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Recommended Citation

Park, Ji-Yeun; Galbadage, Thushara; Lee, Hyuna; Wang, David C.; and Peterson, Brent M., "Mental Health, Substance Use, and the Importance of Religion during the COVID-19 Pandemic" (2022). *Faculty Articles & Research*. 767.

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**Mental Health, Substance Use, and the Importance of Religion during the COVID-19
Pandemic**

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Keywords: long COVID, substance use, grief, faith, psychological distress, mental illness

Abstract

COVID-19 impacted multiple facets of life, with implications on physical, mental, and societal health. Specifically, long COVID and related losses have exacerbated complex and prolonged grief responses and mental disorders including depression and anxiety. These mental health concerns are in turn associated with increased detrimental coping strategies including substance use disorders (SUD). The social and interpersonal implications of SUD are varied. Secondary data analyses from the National Survey on Drug Use and Health (NSDUH) collected during the COVID-19 pandemic revealed an increase in substance use behaviors and mental health problems. Self-reported religious activities had a positive meditating effect on reducing substance use behaviors. Accordingly, we explored the importance of one's religion and faith in coping with stress, grief, and mental health challenges during the COVID-19 pandemic, highlighting the impact of religion and faith in bringing hope and purpose during periods of loss, grief, mental health challenges, and SUD.

Introduction

Nearly three years post-onset of the COVID-19 pandemic, humanity has continued to struggle to return to a sense of normality from the devastating impacts of the SARS-CoV-2 virus. At a time when many nations are rescinding large-scale public health orders and restrictions, some even declaring an end to the COVID-19 pandemic altogether, the long-term implications of the pandemic have been largely overlooked. Regardless of the rationale, whether that be overall fatigue, a reticence to address controversial issues, or issues not yet identified, it does appear that a wave of potential public health crises currently exists and may persist well into the foreseeable future.

COVID-19 could be categorized into two distinct disease phases: acute COVID and long COVID, which may occur from 4 - 12 weeks following initial infection (Nalbandian et al., 2021). Long COVID may persist beyond three months from the initial infection and may continue for at least two months following the cessation of symptoms which cannot be explained by alternative diagnoses (CDC, 2022b). In many cases, long-term symptoms can persist for many months. Recently, the Centers for Disease Control and Prevention (CDC) showed that 1-in-5 people aged 18-to-64 and 1-in-4 people older than age 65 are likely sufferings from long COVID (Bull-Otterson et al., 2022). It is likely that are many more undocumented cases of long COVID.

Psychological, mental health & societal impact of long COVID

Long COVID symptoms may include fatigue, shortness of breath, heart palpitations, sleep dysfunction, muscle or joint pain, dizziness, altered menstrual cycles, as well as psychological symptoms such as cognitive dysfunction, anxiety, depression, difficulty thinking or concentrating, attention disorder, and post-exertional malaise (CDC, 2022b; Lopez-Leon et al., 2021). While these symptoms may present in a very non-specific manner, they can nonetheless take a toll on

patients' health and can lead to adverse mental health and behavioral outcomes, and have a noticeable impact on activities of daily living.

Pandemic-related mental health and substance use disorders (SUD) have risen in incidence and prevalence, exacerbating an already elevated mental health crisis in the United States (U.S.) and beyond. Individuals who have experienced compound stressors such as acute and chronic illness (e.g., long COVID), the loss of loved ones, and financial strain may experience compounded fear, anxiety, anger, and depression as responses to coping with these pandemic-related stressors (Levine, 2022). Systems-based frameworks which have received empirical support have highlighted the interrelatedness of physical health, financial health, mental health, and spiritual well-being (She, Wang, Canada, & Poston, 2022; K. Smith et al., 2022). In the Household Pulse Survey, 42.6% of U.S. adults reported feelings of anxiety and depression in 2020 and these rates have remained high throughout 2021 and 2022 (CDC, 2022c). In contrast, only about 9.5-to-11.7% of U.S. adults reported debilitating feelings of anxiety and depression in 2019 (CDC, 2019). This represents an approximately four-fold increase in identified anxiety and depression disorders as a direct result of the COVID-19 pandemic, which could very well persist long into the foreseeable future. Consequently, lingering mental health struggles and pandemic-related stresses have attributed to an increase in drug-related overdose deaths resulting in 107,000 deaths in 2021-2022 in the U.S. alone. In contrast, before the pandemic, drug overdose deaths in 2019 in the U.S. were around 68,000 (Ahmad, Cisewski, Rossen, & Sutton, 2022).

In contrast, human interaction and experiential learning may lead to positive stress-related coping mechanisms, the development of life lessons, and quality of life improvements. The pandemic has, essentially, been a generational mental health crash course by forcing people to learn to cope with multiple stresses occurring simultaneously without many of the social and

emotional resources typically available to them. Positive coping skills can help individuals, their loved ones, and their community increase resilience. Furthermore, when adaptive coping tools are unavailable, vulnerability to maladaptive coping approaches including increased consumption of alcohol, illegal or recreational drug use like marijuana, heroin, cocaine, methamphetamines, and misuse of prescription drugs like opioids increases (CDC, 2022a).

COVID-19 pandemic and grief response

Much like other viral outbreaks and natural disasters, COVID-19 will likely be associated with prolonged grief responses or disorders in affected communities (Eisma, Boelen, & Lenferink, 2020). These responses are either primary or secondary and can be attributed to grief for the loss of former self-identity and lifestyle, bereavement, or grief for the changed world post-pandemic (Verdery, Smith-Greenaway, Margolis, & Daw, 2020). With greater than one million lives lost during the pandemic, many of these deaths occurring in isolation, this had a significant impact on the dying and grieving process for both the patient and their loved ones (Galbadage, Peterson, Wang, Wang, & Gunasekera, 2020). Rites of passage and rituals such as these are examples of deep, meaningful, and emotionally charged human experiences. The disruption or loss of integral experiences associated with the death and burial of loved ones has forced people to cope with stress and unresolved tensions (Corpuz, 2021). Consequently, longer-term bereavement among loved ones who lost their relatives may have negatively impacted an individual's ability to fully experience and navigate the various stages of grieving: denial, anger, bargaining, depression, and acceptance (Gonçalves Júnior, Moreira, & Rolim Neto, 2020).

Substance use & mental health disorders

As a mental health disorder, SUD affects an individual's behavior resulting in an inability to control the use of legal or illegal drugs (Hasin et al., 2013). Patients diagnosed with SUD are

likely to also be diagnosed with additional mental health disorders, with co-morbid SUD and mental health disorders more common than SUD alone (Ross & Peselow, 2012). For example, studies have indicated that high rates of SUD have been observed concomitantly with anxiety disorders or depressive states (Conway, Compton, Stinson, & Grant, 2006; Wolitzky-Taylor, Operskalski, Ries, Craske, & Roy-Byrne, 2011). During the COVID-19 pandemic, an increase in comorbid SUD and mental health disorders were observed (Johnson, 2021). While substance abuse is a coping mechanism often used in response to stress and grief, it is maladaptive because it ultimately complicates and hinders adaptive grief and stress responses. This dynamic has been at play throughout the COVID-19 pandemic (Caparrós & Masferrer, 2020).

While it is believed that long COVID can lead to an exacerbation of mental health disorders and an associated increase in substance use, there is a knowledge gap in mediating factors that can help mitigate such emerging public health crises. Therefore, the rationale for this comparative data assessment was to investigate potential associations between pandemic-associated mental health diseases, the use of substances as a coping mechanism, and the protective role of religious activities, which for many represents a crucial source of social support and adaptive coping and meaning-making. Specifically, our group investigated the degree to which attending religious services functioned as a protective factor for substance use among individuals with and without serious psychological distress (SPD) during the height of the COVID-19 pandemic.

Methods

Secondary data source

In this study, we analyzed data obtained from the 2020 National Survey on Drug Use and Health (NSDUH). Data are composed of comprehensive face-to-face household interviews of non-institutionalized individuals aged 12 or older. Excluded interviewees included individuals

incarcerated in prison, members of the active-duty military, residents of long-term medical care, and people without housing and not living in shelters. NSDUH is a primary source of information on the use of tobacco, alcohol, illegal drug use, and mental illness in the U.S.

Starting in 2020, NSDUH began to use both in-person interviews and web-based interviews. NSDUH data were only collected in Quarters 1 (January to March) and 4 (October to December) of 2020. Most Quarter 1 data were collected via in-person interviews, whereas online data were dominant in Quarter 4 with limited in-person data collection (SAMHSA, 2021). In 2020, NSDUH collected data from 36,284 respondents aged 12 or older. NSDUH is publicly available, de-identified data, and hence did not require IRB approval.

Study variables

Current marijuana use (CMU)

The main dependent variable utilized in this investigation was CMU, highlighted by NSDUH data. Respondents who indicated marijuana use in the past 30 days were considered current users. Since marijuana is the most commonly used illegal drug, it was used as a representation of overall substance use following the Substance Abuse and Mental Health Services Administration (SAMHSA) guidelines.

Past-month serious psychological distress

The NSDUH incorporates the Kessler-6 (K6) screening instrument (questionnaire) to assess serious psychological distress (SPD) among respondents aged 18 or older only via a 5-point Likert scale. Scores greater than 13 were categorized as having past-month SPD, whereas scores less than 13 were categorized as not having past-month SPD.

Frequency of religious service attendance

The NSDUH also surveyed religious service attendance which was measured by asking “During the past 12 months, how many times did you attend religious services? Please do not include special occasions such as weddings, funerals, or other special events in your answer.” Possible response options were 0 times, 1 to 2 times, 3 to 5 times, 6 to 24 times, 25 to 52 times, and more than 52 times. Responses were categorized into three levels: (1) 0 times, (2) 1 to 24 times, and (3) more than 25 times.

The influence of religious beliefs on one’s decision

Survey respondents were asked to indicate their level of agreement with the following question “My religious beliefs influence my decisions.” Possible response options were strongly disagreed, disagree, agree, and strongly agree. Responses were categorized into two levels: (1) strongly disagree/disagree and (2) agree/strongly agree.

Sociodemographic characteristics

Selected sociodemographic characteristics were included in the analysis as covariates, including sex (male and female), age (18 - 25, 26 - 34, 35 - 49, and 50 +), education (less than high school, high school graduate, some college, and college graduate), and employment status in the past week (full-time, part-time, unemployed/on layoff or looking for work, and others). Race/ethnicity was recorded into 4 levels (non-Hispanic NH-White, NH-Black, Hispanic, and other). Due to the small sample size, we combined NH-Asian, NH-Native American/Alaska Natives, NH-Native Hawaiian/Other Pacific Islanders, and people with multiple races into one group.

Statistical Analysis

Descriptive statistics were conducted to examine sample characteristics. We then estimated the prevalence of CMU by SPD status and then the prevalence of CMU by religious factors. Next,

we performed the multivariate logistic regression, adjusting for all other covariates including sex, age, race/ethnicity, education, and employment status. The multivariate logistic regression was conducted separately for those with SPD and those without SPD to examine the role of religion in marijuana use during the COVID-19 pandemic. The NSDUH sampling weights were adjusted for all analyses, to account for the complexities of the survey. All analyses were conducted using STATA Version 17 (Stata, College Station, TX).

Results

Sample characteristics

Table 1 provides the overall characteristics of the adult sample from the 2020 NSDUH ($N = 27,170$). The majority of the study sample was composed of adults aged 50 years of age or older (46.1%), and NH-White (62.7%), and maintained a full-time employment status (43.1%). In 2020, according to the NSDUH survey results, approximately 7.0% of U.S. adults had SPD based on the Kessler-6 score in the past month. Approximately, 49.1% of the survey respondents reported that they did not attend any religious services or participate in any religious activities. Respondents (29.5%) also indicated that they were infrequent attendants to religious services (1 - 24 times per year) and 21.4% reported they were frequent attendants (25 times per year or more). Yet, in this sample, 67.0% of respondents reported that their religious belief influenced their behavioral decisions.

The presence of SPD & association with CMU

The prevalence of CMU (within the past 30 days) among U.S. adults was 12.1% in 2020. CMU had a higher prevalence among people with SPD (27.2%) compared to those without (10.9%) (Figure 1 a). Similar patterns were observed in the lifetime and past-year prevalence of marijuana use. In 2020, 18.2% of U.S. adults indicated marijuana use in the past year. By SPD

status, those with SPD (39.8%) were more likely to report past-year marijuana use than those without (16.5%) (Figure 1 b). In 2020, among U.S. adults, the lifetime prevalence of marijuana use was 48.4%. Among those with SPD, 68.8% (95% CI = 64.7 - 72.6) reported having ever used marijuana, which was significantly higher than in those without SPD (46.8%, 95% CI = 45.6 - 48.0) (Figure 1 c). Multivariate logistic regression analysis also showed that SPD was a significant factor associated with CMU. Those with SPD had nearly 2 times greater likelihood of being current users than those without SPD (AOR = 2.02, 95% CI = 1.83 - 2.23) (Table 3).

Religious service attendance & CMU

The prevalence of CMU decreased with the number of religious service attendance (Table 2). Among people with SPD, the prevalence of CMU was 29.3%, 24.0%, and 22.3% for non-attendants, infrequent attendants, and frequent attendants, respectively. Among people without SPD, the prevalence of CMU was 15.2%, 9.4%, and 2.9% for non-attendants, infrequent attendants, and frequent attendants, respectively. The prevalence of CMU also varied depending on individuals' religious beliefs. Among people with SPD, those who reported that religious beliefs would not influence their decisions were more likely to report CMU (30.9%) than those who reported that religious beliefs would influence their decisions (24.0%). Similarly, among people without SPD, CMU was more common among those who reported that religious beliefs would influence their decisions (17.0%) than those who reported that religious beliefs would not influence their decisions (7.7%). Overall, results indicated that individuals involved in some form of communal religious activity were less likely to use marijuana.

Multivariate logistic regression analysis also showed that religious service attendance played a significant role in marijuana use for both those with SPD and those without SPD, although the magnitude of the association varied (Table 3). There was a strong association observed among

people with SPD. Among people with SPD, frequent religious service attendance was associated with lower odds of CMU (AOR = 0.58, 95% CI = 0.40 - 0.84) (Table 3). Infrequent religious service attendance was not associated with CMU. Among people without SPD, both infrequent (AOR = 0.79, 95% CI = 0.71 - 0.87) and frequent (AOR = 0.27, 95% CI = 0.23 - 0.32) religious service attendance was associated with lower odds of CMU. Religious belief was another important factor associated with CMU. Considering religion as an important factor in their decision was associated with decreased odds of CMU for both people with SPD (AOR = 0.66, 95% CI = 0.55 - 0.80) and people without SPD (AOR = 0.61, 95% CI = 0.56 - 0.67).

Age & CMU

Additionally, age was negatively associated with marijuana use for both people with SPD and people without SPD (Table 3). Among those with SPD, those aged 26 - 34 (AOR = 0.77, 95% CI = 0.62 - 0.97), those aged 35 - 49 (AOR = 0.68, 95% CI = 0.53 - 0.87), and those aged 50 + (AOR = 0.30, 95% CI = 0.19 - 0.47) had a lower likelihood of CMU than those aged 18 - 25. Similarly, among those without SPD, those aged 26 - 34 (AOR = 0.79, 95% CI = 0.71 - 0.88), those aged 35 - 49 (AOR = 0.58, 95% CI = 0.52 - 0.65), and those aged 50 + (AOR = 0.32, 95% CI = 0.29 - 0.37) had lower likelihood of CMU than those aged 18 - 25.

Additional factors & CMU

Sex, race/ethnicity, education, and employment status were associated with CMU only among people without SPD (Table 3). Women were less likely to report CMU than men (AOR = 0.74, 95% CI = 0.69 - 0.81). Compared to NH-White, NH-Blacks were more likely to report CMU (AOR = 1.23, 95% CI = 1.07 - 1.41) but Hispanics (AOR = 0.73, 95% CI = 0.64 - 0.83) and other racial/ethnic groups (AOR = 0.72, 95% CI = 0.62 - 0.83) were less likely to report CMU. Individuals who completed some college had increased odds of CMU (AOR = 1.29, 95% CI =

1.10 - 1.51) than individuals with less than a high school diploma. Unemployed individuals also had increased odds of CMU (AOR = 1.56, 95% CI = 1.31 - 1.85) than full-time employees.

Conclusion

Religion service attendance is associated with a lower rate of both substance use behaviors and SPD. Religious communities and faith-based activities are likely to play a mediating role in reducing substance use behaviors in people with SPD during the COVID-19 pandemic.

Discussion

COVID-19 impacted our world in many ways. The extensive nature to which COVID-related mental health and accompanying substance use problems are manifesting in the U.S. is just starting to emerge. Understandably, substance use and psychological distress increased during the pandemic. Herein, our findings empirically confirmed this association between substance use and psychological distress during the COVID-19 pandemic. Thus, public health practitioners need to recognize the exigent, yet potentially ominous nature by which these issues could have future implications and develop strategies toward a greater understanding of the influence of long-COVID on aspects of mental health and substance abuse.

Current understanding of long COVID

To date, no unified consensus exists to precisely describe etiological and mechanistic functional determinants that may lead to the development of long COVID. However, researchers and clinicians working directly with COVID-19 patients over the past three years have posited three hypotheses (Couzin-Frankel, 2022): (1) micro blood clots leading to micro-infarctions and vascular damage, (2) persistent replicating viral particles causing localized inflammation (3) dysfunctional or hyperactive immunological responses causing localized tissue damage.

Several investigative studies have revealed immune activation and inflammation in the CSF and brains of COVID-19 patients (Yang et al., 2021). Immune cells become activated to fight infection by releasing various proteins including cytokines. However, prolonged cytokine release can lead to neuroinflammation that can destabilize the blood-brain barrier, interfere with neurological function, and ultimately lead to neuronal damage (Boziki et al., 2020). Furthermore, neuroimaging studies of patients post-acute COVID-19 showed changes in brain structure, including microstructural and functional changes within the hippocampus, a brain region critical for memory formation, anxiety, mood, and stress responses (Douaud et al., 2022; Qin et al., 2021). Therefore, persistent neuroinflammation as a result of acute COVID-19 infection in many cases can have off-target effects and serve as primary drivers of neurologic symptoms frequently observed in long COVID, which may in part explain the increase in mental health issues during the pandemic (Ellul et al., 2020).

Study limitations

We used cross-sectional NSDUH data in the general population of U.S. adults aged 18 and older. Therefore, our study findings can't be generalized across other countries. Additional studies conducted in different countries and with longitudinal data are needed to provide more robust evidence of the relationship between SPD and substance use, and the role of faith in this relationship. Furthermore, due to the cross-sectional nature of the data, we could not establish causality between SPD and substance use. Some caution is needed when interpreting our study findings as they indicate only associations. Finally, the NSDUH did not provide information about the religious affiliations of study participants. Hence, we could not specify the relationship between faith, SPD, and substance use by type of religion. Moreover, we are unable to identify the specific mechanisms of change active in religious activity, whether it relates to general social

support, meaning-making, or even religious stigma to substance use, for example. Further study is warranted to determine the specific and multi-faceted role that religion might play in the relationship between mental illness and substance use.

Association between SPD & SUD

Consistent with previous research, our group found a higher prevalence of CMU in people with SPD (Weinberger et al., 2019). Adults with SPD were more likely to report prior month, previous year, and lifetime marijuana use than adults without SPD. Previous studies provided a plausible mechanism linking psychological distress and marijuana use as a coping strategy (Aselton, 2012). Another recent study found an association between psychological distress and coping-oriented marijuana use among pregnant women during the COVID-19 outbreak (C. L. Smith et al., 2022). Given the substantial impact of COVID-19 on mental health, our findings are noteworthy. Since the pandemic and its long-term effects are still ongoing, it is important to ensure that mental health screening, referral, and treatment services are made available, and delivered effectively. Especially since mental health interventions aiming to promote positive coping mechanisms and stress management strategies may play a vital role in preventing and reducing marijuana use.

Psychological stressors such as anxiety, loneliness, and changes in lifestyle during the pandemic were associated with sustained marijuana use (Rhew, Cadigan, & Lee, 2021). This is a major risk factor for developing or worsening mental illnesses including depression and anxiety, leading to SUD (Arnsten, 2015; McEwen, 2012). The anxiolytic effects of marijuana are mediated through the increased cannabinoid receptor activation by the two primary active ingredients of marijuana. They are Δ^9 -tetrahydrocannabinol (THC), the psychoactive compound of marijuana,

and cannabidiol. THC may reduce distress and anxiety at a low dose, but can also increase negative mood and exacerbate anxiety at higher doses (Childs, Lutz, & de Wit, 2017).

Religion, faith, mental health, & substance use behavior

Religious affiliation and one's dedication to faith are closely tied to a person's source of hope, sense of purpose in life, coping skills, and social support network (Ano & Vasconcelles, 2005; Berthold & Ruch, 2014). Within the context of mass trauma due to natural disasters, religious participation was found to contribute to positive mental health outcomes through the mechanisms of social support and positive religious coping (Wood et al., 2021). Practicing faith increases life satisfaction compared to those who have no religious affiliation or do not practice, and can protect against negative emotions that can lead to depression and anxiety (Berthold & Ruch, 2014). Coping through stressful life events, such as the pandemic, by religious means can allow one to experience positive psychological outcomes evident through lowered depression and anxiety; while non-religious coping mechanisms can at times lead to greater distress (Ano & Vasconcelles, 2005). These outcomes have bolstered religious service attendance as a means of coping with pandemic stress, and at the same time have disincentivized sustained marijuana use as a possible coping activity.

Our study findings showed that religion plays a salient role in the relationship between mental illness and substance use. Religious beliefs, practices, and spirituality have been observed to promote mental health through positive religious coping, positive beliefs, and community support as a means to cope with stress and illness (Weber & Pargament, 2014). For example, the adaptive coping benefits of religious practices such as prayer may potentially be attributed to religion's capacity to help individuals approach instead of avoiding the reality of themselves and their circumstances (Lowe, Wang, & Chin, 2022). Virtues such as humility and gratitude have also been identified as mediators of the association between religious commitment and eudemonic

well-being longitudinally (Jankowski, Sandage, Wang, & Crabtree, 2022). Religious beliefs also provide a sense of purpose for those that believe in a God and help provide an understanding of role and purpose (Koenig, 2009). The understanding of great good and the assurance faith and religion provide for people influences the choices they make including avoidance of substance use behaviors. Another study looking at the NESARC-III survey data showed that among various religiosity factors, attending religious services was a strong substance use protective factor (Livne et al., 2021). Using the most recent data our study results align with this study's findings and further support the importance of religion and faith as deterrence of substance use even in the context of the COVID-19 pandemic.

Competing interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as potential competing interests.

Tables

Table 1. Sample Characteristics from NSDUH 2020 (N = 27,170)

Variable	N	% [95% CI]
Sex:		
Male	12185	48.3 [47.2-49.4]
Female	14985	51.7 [50.6-52.8]
Age:		
18-25	7946	13.3 [12.7-13.9]
26-34	5711	16.1 [15.4-16.8]
35-49	7418	24.6 [23.7-25.5]
50+	6095	46.1 [44.7-47.4]
Race/ethnicity:		
NH-White	18144	62.7 [61.1-64.2]
NH-Black	2437	12.1 [11.1-13.2]
Hispanic	3728	16.7 [15.5-18.0]
Others	2861	8.51 [7.94-9.12]
Education:		
Less than high school	2244	11.3 [10.5-12.3]
High school graduate	5683	27.7 [26.5-29.0]
Some college	8371	30.5 [29.5-31.5]
College graduate	10872	30.5 [29.2-31.7]
Employment status in the past week:		
Worked at a full-time job	12569	43.1 [42.1-44.2]
Worked at a part-time job	3333	10.5 [9.9-11.0]
Unemployed/on layoff, looking for work	1140	3.9 [3.4-4.3]
Others	8835	42.6 [41.3-43.8]
Past-month SPD		
No	24443	92.8 [92.3-93.3]
Yes	2727	7.2 [6.7-7.7]
Frequency of religious service attendance in the past year		
0 time	13604	49.1 [47.9-50.3]
1-24 times	7689	29.5 [28.5-30.4]
More than 25 times	5023	21.4 [20.3-22.6]
My religious beliefs influence my decisions		
Disagree	10191	33.0 [31.8-34.2]
Agree	15884	67.0 [65.8-68.2]

Table 2. Prevalence of CMU by Religious Factors

Variable	People with SPD^a (N=2,699)		People without SPD^a (N=23,376)	
	N	% [95% CI]	N	% [95% CI]
Frequency of religious service attendance in the past year				
0 time	1693	29.3 [25.8-33.1]	11911	15.2 [14.1-16.4]
1-24 times	773	24.0 [19.9-28.5]	6916	9.4 [8.3-10.6]
More than 25 times	249	22.3 [11.4-39.1]	4774	2.9 [2.2-3.8]
My religious beliefs influence my decisions				
Disagree	1407	30.9 [27.4-34.6]	8784	17.0 [15.7-18.4]
Agree	1292	24.0 [20.4-28.0]	14592	7.7 [6.8-8.7]

^a SPD: serious psychological distress

Table 3. Results from Multivariate Logistic Regression Predicting CMU Among U.S. Adults

Variable	Overall (N=25,382) AOR [95% CI]	People with SPD^a (N=2,617) AOR [95% CI]	People without SPD^a (N=22,765) AOR [95% CI]
SPD^a status (ref.= Without SPD^a)			
With SPD ^a	2.02 [1.83-2.23]**	-	-
Sex (ref.=male)			
Female	0.78 [0.72-0.84]**	1.02 [0.84-1.22]	0.74 [0.69-0.81]**
Age (ref.=18-25)			
26-34	0.79 [0.72-0.87]**	0.77 [0.62-0.97]*	0.79 [0.71-0.88]**
35-49	0.59 [0.54-0.65]**	0.68 [0.53-0.87]*	0.58 [0.52-0.65]**
50+	0.32 [0.28-0.36]**	0.30 [0.19-0.47]*	0.32 [0.29-0.37]**
Race/ethnicity (ref.=NH-White)			
NH-Black	1.24 [1.09-1.41]**	1.28 [0.90-1.82]	1.23 [1.07-1.41]**
Hispanic	0.74 [0.66-0.84]**	0.84 [0.64-1.10]	0.73 [0.64-0.83]**
Others	0.75 [0.66-0.85]**	0.92 [0.70-1.20]	0.72 [0.62-0.83]**
Education (ref.=Less than high school)			
High school graduate	1.20 [1.03-1.40]*	1.32 [0.95-1.83]	1.16 [0.98-1.38]
Some college	1.26 [1.09-1.46]*	1.14 [0.83-1.57]	1.29 [1.10-1.51]*
College graduate	0.95 [0.82-1.11]	0.93 [0.66-1.31]	0.95 [0.81-1.13]
Employment status in the past week (ref.=full time)			
Part-time job	1.04 [0.93-1.17]	0.95 [0.73-1.23]	1.07 [0.94-1.21]
Unemployed/on layoff, looking for work	1.49 [1.28-1.74]**	1.37 [0.99-1.89]	1.56 [1.31-1.85]**
Others	1.04 [0.95-1.13]	1.10 [0.89-1.35]	1.02 [0.93-1.13]
Frequency of religious service attendance in the last year (ref.=0 time)			
1-24 times	0.82 [0.75-0.89]**	1.00 [0.82-1.23]	0.79 [0.71-0.87]**
More than 25 times	0.30 [0.26-0.35]**	0.58 [0.40-0.84]**	0.27 [0.23-0.32]**
My religious beliefs influence my decisions (ref.=disagree)			
Agree	0.62 [0.57-0.68]**	0.66 [0.55-0.80]**	0.61 [0.56-0.67]**

^a SPD: serious psychological distress

Note. AOR=Adjusted Odds Ratio; CI=Confidence Interval.

** < .01, * < .05

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Figures

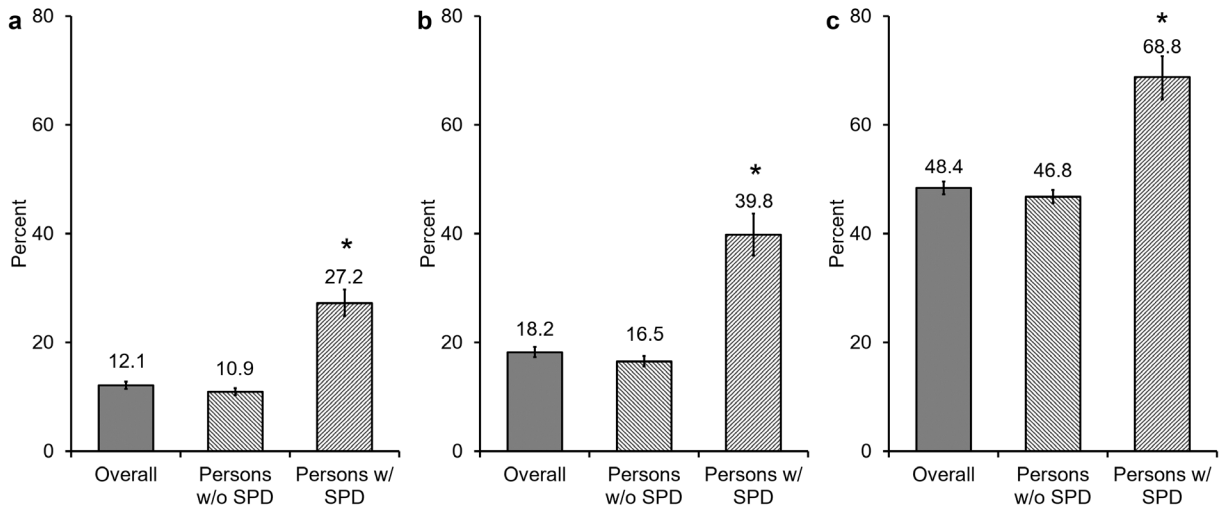


Figure 1. Prevalence of marijuana use comparing persons without (w/o) serious psychological distress (SPD) and person with (w/) SPD. Secondary data was obtained from the 2020 National Survey on Drug Use and Health (NSDUH) conducted by the Center for Behavioral Health Statistics and Quality within the Substance Abuse and Mental Health Services. NSDUH used the Kessler-6 (K6) screening instrument to assess serious psychological distress (SPD) among respondents aged 18 or older. (a) past-month marijuana use, (b) past-year marijuana use, and (c) ever use of marijuana. Past-month marijuana use indicates CMU status during the COVID-19 pandemic. Error bars represent the upper and lower limits of the 95% confidence intervals (C.I.s) * Statistically significant differences between persons with SPD and persons without SPD: if the confidence intervals are not overlapping, the difference between the value is significantly different.