Final Project Initial Report

Jeffrey Xing and Liam Conaboy

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Abstract

Research suggests that psychiatric symptoms contribute to sharp declines in quality of life and life expectancy and clearly demonstrates the importance of addressing this (Blanco et al., 2021; Liu et al., 2017; Shanahan & Copeland, 2021). Psychedelic compounds are being posited as underutilized approaches for attenuation of psychiatric symptoms with promising results (Griffiths et al., 2011; Carhart-Harris et al., 2017). However, there appears to be a dearth of investigation regarding why individuals use psychedelics and their potential exacerbation of psychiatric symptoms. We therefore wanted to examine if individuals experiencing psychiatric distress are motivated to use psychedelic compounds despite their legal status, if positive media coverage or changes in public attitudes play a role in this motivation, and if this results in better or worse mental health outcomes. We replicated the findings of Matzopoulos et al. (2022) and conducted novel analysis on the relationships between variables like psychiatric symptoms, information participants received regarding psychedelics, mental health outcomes, and self-reported psychedelic mushroom (PM) use. We found [.....results here.....]. These results indicate that people experiencing psychiatric symptoms are likely to self-medicate with PMs, particularly when exposed to information about their benefits. This has consequences for society as legalization of PMs would likely increase using behavior and, without randomized controlled trials in human populations elucidating harmful side-effects, these could manifest in the population without a corrective mechanism or responsible disclaimer. More research needs to be done regarding the potential of PMs to exacerbate psychiatric symptoms, and responsible messaging surrounding this practice.

Motivation

The last few decades have seen a marked change in scholarly research and public attitudes surrounding "psychedelic" compounds. These compounds are a diverse class, largely comprised of serotonergic hallucinogens. Changes in drug policy following randomized, controlled clinical trials have led to psychedelic prescriptions for treatment-resistant psychiatric disorders (Daly et al., 2018). Moreover, a complete reversal of the prevailing attitude toward these compounds in media and public consciousness, as well as publication of hundreds of papers on topics ranging from molecular characterization to therapeutic value constitute what some are calling a "Renaissance" (Sessa, 2018). Moreover, evidence suggests that these compounds have been used for centuries (Rodríguez Arce & Winkelman, 2021), and recreational or illegal use of these compounds persists worldwide, with PMs being one of the most longstanding psychedelic substances consumed by humans. Despite these changes in attitude and documentation that PMs are well-tolerated physiologically (Tylš et al., 2014), and although human consumption of psychedelics is not new, little scientific research has investigated their psychological harm potential. Widespread recreational use implies that data on the relationship between psychedelics and psychiatric symptoms exists outside of randomized controlled trials, a fact of which which our target article (Matzopoulos et al., 2022) made use. We are motivated to examine the data collected in this article to determine if relief from psychiatric symptoms drives recreational use of PMs, if promotion in media contributes to this phenomenon, and if there is any cause for concern regarding mental health outcomes resulting from PM use.

Research questions

1. **Our first question: Do individuals experiencing psychiatric symptoms use PMs at a higher rate than those who are not?**
2. **Our second question: Does positive media coverage or word-of-mouth communication on the benefits of PMs for psychiatric symptoms increase their use among individuals?**
3. **Our third question: Are individuals with specific combinations of different psychiatric symptoms more likely to use PM?**

Hypotheses

1. **We hypothesize that there are correlations between self-reported past-year PM use and an individual's mental health status indexed by scores on different psychiatric evaluations such as the CCI, GAD-7, and PHQ-9. Finding significance in a multivariate logistical regression between these variables would suggest a relationship between PM use and an individual's mental health status.**
2. **We hypothesize that positive media coverage or word-of-mouth communication about PMs is positively correlated with individuals' motivation to use them. Finding a significant positive correlation between past-year PM use and hearing positive things about PM use, especially regarding use for psychiatric conditions and well being would suggest that there is a relationship between a person hearing positive things about using PMs and deciding to use them despite their legal classification**
3. **We hypothesize that the correlations between self-reported PM use and an individual's CCI, GAD-7, or PHQ-9 scores changes depending on the individual's status on the two other psychiatric evaluations. Finding significant interactions three psychiatric evaluations would suggest that PM use is affected by the combination of psychiatric symptoms that the individual presents.**

Methods

Study type

Our target study employs observational data obtained through a national (US) online study operative from November 2020 - March 2021.

Independent variables

We will be analyzing three classes of predictor variables:

1. Demographic information (Age, Sex, Ethnicity, Geographical Region, Insurance Information)
2. Knowledge about PM (Heard PM has positive uses for mental health, for general well-being, for diagnosed condition, or have no knolwedge at all)
3. Psychiatric Evaluations (Charlson Co-morbidity Index (CCI), Generalized Anxiety Disorder Scale (GAD-7), Patient Health Questionnaire (PHQ-9))

Dependent variables

Past-year psychedelic mushroom use.

Data preprocessing

The dataset from Matzopoulos et al. (2022) was mostly well curated, except for the missing data regarding participants' education level and employment status. For the dependent variable, there are three variables in the dataset regarding past-year psychedelic use that must be aggregated into a single variable, wherein any indication of past-year psychedelic use is recorded. For the independent variables, the dummy code in the current dataset must be transformed into factors according to the attached code book.

Results

Data visualizations

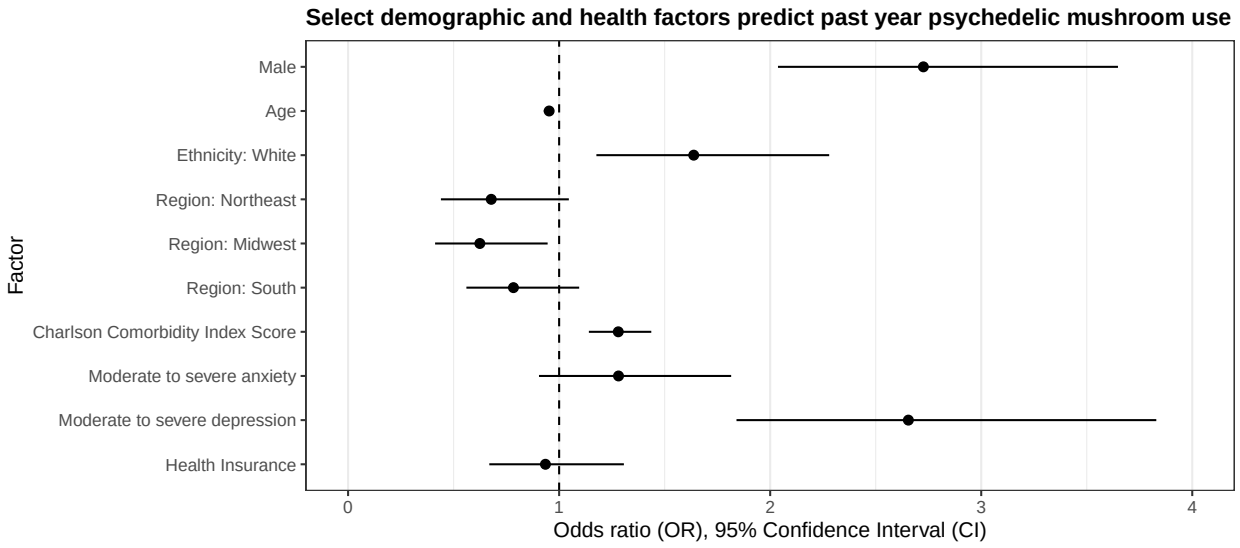

Figure 1: Odd ratios of past-year psychedelic mushroom use predicted by demographic and health factors. Odd ratios above 1 indicates that the factor is predictive of past-year psychedelic mushroom use, odd ratios below 1 indicates that the factor is predictive of non-psychedelic use.

Statistical modeling

Please define at least one ***COMPACT MODEL*** *and one* ***AUGMENTED MODEL*** *to compare.*

** COMPACT MODEL:

$PM = Error$ **

** AUGMENTED MODEL:

$PM = Sex + Age + Ethnicity + Region + Co - morbidity + Anxiety + Depression + Insurance + Error$ **

** HEALTH-INTERACTION MODEL:

$PM = Sex + Age + Ethnicity + Region + (Co - morbidity * Anxiety * Depression) + Insurance + Error$**

Summary of findings

Select demographic and health factors are predictive of past-year psychedelic mushroom use. Particularly, past-psychedelic mushroom use is associated with being male (OR = 2.73, 95% CI = [2.04, 3.65]), white (OR

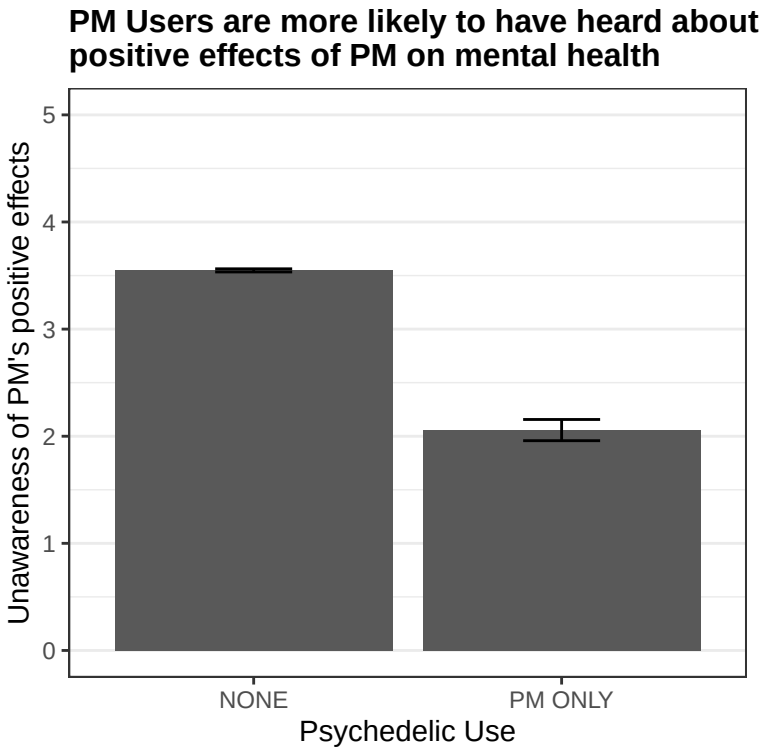

Figure 2: Odd ratios of past-year psychedelic mushroom use predicted by demographic and health factors. Odd ratios above 1 indicates that the factor is predictive of past-year psychedelic mushroom use, odd ratios below 1 indicates that the factor is predictive of non-psychedelic use.

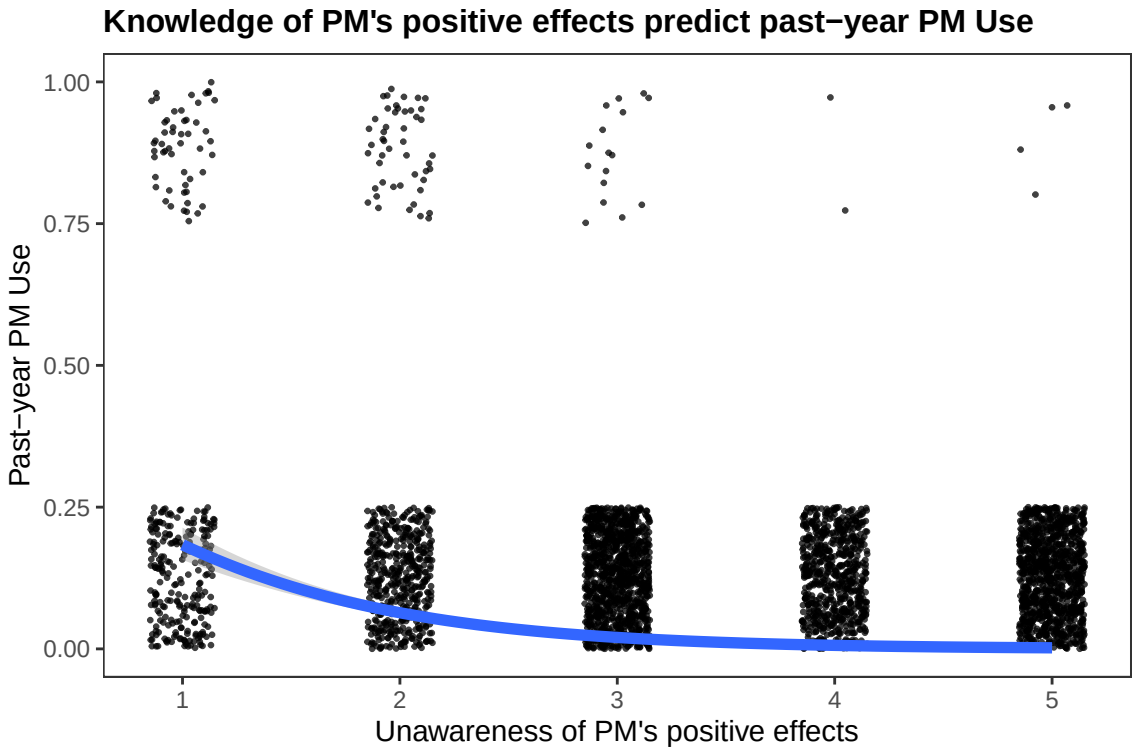

Figure 3: Odd ratios of past-year psychedelic mushroom use predicted by demographic and health factors. Odd ratios above 1 indicates that the factor is predictive of past-year psychedelic mushroom use, odd ratios below 1 indicates that the factor is predictive of non-psychedelic use.

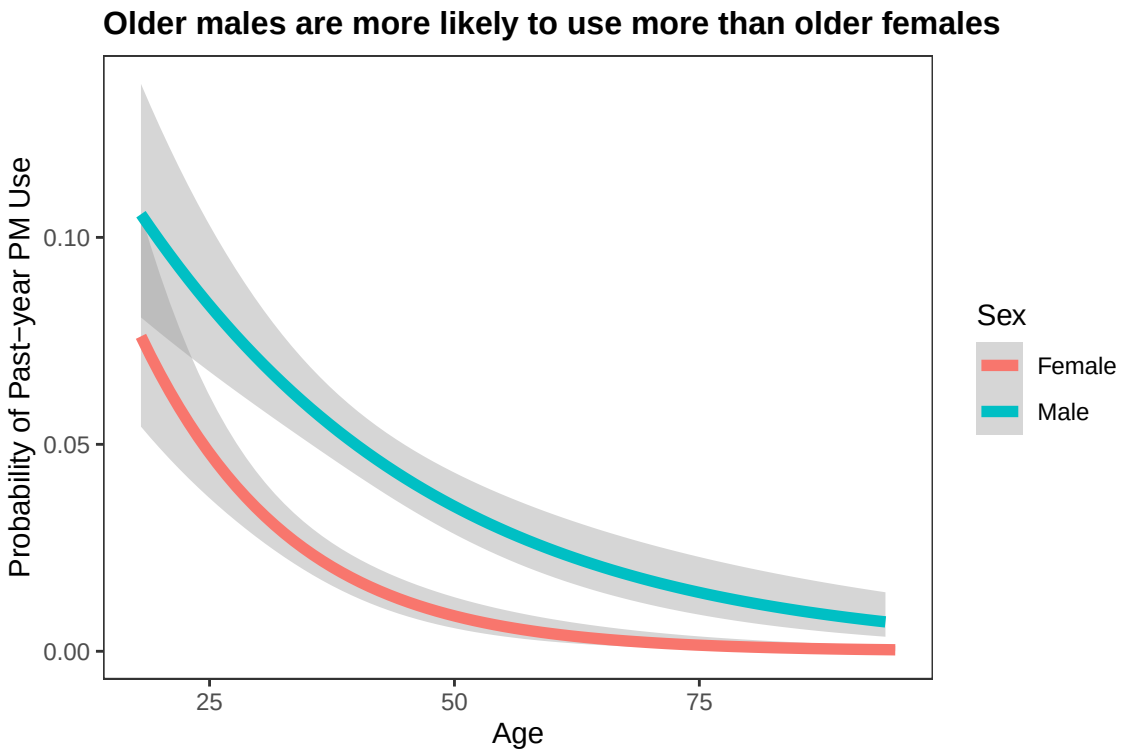

Figure 4: Odd ratios of past-year psychedelic mushroom use predicted by demographic and health factors. Odd ratios above 1 indicates that the factor is predictive of past-year psychedelic mushroom use, odd ratios below 1 indicates that the factor is predictive of non-psychedelic use.

= 1.64, 95% CI = [1.18, 2.28]), higher co-morbidity (OR = 1.28, 95% CI = [1.14, 1.44]), and having moderate to severe depression (OR = 2.65, 95% CI = [1.84, 3.83]). Conversely, non-psychedelic use is associated with increased age (OR = 0.95, 95% CI = [0.94, 0.96]) and being from the Midwest (OR = 0.62, 95% CI = [0.41, 0.95]).

Health factors like co-morbidity, anxiety, and depression do not significantly interact with each other (OR = 1.43, 95% CI = [0.56, 3.65]), but in an exploratory analysis, demographic factors like sex and age do significantly interact with each other (OR = 1.03, 95% CI = [1.01, 1.06]), where older men are more likely to use psychedelic mushrooms than older women. Additionally, when the interaction between sex and age is taken into account, past-psychedelic mushroom use becomes no longer significantly associated with being male (OR = 0.83, 95% CI = [0.35, 2.01]). It is reasonable that the association between past-psychedelic mushroom use and being male is qualified by this interaction between sex and age.

We also note that the augmented model (AIC = 1788.5) improved model fit over the compact model (AIC = 2021.1). The health interaction model (AIC = 1789.9) that takes into account interactions between co-morbidity, anxiety, and depression does not improve model fit, but the sex and age interaction model (AIC = 1782.6) improved model fit over the augmented model.

Discussion

Please write a few sentences about the broader implications of this research. Please also note any methodological limitations or other open questions for future research to address.

[Discussion on hold.]

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