

CLINICAL REVIEW

Religiousness as a Protective Factor against Psychological Distress in Adult Marijuana Users in the United States

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ABSTRACT

OBJECTIVE

Understanding the interplay between marijuana use, mental health, and protective factors is crucial in the ever-changing context of legalized marijuana use in the United States. This study bridges an existing research gap by delving into the potential of religiousness as a protective element against psychological distress among adult marijuana users. Amid predominantly risk-focused literature, this research explores a protective influence, offering a fresh perspective. Additionally, we establish a potential connection between the secularization/medicalization theory and the ascetic hypothesis by examining whether religiousness is significantly associated with medical or recreational marijuana use.

METHODS

Using the 2021 National Survey on Drug Use and Health (NSDUH) cross-sectional data, we analyze responses of 7,854 current adult marijuana users (aged 18 and above) through descriptive and regression analyses.

RESULTS

The results support our hypotheses, revealing that higher levels of religiousness are associated with decreased psychological distress among marijuana users. Moreover, the analysis underscores that religiousness significantly aligns with the medical usage of marijuana rather than recreational consumption. Interestingly, our study further reveals that frequent adult marijuana usage does not independently predict heightened psychological distress after accounting for the use of illicit drugs other than marijuana.

CONCLUSION

Overall, the study contributes to the nuanced understanding of the relationship between religiousness, marijuana use, and mental health outcomes. Findings have implications both in terms of theoretical insights and potential policy considerations in the realm of substance use and mental health.

KEYWORDS

Marijuana; Mental health; Psychological Distress; Religiousness; Protective influence; Secularization; Drug Use

INTRODUCTION

Mental health constantly emerges as a significant risk factor for drug use in the United States. Notably, the frequent use of marijuana has been consistently linked to various psychological distress challenges, including depression, anxiety, and suicidal thoughts [1-4]. Despite concerns, national surveys show increasing cannabis consumption and widespread support for legalization among Americans. Research indicates marijuana ranks third most used after tobacco and alcohol [5,6]. Studies have suggested that mental health conditions affect a substantial portion of the US population, with approximately one in five adults living with a mental illness as of 2021 [7].

Alarmingly, over half of these individuals, totalling more than 28 million, do not receive the necessary treatment [8]. Researchers have also estimated the negative impact of depressive symptoms on productivity to exceed \$12 billion annually [9].

In response to the increasing prevalence of psychological distress and its connection to the growing use of marijuana in the US, extensive research efforts have primarily focused on identifying risk factors related to marijuana use and mental health issues among both adults and adolescents. However, there has been a notable gap in exploring protective factors that can effectively reduce the occurrence of psychological distress symptoms among current marijuana users. To address this gap, our study aims to investigate the intersectionality of religiousness, mental health symptoms, and marijuana usage among adults in the US. Specifically, we examine whether religiousness can act as a safeguard, lowering the occurrence of psychological distress symptoms among adult marijuana users.

The association between religion and mental health is multifaceted and has yielded varying findings in the literature. Researchers generally agree that religiousness - particularly religious involvement and beliefs - may offer potential mental health benefits. Studies have suggested that religious involvement fosters social support and frequent interactions with coreligionists, creating a sense of shared beliefs, values, and interests that can positively influence mental well-being [10-12]. Research has also shown that beliefs about the divine are a pivotal feature for understanding mental well-being, with higher religious beliefs related to higher levels of happiness and life satisfaction [13-15].

However, some studies have indicated the potential for a detrimental relationship between religiousness and distress, particularly if doctrinal dynamics are characterized by excessive criticism or demands [16-19]. A recent study among college students in a US Christian university found that strong religious belief was associated with greater marijuana-related distress [20], possibly indicating a connection between the feeling of shame and marijuana use among highly religious individuals [21]. However, this insightful finding's generalizability is restricted, highlighting the necessity of our study, which employs nationally representative data.

Despite this perspective, several compelling theories have been proposed, suggesting that religiousness could decrease the likelihood of initiating drug use. Scholars argue that ascetic norms associated with religious beliefs may lead religious individuals to abstain from sensual pleasures, including drug usage, in pursuit of spiritual goals or to avoid divine retribution and guilt [22-25].

This notwithstanding, the legalization of medical marijuana has played a significant role in reshaping perceptions and challenging long-standing drug policies. With growing support for medical marijuana as an acceptable treatment option for various health conditions, the perception of marijuana use has shifted toward medicalization [26].

Burdette et al. [27] have suggested that coping with chronic illness may reduce the influence of religious prohibitions against marijuana use. They assert that religious beliefs may become less influential when individuals seek effective ways to manage pain and suffering, especially if recommended by medical professionals. While their findings lacked sufficient evidence to support their assertion, this idea aligns with the "secularization" theory, which posits that modern societies prioritize medical development over religion as the primary moral ideology and social control institution [28,29].

Contrarily, some studies propose that religious individuals may disapprove of alternative medicine due to their belief in the significance of suffering, leading them to rely on traditional medical treatments during illness and potentially reducing their likelihood of using marijuana for medicinal purposes [30,31]. Drawing from these competing theories and establishing a connection between the secularization/medicalization theory and the ascetic hypothesis, our study will further explore whether religiousness among marijuana users is significantly associated with medical or recreational use. We expect religiousness among marijuana users to exhibit a robust association with a preference for medical marijuana usage over recreational consumption.

The Present Study

The primary objective of this study is to investigate the relationship between religiousness, psychological distress, and marijuana usage among adults in the United States. Specifically, we aim to assess the potential protective role of religiousness against mental distress among adult marijuana users. Additionally, we seek to explore whether religiousness is significantly linked to medical usage as opposed to recreational use. Based on well-established theoretical foundations, our research hypotheses are as follows:

[H1] Among adult marijuana users, higher levels of religiousness will be inversely associated with levels of psychological distress, suggesting a potential protective effect of religiousness against mental health challenges.

[H2] Furthermore, we hypothesize that higher levels of religiousness among marijuana users will be positively associated with medical marijuana usage compared to recreational marijuana usage, indicating a potential

connection between religious individuals and alternative medicinal usage patterns.

By examining the relationship between religiousness, mental health symptoms, and marijuana usage, our study aims to shed light on the potential role of religiousness in mitigating psychological distress among adults who use marijuana. This research has implications for understanding the complex relationship between religion, mental health, and substance use and may contribute to the development of targeted interventions and support systems for individuals experiencing psychological distress within the context of marijuana use.

METHODS

Data

The study utilized data from the 2021 annual National Survey on Drug Use and Health (NSDUH). The sub-sample consisted of 7,854 individuals who met two criteria: (1) reported using marijuana at least once in the past month, and (2) were adult participants aged 18 years and older. The NSDUH employs multistage area probability sampling methods to ensure a representative sample of the noninstitutionalized US civilian population aged 12 or older. This encompasses individuals residing in diverse environments, including households, military personnel living off bases, college dormitories, and civilian dwellings on military bases.

Additional information about the NSDUH sampling methods and survey techniques can be found on the Substance Abuse and Mental Health Services Administration website [32].

Measures

Psychological distress was assessed using Kessler et al. [33] K6 scale adopted by NSDUH. The scale estimates nonspecific psychological distress and is based on a series of six questions that correspond to how (1) nervous, (2) hopeless, (3) restless or fidgety, (4) sad or depressed, (5) worthless, and (6) everything felt like an effort to the respondent during the past 30 days. For each of the six items, responses of "all of the time" was coded 4, "most of the time" coded 3, "some of the time" coded 2, "a little of the time" coded 1, and "none of the time" coded 0. All scores were then converted to a range from 0 to 24, with a zero-score indicating no psychological distress.

To assess medical marijuana usage, we utilized the survey question that inquired whether any of the respondent's marijuana use in the past year was prescribed or recommended by a doctor or healthcare professional. The response options were categorized as (1) Yes and (2) No. We adjusted the variable coding to (0) Recreational and (1) Medical.

In this study, religiousness is operationalized as an individual's engagement, adherence, and involvement in religious beliefs, practices, and attitudes. We employed a novel approach to estimate a latent variable of religiousness using a standardized summated rating model (SRM). This model comprised four items encompassing respondents' religious beliefs, practices, and attitudes. The items included the following:

1. Frequency of attendance at religious services in the past 12 months (response options range from 1, "0 times" to 6, "25 to 52 times").
2. Perceived importance of religious beliefs in one's life. (response options range from 1, "strongly disagree," to 4, "strongly agree")
3. Influence of religious beliefs on decision-making (response options range from 1, "strongly disagree" to 4, "strongly agree")

4. The salience of having friends who share the same religious beliefs (response options range from 1, "strongly disagree" to 4, "strongly agree").

The standardized latent approach achieved Cronbach's alpha of 0.84, indicating our religiousness scale's excellent internal consistency and reliability. It is crucial, however, to mention that Cronbach's alpha assumes unidimensionality but is not a test for it [34]. To assess the SRM monotone homogeneity assumption, we visually inspected the plots of each item against the remaining scores (Figure 1). The observed monotonic curves in the graphs affirm the monotonous nature of our scale, providing an interval-level estimation. The standardized latent scale ranges from 0.28 to 3.27, with higher values indicating increased religiousness.

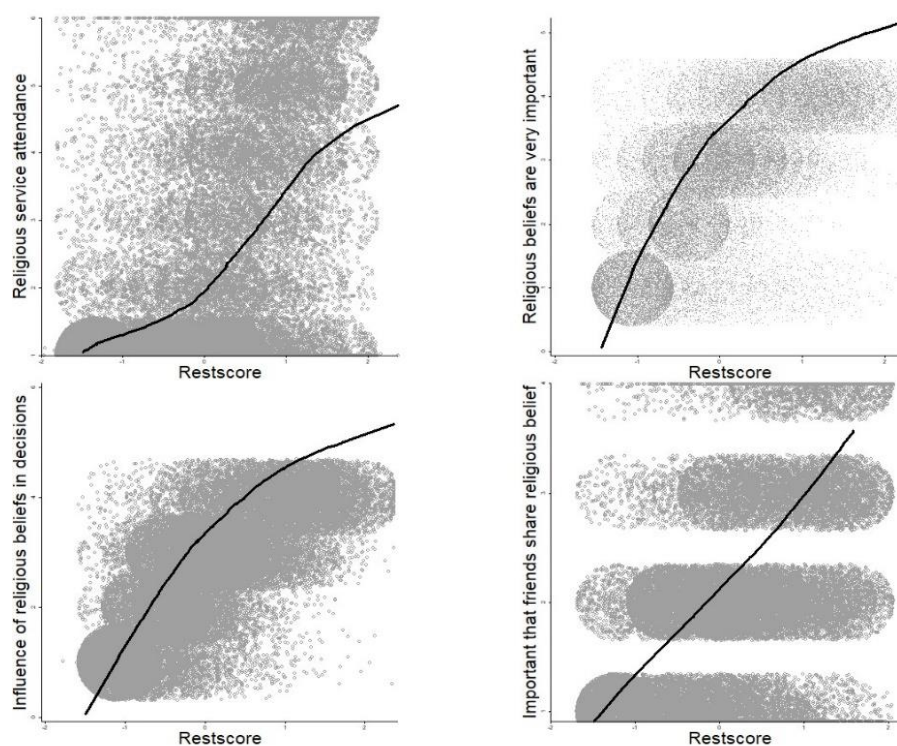


Figure 1: Monotone homogeneity assumption (plot of restscores).

We controlled for several potential confounders that studies have shown to be associated with religion, psychological distress, and marijuana use: Sociodemographic characteristics [35-38], marijuana use frequency [1,2], overall health [27], and other substance use variables [39].

Marijuana use frequency was measured by asking participants how many days they used marijuana in the past 30 days ("Number of days used marijuana/hashish in the past 30 days?"). The response option ranges from (1) "1-2 days" to (4) "20-30 days".

Regarding other substance use variables, we examined the consumption of alcohol, cigarettes, and illicit substances other than marijuana within the previous 30 days. Cigarette use was classified as (0) "Did not use daily in the past month" or (1) "Used daily in the past month." Alcohol usage was assessed as (0) "Never/no binge alcohol use" or (1) "Binge alcohol use." The utilization of illicit substances other than marijuana, such as hallucinogens, heroin, cocaine, inhalants, and psychotherapeutics, was categorized as (0) "Used only marijuana past month" or (1) "Used an illegal drug other than marijuana."

The overall health assessment was conducted through a single item that prompted participants to provide a self-assessment of their general health. The available response choices span from "Excellent" to "Poor." For analysis, we applied reverse coding to the variable, assigning (1) to "Poor health," (2) to "Fair," (3) to "Good," (4) to "Very good," and (5) to "Excellent."

The social demographic variables included in the study were age, education, marital status, gender, race/ethnicity, sexual identity, employment, income, and urbanicity. Age was categorized as (1) "Young adults 18-29 years," (2) "Middle-aged adults 30-49," and (3) "Older adults 50+." Education was recoded as (1) "Less than high school diploma," (2) "High school diploma," and (3) "Some college/college degree." Marital status was recoded as (0) "Unmarried" and (1) "Married." Gender was categorized as (0) "Female" and (1) "Male." Race was recoded as (1) "non-Hispanic Whites," (2) "non-Hispanic Blacks," (3) "Hispanics," and (4) "Other ethnicities/races." Sexual identity was classified as (0) "Heterosexuals" and (1) "Non-heterosexuals." Employment was grouped as (0) "Employed" and (2) "Unemployed." Income was categorized as (1) "Less than \$20,000," (2) "\$20,000 - \$49,999," (3) "\$50,000 - \$74,999," and

(4) "\$75,000 or More." Urbanicity was classified as (1) "Urban," (2) "Suburban," and (3) "Rural".

Analyses

To examine our hypotheses, we initially performed a descriptive analysis to understand the distribution of the variables used in this study. Table 1 provides descriptive statistics for all study variables. Secondly, we employ stepwise multiple Poisson regression models to answer the question does religiousness lower the occurrence of psychological distress among marijuana users? As shown in Figure 2, our outcome variable - psychological distress - is a count variable that demonstrates positive skewness and resembles a gamma distribution. Therefore, we employ multiple Poisson regression models to obtain optimal estimates [40]. Furthermore, we employ multiple logistic regression to examine whether medical marijuana use relative to recreational use is associated with religiousness, i.e., we model medical marijuana use relative to recreational use as a function of religiousness, holding other variables constant. (Table 2 for the regression models).

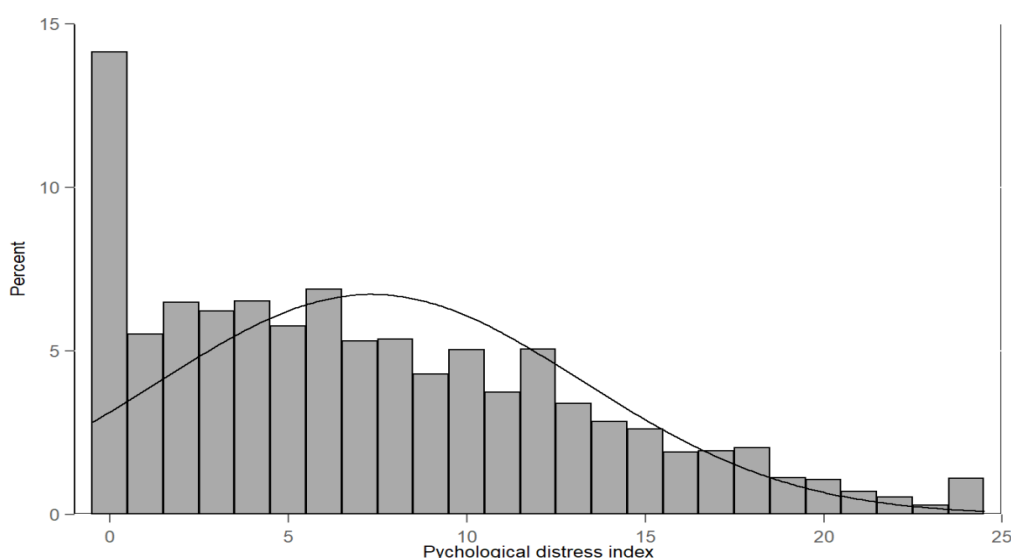


Figure 2: Histogram graph of psychological distress among adult marijuana users.

Table 1: Sample Characteristics (N = 7,854).

Variables	N (%) for categorical data. M (SE) for continuous data.
Psychological distress	7.32 (5.93)
Medical marijuana use	1,370 (17.86%)
Religiousness (mean standardized)	1.12 (0.68)
Religious service attendance	1.57 (1.15)
Importance of religion	2.22 (1.06)
Influence of religious beliefs on decision-making	2.13 (1.03)
Saliency of friends sharing religious beliefs	1.61 (0.77)
Overall health	2.51 (0.98)
Marijuana use frequency	2.97 (1.17)
Other substance use	
Cigarette use	1,476 (18.79%)
Alcohol usage	3,887 (49.49%)
Illicit substances other than marijuana	1,166 (14.85%)
Age	
Young adults 18-29years ^a	4,088 (52.05%)
Middle-aged adults 30-49	2,925 (37.24%)
Older adults 50+	841 (10.71%)
Educational attainment	
Less than high school diploma ^a	839 (10.68%)
High school diploma	2,085 (26.55%)
Some college/college degree	4,930 (62.77%)
Marital status (married)	1,894 (24.12%)
Sex (Male)	3,944 (50.22%)
Sexual identity (non-heterosexual)	1,646 (22.43%)
Race/ethnicity	
non-Hispanic Whites ^a	4,853 (61.79%)
non-Hispanic Blacks	1,010 (12.86%)
Hispanics	1,162 (14.80%)
Others	829 (10.56%)
Employment Status (unemployed)	3,070 (41.67%)
Urbanicity	
Urban ^a	3,606 (45.91%)
Suburban	2,929 (37.29%)
Rural	1,319 (16.79%)
Income	
Less than \$20,000 ^a	1,900 (24.19%)
\$20,000 - \$49,999	2,445 (31.13%)
\$50,000 - \$74,999	1,146 (14.59%)
\$75,000 or More	2,363 (30.09%)

Note: ^a indicates reference group.

RESULTS

As shown in Table 1, The average count score of psychological distress among marijuana users is $M = 7.31$ and $SD = 5.92$ (min = 0, max = 24). Approximately 18% of respondents reported using marijuana for medicinal purposes. 39.27% of our sample said they either agree or strongly agree that their religious beliefs influence their decisions. Approximately 43% said they either agree or strongly agree that their religious beliefs were important to them. 53.35% strongly disagree that it is essential for their friends to share their religious beliefs. 9.84% reported that they at least attended religious service six times in the past year. While the records of lower numbers for religious attendance are well established in the literature [41,42], we can largely attribute it to the suspension of social gatherings during the covid period when the present data utilized was collected [43]. Taking together all

the religious variables, our standardized religiousness scale, as shown in Figure 3, shows that the variable is positively skewed and has an average value (M) = 1.12 and a standard deviation (SD) = 0.68 (min = 0.28, max = 3.27).

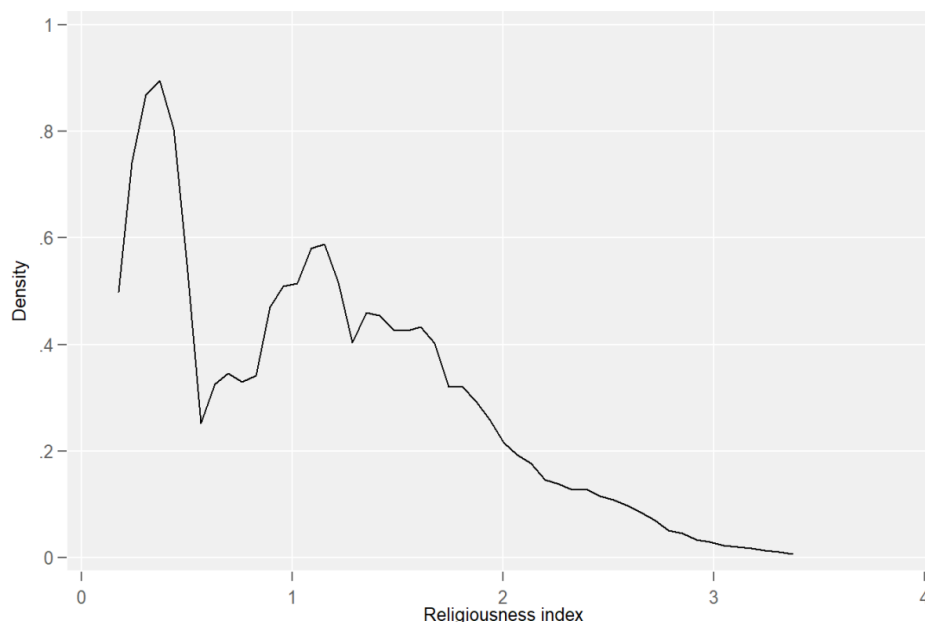


Figure 3: Kernel density plot of religiousness among adult marijuana users.

Many respondents (48.71%) said they used marijuana for about 20-30 days in the past month. 49.49% said they binged on alcohol at least once in the past month. 18.79% of the respondents reported using cigarettes daily in the past month, and 14.85% said they used illicit drugs other than marijuana. Regarding demographics, 61.79% are non-Hispanic Whites, 12.86% are non-Hispanic Blacks, 14.80% are Hispanics, and 10.56% are other races/ethnicities. 50.22% of the respondents from our sample are males, and 49.78% are females. 58.33% of our sample are employed, and 44.68% earn a total family income of at least \$50,000. Most respondents from our sample are unmarried (75.88%), young-adults (52.05%), who live in urban areas (45.91%), and who have earned some college credits or have a college degree (62.77%).

Model (1) in Table 2 assesses the expected incidence rate ratio score of psychological distress among marijuana users in the US. A unit increase in religiousness among marijuana users decreases the predicted count of psychological distress by 3% (Incidence rate ratio [IRR] = 0.97; CI = [0.96, 0.98]; $p < .001$), holding other variables constant. Non-Hispanic Blacks, compared to non-Hispanic Whites, decreased the likelihood count of psychological distress by 15% (IRR = 0.85; CI = [0.83, 0.88]; $p < .001$). Compared to young adults, older age groups are likely to decrease the expected count of psychological distress. The most significant difference is from 50+ older adults with a 50% (IRR= 0.52; CI = [0.50, 0.54]; $p < .001$) decrease in the expected count of psychological distress. Married marijuana users relative to unmarried users also had an inverse significant relationship with psychological distress (IRR = 0.95; CI = [0.92, 0.97]; $p < .001$). Finally, A unit improvement in overall health decreases the expected count of psychological distress by 11% (IRR = 0.81; CI = [0.80, 0.82]; $p < .001$).

On the contrary, medical marijuana users, compared to recreational users, while holding all other variables constant, are expected to have a 2% (IRR=1.02; CI = [1.00, 1.05]; $p < .001$) increase in psychological distress

count. Marijuana users who use illicit drugs other than marijuana compared to those who do not use illegal drugs predict a 22% (IRR=1.22; CI= [1.19, 1.24]; $p < .001$) increase in psychological distress count holding all other variables constant. There was a null relationship between the frequency of marijuana use and psychological distress. However, in a stepwise regression model (see Supplemental Table A), without adjusting for illicit drug use other than marijuana, a one-day increase in marijuana usage significantly predicted a 1% increase in psychological distress count holding all other variables constant (IRR = 1.01; CI= [1.00, 1.02]; $p < .005$). The stepwise regression model had an Akaike's information criterion (AIC) = 54475.03 compared to the final model's AIC = 54207.67. This indicates that including the variable "other illicit drug use" in model (1) led to improved goodness of fit (see Supplemental Table A for full stepwise regression models).

Table 2: Estimated effects on psychological distress and medical marijuana use.

Variables	Model (1)		Model (2)	
	Psychological distress		Medical marijuana use	
	IRR (SE)	[95% CI]	OR (SE)	[95% CI]
Religiousness	0.97 (0.01)	[0.96 - 0.98] ***	1.19 (0.06)	[1.08 - 1.30] ***
Marijuana use frequency	1.00 (0.00)	[0.99 - 1.02]	1.53 (0.05)	[1.43 - 1.63] ***
Medical marijuana	1.02 (0.01)	[1.00 - 1.05] *	-	-
Illicit drug other than marijuana	1.22 (0.01)	[1.19 - 1.24] ***	0.74 (0.07)	[0.61 - 0.90] **
Cigarette use	1.00 (0.01)	[0.98 - 1.03]	0.82 (0.07)	[0.69 - 0.96] *
Binge alcohol use	0.98 (0.01)	[0.97 - 1.00]	0.66 (0.04)	[0.58 - 0.75] ***
Overall health	0.81 (0.01)	[0.80 - 0.82] ***	0.87 (0.03)	[0.80 - 0.93] ***
Male	0.82 (0.01)	[0.81 - 0.84] ***	0.84 (0.06)	[0.74 - 0.96] *
Age (Young adults 18-29years)				
Middle-aged adults 30-49	0.82 (0.01)	[0.80 - 0.84] ***	1.83 (0.14)	[1.57 - 2.13] ***
Older adults 50+	0.52 (0.01)	[0.50 - 0.54] ***	1.76 (0.20)	[1.40 - 2.21] ***
Race/ethnicity (Non-Hispanic Whites)				
Non-Hispanic Blacks	0.84 (0.01)	[0.81 - 0.84] ***	0.68 (0.08)	[0.54 - 0.84] ***
Hispanics	0.98 (0.01)	[0.95 - 1.00]	0.84 (0.09)	[0.70 - 1.03]
Other races/ethnicities	0.96 (0.01)	[0.94 - 0.99] *	1.06 (0.11)	[0.86 - 1.31]
Unemployed	1.06 (0.01)	[1.04 - 1.08] ***	1.39 (0.10)	[1.21 - 1.59] ***
Urbanicity (Urban)				
Suburban	0.99 (0.01)	[0.97 - 1.01]	1.01 (0.07)	[0.87 - 1.16]
Rural	0.99 (0.01)	[0.96 - 1.01]	1.04 (0.10)	[0.87 - 1.25]
Income (Less than \$20,000)				
\$20,000 - \$49,999	1.01 (0.01)	[0.99 - 1.04]	1.03 (0.10)	[0.87 - 1.23]
\$50,000 - \$74,999	0.93 (0.01)	[0.90 - 0.96] ***	0.91 (0.10)	[0.73 - 1.14]
\$75,000 or More	0.95 (0.01)	[0.93 - 0.97] ***	0.79 (0.08)	[0.65 - 0.97] *
Education (Less than High sch.)				
High school diploma	1.03 (0.02)	[1.00 - 1.07] *	1.03 (0.12)	[0.82 - 1.31]
Some college/college degree	1.08 (0.02)	[1.05 - 1.12] **	1.10 (0.12)	[0.88 - 1.36]
Married	0.95 (0.01)	[0.92 - 0.97] ***	1.27 (0.10)	[1.09 - 1.49] **
Non-heterosexual	1.27 (0.01)	[1.24 - 1.29] ***	1.35 (0.11)	[1.15 - 1.58] ***
Psychological distress	-	-	1.01 (0.01)	[0.99 - 1.02]

Note: Entries for model (1) are incidence rate ratios (IRR) with standard errors (SE) in parentheses. Entries for model (2) are odd ratios (OR) with standard errors (SE) in parentheses. Both models have 95% confidence intervals (CI) in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Model (2) assesses the odds of being a medical versus recreational user. The odds of being a medical marijuana user compared to recreational users are 19% higher for a unit increase in religiousness (odds ratio [OR] = 1.19; CI = [1.08, 1.30]; $p < .001$). A one-day increase in the use of marijuana increased the odds of using medical marijuana relative to recreational by 53%. (OR = 1.53; CI = [1.43, 1.63]; $p < 0.001$). Model (2) also showed that the odds of using other substances are lower for those who used marijuana for medicinal purposes than for recreational use. The biggest difference is bingeing on alcohol (OR = 0.66; $p < .001$), followed by using illicit drugs

other than marijuana (OR = 0.74; $p < .005$), and cigarette usage (OR = 0.82; $p < .05$).

DISCUSSION

Our study's findings carry significant implications, both in theory and policy. As anticipated in our second hypothesis and in line with the secularization/medicalization perspective [44,45], we established a significant association between religiousness among marijuana users and a preference for medical marijuana usage over recreational consumption. The finding also implies that religious marijuana users are more likely to abstain from using marijuana for sensual pleasures, which is also consistent with the ascetic hypothesis [22,23,46]. This discovery connects the secularization/medicalization-ascetic theories and suggests that certain religious individuals are embracing medical marijuana as a legitimate and effective form of medical treatment.

Consequently, the utilization of medical marijuana within some religious circles has the potential to promote broader societal acceptance of marijuana usage and alleviate associated stigmas. As such, religious stakeholders and institutions may need to reassess prevailing stigmatization and harmful perceptions related to marijuana usage and consider the potential health benefits that medical marijuana can offer.

While our study reveals a positive association between religiousness and medical marijuana usage, we also observe a contrasting pattern regarding psychological distress symptoms among users. Notably, those who use medical marijuana, as opposed to recreational users, tend to exhibit increased psychological distress symptoms which is consistent with previous scholarship [44]. However, this finding should be interpreted within the broader context of our first hypothesis, which aligns with existing literature on religion as a protective factor. Indeed, our research demonstrates that an increase in religiousness among adult marijuana users is significantly associated with reduced psychological distress symptoms, indicating that religiousness serves as an effective coping mechanism that mitigates the occurrence of psychological distress.

Additionally, while it is well established that frequent marijuana usage in adolescents is associated with psychological distress [4,47], we find that frequent adult marijuana usage does not independently predict heightened psychological distress after accounting for the use of illicit drugs other than marijuana. This suggests that regular marijuana use is not inherently linked to psychological distress. However, we must remain cautious in addressing the potential risks of using other illicit substances, such as hallucinogens, heroin, cocaine, inhalants, and psychotherapeutics. These findings call for targeted interventions that focus on reducing the use of such substances among marijuana users to safeguard their mental well-being. Moreover, our study contradicts the notion of marijuana serving as a gateway drug, as we found no evidence supporting such a relationship. Instead, most marijuana users (85.15%) reported abstaining from other illicit drug use, providing a compelling argument against the gateway theory. Therefore, policies of prohibition are unlikely to effectively decrease the use of illegal drugs [48].

Like most empirical studies, we acknowledge that our study has some limitations worth mentioning. Firstly, our data rely on self-reports, which may introduce social desirability bias, leading respondents to underreport socially undesirable behaviors like substance use. As a result, we urge readers to exercise caution in further interpreting the presented results. Secondly, it is essential to note that our measure of psychological distress is based on symptom counts rather than diagnostic outcomes. Consequently, future research should explore diagnosed mental health conditions and investigate the intricate relationship between religiousness and adult marijuana usage more

comprehensively.

Moreover, the NSDUH data lacks a metric for religious affiliation. Although the omission of religious affiliation might result in an overestimation of the impact of religiousness, it is essential to highlight that prior research has demonstrated the safeguarding effects of religiosity on recreational marijuana use even when controlling for religious affiliation [36,45]. Furthermore, given that our study employs cross-sectional data, the potential exists for omitted variable bias or unobserved confounding variables, thereby restricting our ability to establish causal relationships between religiousness, psychological distress, and adult marijuana usage. Future studies should endeavour to investigate these factors to gain a clearer understanding of the causal associations involved.

Despite these limitations, the nuanced findings from our study provide valuable insights for researchers and policymakers. The implications of our study underscore the importance of recognizing the multifaceted relationship between religiousness, marijuana usage, and psychological well-being among adults. Our findings also emphasize the importance of acknowledging the evolving landscape of medical marijuana usage within religious communities and recognizing the potential risks associated with co-occurring illicit drug use. By fostering a nuanced understanding of these dynamics, policymakers and health practitioners can develop evidence-based interventions to promote positive health outcomes and enhance the overall well-being of individuals within this context.

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