization and a perception of the drug's risks. These risks include driving fatalities, diminishing disruptions in brain functioning, mental health abnormalities (i.e., anxiety and depression), and lifestyle detachments that negatively impact daily functioning. We hypothesized that 1) young people who reported parental use of marijuana are more likely to use it and other substances, 2) young people who reported more mental health issues (e.g., anxiety, depression, subclinical psychotic symptoms) were more likely to use marijuana and make irrational or inappropriate decisions leading to unethical or illegal behaviors, 3) our education sessions would improve participants' knowledge of marijuana use and mental health, promoting healthy coping strategies.

Introduction

While there is an increase in marijuana use among young populations, there is a parallel increase in the rate of diagnosed anxiety, depression, and psychosis. Further, youth and young adults fail to seek medical and psychological assistance to address diagnosed and undiagnosed mental health conditions. Reasons for avoiding professional help range from cultural myths and disbeliefs to not interpreting mental health as a psychobiological condition that can be treated medically and psychologically. Burney D, et al. [1], reports that the Marijuana Behavior Change Determinant Model (MBCDM) takes a cognitive-behavior and sociological approach with the use of technology to theoretically explain the use of cannabis as a coping mechanism to release anxiety and depression resulting from environmental stress.

The MBCDM [2,3], identifies several psychological conditions that promote the use and abuse of marijuana including demography and culture, past behavior, expressed personality (moods and emotions), acute and chronic stress, self-induced or genetic disposition for mental health problems, media influence and intervention. The rate and intensity of these etiological conditions can influence the belief systems of the individual and determine the attitudes and self-efficacy of becoming a user or non-user of cannabis. Intentions, skills and abilities, environmental constraints,

and self-efficacy are viewed as the immediate determinants of behavior, while attitudes, motivation to comply, and self-efficacy are viewed as the primary determinants of becoming a user or non-user of marijuana. These three determinants of motivation intention are themselves determined by underlying behavioral, normative, and self-efficacy beliefs. Ultimately these same belief systems and attitudes will determine the individual's belief and motivation to participate in self-monitoring behavior change program.

Communication, behavior and sociological theories also point to the importance of considering diversity in developing effective health communication interventions [4-6]. The current MBCDM was developed using these theoretical perspectives. Figure 1.0 shows that there are a large number of distal variables that may influence these underlying beliefs that can influence behavior change. Mobile Heath format is a unique technique to the targeted population and satisfies the motivation and style of communication of most young populations and will enhance their participation. Ultimately it is believed that the behavioral performance may lead to changes in a person's behavioral, normative, or control beliefs, and these changes may, in turn, lead to changes in attitudes, perceived norms, or self-efficacy. We suggest that the variables connected by bidirectional arrows are related and single direction arrows are influenced by the user and nonuser which are critical to an understanding of health behavior change and must be considered in developing health communication interventions [7].

Cognitive, behavior and sociological theories point to the importance of considering diversity in developing effective health communication interventions [4-6]. The Marijuana Behavior Change Determinant Model (MBCDM) was developed using these theoretical perspectives. Figure 1 identifies several psychological conditions that promote the use and abuse of marijuana including demography and culture, cannabis use, history of anxiety and depression, expressed personality (moods and emotions regulation or dysregulation), acute and chronic stress, self-induced or genetic disposition for mental health problems, media influence and intervention. The rate and intensity of these etiological conditions can influence the belief systems of the individual and determine the attitudes and self-efficacy of becoming a user or non-user of marijuana. Intentions, skills and abilities, environmental constraints, and self-efficacy are viewed as the immediate determinants of behavior, while attitudes, emotional regulation and motivation to comply, and self-efficacy are viewed as the primary determinants of becoming a user or non-user of marijuana. These three determinants of motivation intention are themselves determined by underlying behavioral, normative, and self-efficacy beliefs. Ultimately these same belief systems and attitudes will determine the individual's belief and motivation to participate in self-monitoring behavior change program. The purpose of this study was to evaluate the conditions of marijuana use as a coping mechanism as a applied to the Marijuana Behavior Change Determinant Model (MBCDM) [2].
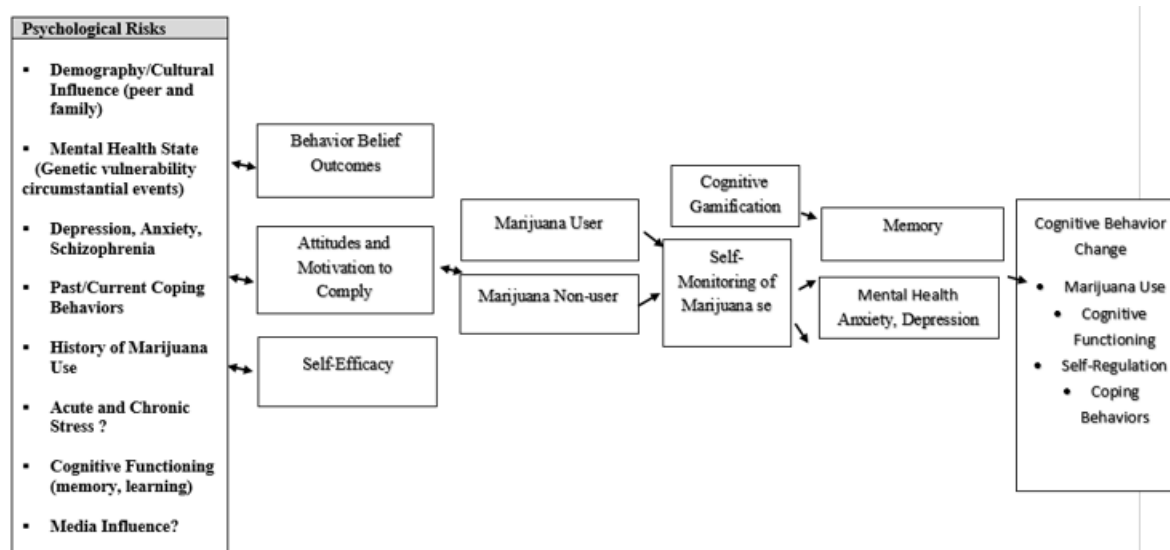

Figure 1: Marijuana Behavior Change Determinant Model (MBCDM).

The Before-After-Control-Impact (BACI) theoretical model will be used to formulate analyses. Based on the AIMs of this study a 2x2x2 research design is used which are smokers vs. non-smokers, phase factor with two levels ("pre"/"post") and the intervention factor with two levels (the "control"/"treatment"). A two-way factorial analysis of variance (ANOVA) will be used to test the interactive effects of memory and mental health on binary response variables technology app and memory assessments

of mental health (anxiety and depression). The nominal logistic regression will examine groups of variables that accurately classify participants according to their membership of the different categories of a nominal variable, such as smokers and non-smokers which will further serve as predictors of behavior change based on the intervention. Because the same population will be used in the treatment phase, two additional analyses may be used the Wilcoxon Rank Sum Test will assist in observing the group that benefitted

well from the intervention at a pre and post continuum. The Cohen's d (also known as the standardized mean difference)—will be used to calculate treatment effect sizes and are particularly useful in prospective clinical trials to assess differences between treatments.

Research Methodology

We conducted a three-stage study: Stage 1) conducted qualitative research to explore student marijuana use pathways and attitudes, culturally appropriate strategies to reduce its use and related crimes and violence, Stage 2) Implemented an epidemiological study of intergenerational marijuana use on a state university located in South-east to examine the relationship between marijuana use and mental health status and illegal behaviors, Stage 3) Developed a culturally sensitive marijuana prevention and intervention program.

Measurable Outcomes

Stage 1). Qualitative themes of marijuana use; Stage 2). Marijuana use, mental health status (depression, anxiety, risk for psychosis), discrimination, and life satisfaction; Stage 3). Marijuana use knowledge improvement from pre to post test.

Data Gathering and Analyses

Stage 1: Qualitative themes of marijuana use: We conducted 12 focus groups (about 10 in each group) with 119 college student participants (Female=83, Male=36) from a Historically Black College and University. For each focus group, a standardized process was followed. There were two researchers, one in charge of guiding the discussion and the other taking detailed notes and making sure that the recording was done properly. Each focus group session lasted approximately 50 minutes. The focus group sessions were recorded and transcribed. The researchers followed Braun and Clarke's (2006) procedures for theoretical thematic analysis to identify themes across focus group discussions.

Stage 2: Implemented an epidemiological study of intergenerational marijuana use to examine the relationship between marijuana use and mental health status and illegal behaviors: We conducted a quantitative study of the variables stated in Stage 2. We collected data from 850 participants (Female=574, Male=151, Missing Gender=125; Age ranges from 18 to 55, with the most participants between ages 21 to 23[58%]). The participants completed in Qualtrics a set of questionnaires and Cronbach Alpha scores were computed measuring mental health Intergenerational Marijuana Assessment Scale (IMAS, α= 82), Satisfaction with Life (α =.85), DSM IV-Self Rated Cross Cutting Symptom Measure (α = 92), Prodromal Questionnaire-Brief (α =77), Beck Anxiety Inventory (α =95),), marijuana use (Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory), discrimination (Everyday Discrimination Scale (α = 99), Suicide Ideation Scale (α = 71). It took participants about 30 minutes to complete these questionnaires. A two-tailed Pearson Product-Moment correlation was conducted to examine the relationships between marijuana use and mental health status, discrimination and life satisfaction.

Stage 3: Developed a culturally sensitive marijuana prevention and intervention program: We created two training modules, one on the impact of marijuana use on mental health and the other one on risk factors of marijuana use. Each module includes a pretest, a case study, comprehensive review of current research findings, especially in relation to African American young adults, and a post-test. The modules were posted in Qualtrics for participants to complete and each module took about 30 minutes. A descriptive analysis was done to compare pre and post-test differences.

Results

Stage 1: Qualitative themes of marijuana use

We conducted 12 focus groups with 119 college student participants. Our major findings are classified around seven themes: onset of marijuana use (between 14 and 16 years of age), reasons/patterns of use (as a coping mechanism, to self-medicate, to improve physical health and sleep habits, and to increase concentration and better thought processes), accessibility (from local person who sells it, also known as the "plug" or "ganja farmer", dispensaries, and family or friends, or people who grow their own marijuana plants at home), forms of marijuana (blunts, vapes or pens, dabs or waxes, inhaling it with the use of a bong, or ingesting it with the use of edibles or CBD oils), impact of marijuana use on school performance (increase absences, decrease anxiety and reduces stress, and affect thinking, concentration, and motivation in mixed manner. When people smoke, they may get "bad grades", "forget homework", "improve personal statements", "more work accomplished", "enhanced school performance", or "better performance"), general beliefs about marijuana use (become normalized as it is "a part of the culture now", and it is beneficial for individuals because "it is a medicine", marijuana use may help develop individuals into free-spirits and non-conformists, and aid in relieving stress), changes in one's physical health after marijuana use (positive: relieves pain, or aids with cancer, glaucoma, Alzheimer's, attention deficit hyperactivity disorder, Parkinson's disease, nausea, cerebral palsy, and asthma; and harmful: causes heart problems, dry mouth, darker lips, yellow eyes, deeper voice, dirty fingernails, nasty cough, or weight loss), and marijuana use prevention methods (legalize marijuana, provide education about marijuana, remove the stigma associate with smoking marijuana, and to build support systems that will discourage marijuana use).

Stage 2: Quantitative analysis

We implemented an epidemiological study of intergenerational marijuana use to examine the relationship between marijuana use and mental health status and illegal behaviors. The Pearson Product-Moment Correlation results indicate there are significant correlations between marijuana use and mental health status, depression (r=.5, p=000), suicide (r=.24, p=.000), anxiety (r=.15, p=.000), overall well-being (r=.5, p=.000), and life satisfaction (r=.28, p=.000). Participants reported experience with psychosis symptoms (43%), depression (32%), anxiety (31%), physical pains and discomfort (28%), decreased life satisfaction (25%), and feelings of failure (30%), suicide ideation (20%), racial discrimination (35%). Consistent with focus group data, an ANOVA shows a significant relationship between parental use and participant use. Participants reported use being influenced by parents (20%) and siblings and peers (74%).

Stage 3: Descriptive analysis of marijuana prevention and intervention program

We examined the effectiveness of a culturally sensitive marijuana prevention and intervention program. A descriptive analysis of pre and post-tests of the educational training modules indicates that participants have benefitted from the training with higher post-test scores when compared to pre-test.

Discussion

Our project shows that marijuana use has a significant negative impact on African American young adults' mental health, depression and anxiety in particular. Participants hold mixed views on its impact, especially with regard to school performance and physical health. A majority of the participants want marijuana to be legalized and they request community education about its effects and stigma associated with it. Colleges are at the forefront of helping individuals understand the possible impact of marijuana use on health, wellness, and college success. Institutions are also uniquely positioned to incorporate marijuana education into existing health promotion models. Through prevention, education, and support services we can better equip our college students to understand the realities of Cannabis/marijuana use and empower them to make the best health choices for themselves. However, marijuana education needs to be wraparound and innovative in order to maximize the effect. Future research should aim to explore culturally sensitive and developmentally appropriate strategies, such as mobile health applications, in order to engage young adults in marijuana educational training.

Acknowledgement

Conflict of interest

None of the authors have a conflict of interest.

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