Neuropsychiatric Conditions Associated with Marijuana Use Among Cancer Survivors: An Analysis of the NIH All of Us Research Program

Carolyn Nguyen[1], Julia Trudeau[1], Ding Quan (Quinton) Ng[1], Matthew Heshmatipour[1], Michael Sayer[1], Reem Nasr[1], Brandon Xie[1], Kalpna Gupta[2], Munjal M. Acharya[2], Alexandre Chan[1]

(1) School of Pharmacy & Pharmaceutical Sciences, (2) School of Medicine

UC Irvine — School of Pharmacy & Pharmaceutical Sciences

Introduction

- Marijuana use has become prevalent among cancer survivors seeking relief from a range of neuropsychiatric conditions.

- As legalization of marijuana within the United States increases, the impact of marijuana use among cancer survivors with neuropsychiatric conditions remains largely unknown.

- This study aims to investigate the relationship between neuropsychiatric condition profiles and marijuana use among cancer survivors participating in the nationwide NIH All of Us (AoU) research program.

Methods

- **The NIH AoU Research Program:** The program gathers health data from a diverse group of individuals in the United States. For this study, the AoU Controlled Tier Dataset v8 was used.

- **Eligibility:** Cancer survivors (≥18 years old) based on the self-reported Personal Medical History survey.

- **Marijuana use:** Non-users and users (self-reported use within 3 months) were identified through the Lifestyle survey.

- **Neuropsychiatric conditions:** Self-reported neuropsychiatric conditions were identified from the Personal Medical History survey. Conditions associated with marijuana use ($p < 0.1$) in univariate logistic regression analyses were selected for multivariate analysis.

- **Statistical analysis:** Using a multivariate logistic regression model adjusted for sociodemographic and clinically relevant confounders, we investigated neuropsychiatric conditions associated with marijuana use (vs. non-users) among all cancer survivors and in exploratory subgroup analyses by cancer diagnosis.
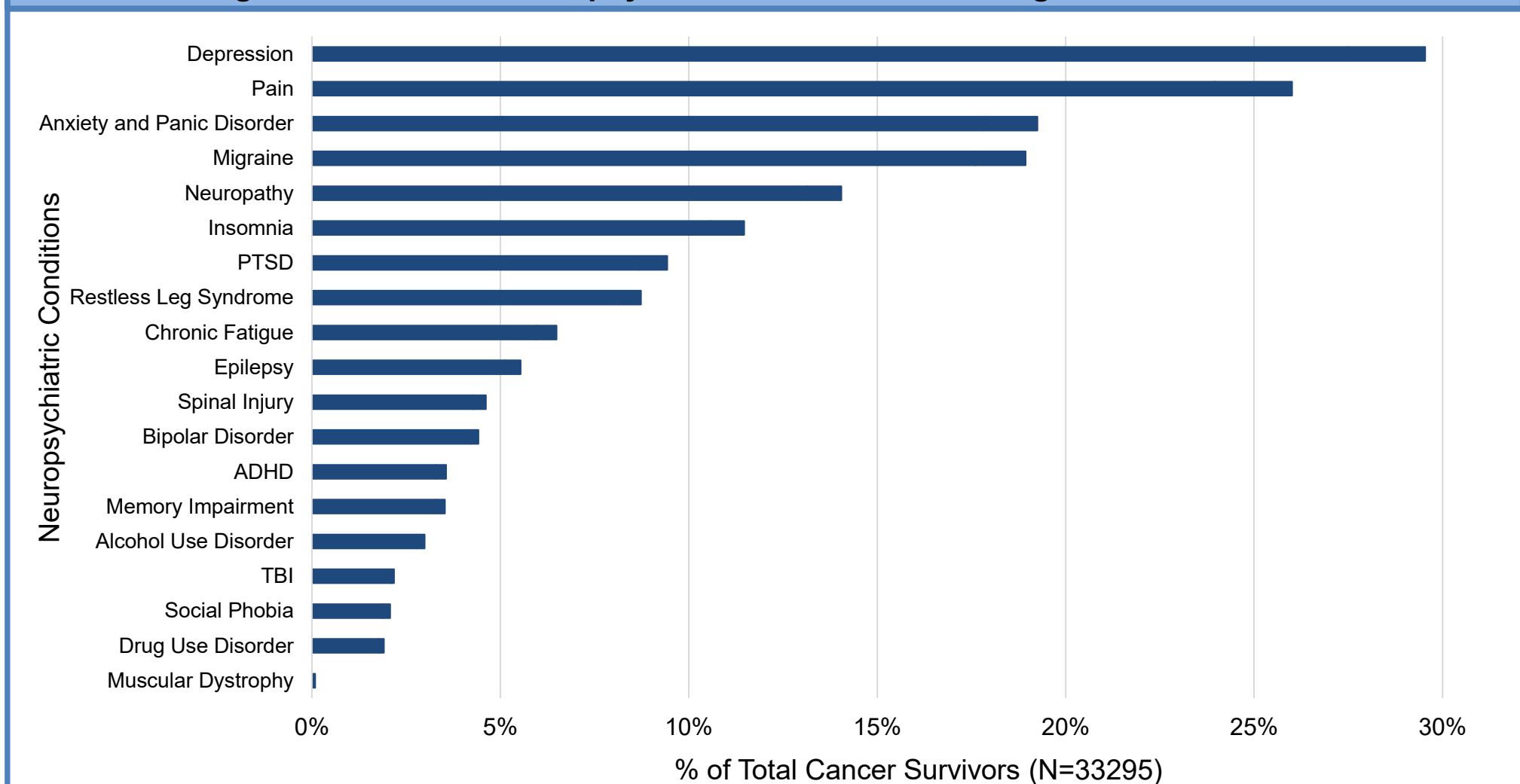
Results

Table 1: Participant Characteristics[c]

		Marijuana		
	Users (N=1762)	Non-users (N=31533)	OR (95%CI)	p-value[a]
Age				
18-39	275	1686	Ref	
40-64	866	12562	0.42 (0.36, 0.49)	<0.001
65+	621	17285	0.22 (0.19, 0.26)	<0.001
Female	545	19849	1.29 (1.17, 1.43)	<0.001
Race/Ethnicity				
Non-Hispanic White	1283	25564	Ref	
Non-Hispanic Black	215	1869	2.29 (1.96, 2.66)	<0.001
Non-Hispanic Asian	NA	529	0.72 (0.44, 1.1)	0.155
Hispanic	93	1641	1.13 (0.90, 1.39)	0.271
Married	957	18900	0.72 (0.62, 0.84)	<0.001
Bachelor's degree	465	8830	0.72 (0.62, 0.85)	<0.001
Living in state with legal recreational marijuana	925	12897	1.60 (1.45, 1.76)	<0.001
Cancer diagnosis[b]				
Breast cancer	468	9074	0.90 (0.80, 1.00)	0.045
Gynecological cancer	291	4304	1.25 (1.10, 1.42)	<0.001
Prostrate cancer	192	5350	1.33 (0.99, 1.73)	<0.047
Currently receiving cancer treatment	733	11792	1.19 (1.08, 1.31)	<0.001

[a] p-values retrieved from univariate logistic regression analyses (marijuana use vs. non-use).
[b] Other cancer diagnoses include colorectal cancer, upper GI cancer, endocrine cancer, head and neck cancer, blood and soft tissue cancers, brain cancer, bone cancer, and lung cancer.
[c] In accordance with NIH AoU policy, values with fewer than 20 participants were removed from the table.

Figure 1: Common Neuropsychiatric Conditions Among Cancer Survivors

Statistically Significant Neuropsychiatric Conditions Associated with Marijuana Use

Figure 2: Statistically Significant Neuropsychiatric Conditions Associated with Marijuana Use*

Statistically Significant Neuropsychiatric Conditions Associated with Marijuana Use
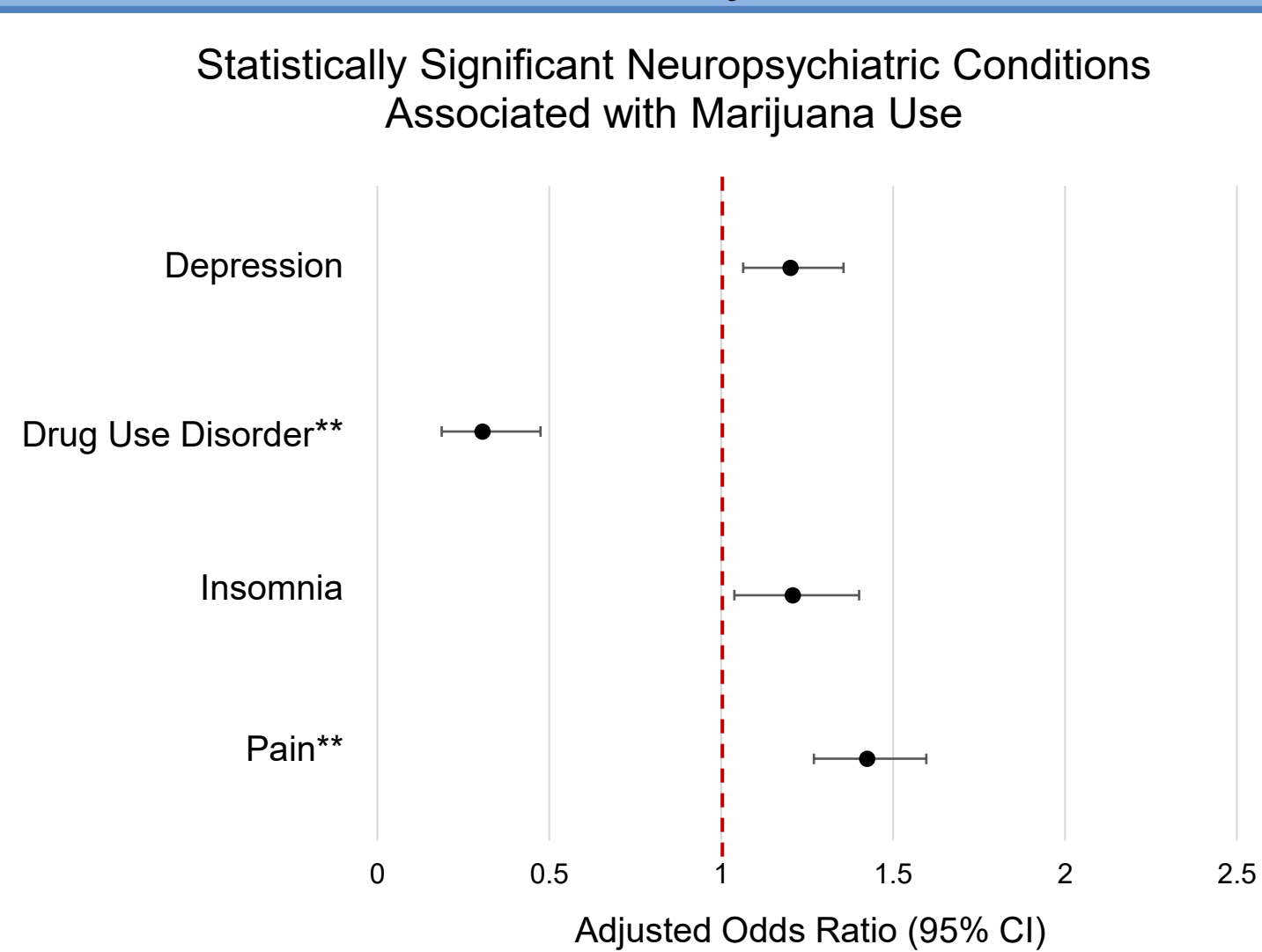
*All p<0.05 in multivariate logistic regression analysis (marijuana use vs. non-use) adjusted for sociodemographic and clinically relevant confounders.
**Significant after adjusting for multiple comparisons (p<0.0026)

Table 2: Neuropsychiatric Conditions Associated with Marijuana Use by Cancer Diagnosis

Cancer Diagnosis	Neuropsychiatric Conditions Associated with Marijuana Use
Breast cancer (n=9542)	Insomnia (OR=1.34, p=0.039), Restless leg syndrome (OR=1.42, p=0.023), TBI (OR=0.29, p=0.041)
Gynecological cancer (n=4594)	Pain (OR=1.82, p<0.001), Depression (OR=1.40, p= 0.002), Drug use disorder (OR= 0.26, p<0.001)
Urologic cancer (n=2463)	Epilepsy (OR= 2.35, p=0.038)
Colorectal cancer (n=1913)	Spinal injury (OR=2.35, p=0.049)
Lung cancer (n=1226)	PTSD (OR=2.42, p=0.048), Pain (OR=2.08, p=0.009)
Head and neck cancer (n=1122)	Anxiety and Panic Disorder (OR=2.70, p=0.009)
Upper GI cancer (n=803)	Anxiety and Panic Disorder (OR=2.92, p=0.019)

- Neuropsychiatric conditions associated with marijuana use differed depending on the type of cancer diagnosis (**Table 2**).

Discussion

- We identified 33295 cancer survivors, with 5% (n=1762) being recent marijuana users. Marijuana users had distinct demographic characteristics compared to non-users, such as being more likely to be younger and female (**Table 1**).

- Depression, pain, and anxiety/panic disorders were among the most common neuropsychiatric conditions reported by cancer survivors (**Figure 1**).

- Our main finding shows that marijuana users were more likely to report depression, insomnia, and pain, but less likely to report drug use disorder (all p<0.05) (**Figure 2**). After adjusting for multiple comparisons, only drug use disorder and pain were statistically significant (Bonferroni-corrected p<0.0026).

Conclusion

- Cancer survivors who use marijuana have distinct neuropsychiatric condition profiles compared to non-users. Subgroup analyses further revealed that these associations vary by cancer type.

- Limitations of the present study include the use of cross-sectional, self-reported data. To fully elucidate if marijuana is being used to alleviate these conditions or alternatively may be playing a role in their occurrence, future studies utilizing objective measures and longitudinal data are warranted.

References

All of Us Research Program Investigators; Denny JC, Rutter JL, Goldstein DB, Philippakis A, Smoller JW, Jenkins G, Dishman E. The "All of Us" Research Program. N Engl J Med. 2019 Aug 15;381(7):668-676.

Acknowledgements