The Association Between Social Determinants of Health, COVID-19, and Incidence of De Novo Depression Following TBI

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Camellia Edalat, Francie Moehring-Moskal, Weiqi Jiao, Lejia Hu, Kunal Lodaya, Fabian T.W. D'Souza
Boston Strategic Partners, Inc.

BACKGROUND

- Traumatic brain injury (TBI) is an acquired brain injury, which occurs when sudden trauma damages the brain.[1]
- TBI is a significant cause of death and disability in the US and one frequent complication is major depressive disorder (MDD).[2-4]
- Social determinants of health such as race, ethnicity, and insurance type are external factors beyond medical care that impact an individual's overall health and can contribute to the risk of both MDD and TBIs.[5-8]

OBJECTIVE

To determine whether race, ethnicity, insurance type, and COVID-19 diagnosis correlate to the *de novo* development of MDD in patients with TBI.

METHODS

- This retrospective study used the National COVID Cohort Collaborative database and identified adult patients (≥18 years) with a TBI diagnosis based on ICD-10 codes within 10/01/2015-01/31/2023.
- Patients with a diagnosis of MDD or other psychiatric disorders, on antidepressants, or antianxiety medications prior to TBI diagnosis were excluded.
- Healthcare resource utilization (HCRU) was identified through procedure occurrences, visit occurrences, and inpatient length of stay throughout a 3-year follow-up.
- Chi-squared and T tests were run to determine significant differences among groups; significance was determined by $p<0.05$.

RESULTS

- Of the 18,924 individuals identified, 2,889 (15.27%) developed *de novo* MDD after TBI and 16,035 did not **(Table 1)**
- The difference in the number of individuals developing MDD was significant between males and females ($p<0.01$), Caucasians and African Americans ($p<0.01$), and private and commercial payers ($p<0.05$) **(Table 1)**
- HCRU (visits and procedures per individual) was statistically significant in the MDD vs non-MDD cohorts 3 years post-index and similar trends were found at 0.5-, 1-, and 2-years post-index **(Figures 1-3)**

TABLE 1. Patient Characteristics

	MDD Cohort (N=2,889)	Non-MDD Cohort (N=16,035)
Age, years ± SD	60 ± 19	58 ± 20
Race, n (%)		
White or Caucasian	2,218 (76.8%)	10,811 (67.4%)
Black or African American	340 (11.8%)	2,607 (16.3%)
Asian	50 (1.7%)	610 (3.8%)
Native Hawaiian or Other Pacific Islander	7 (0.2%)	113 (0.1%)
American Indian or Alaska Native	10 (0.4%)	61 (0.4%)
More than One Race	1 (0.03%)	6 (0.04%)
Other	5 (0.2%)	126 (0.8%)
Unknown	258 (8.9%)	1,701 (10.6%)
Gender, n (%)		
Male	1,592 (55.1%)	10,870 (67.8%)
Female	1,297 (44.9%)	5,161 (32.2%)
Ethnicity, n (%)		
Not Hispanic or Latino	2,373 (82.1%)	13,240 (82.6%)
Hispanic or Latino	237 (8.2%)	1,350 (8.4%)
Other	1 (0.03%)	13 (0.1%)
Unknown	278 (9.6%)	1,432 (8.9%)
Mental Health Disorder Developed Post-Index, n (%)		
Anxiety	1,668 (57.7%)	2,102 (13.1%)
Schizophrenia	88 (3.1%)	183 (1.1%)
Bipolar Disorder	215 (7.4%)	307 (1.9%)
Substance Use Disorder	7 (0.2%)	52 (0.3%)
Obsessive Compulsive Disorder	3 (0.1%)	3 (0.02%)
None	908 (31.4%)	13,388 (83.5%)
Positive COVID-19 Diagnosis, n (%)		
Before Index	8 (0.3%)	420 (2.6%)
Within 6 months Post-Index	57 (2.0%)	834 (5.2%)
Payer Type, n (%)		
Public (Medicare, Medicaid, Other Gov Coverages)	533 (18.4%)	1,883 (11.7%)
Commercial (Private Insurance)	217 (7.5%)	3,724 (23.2%)
Other	2,139 (74.1%)	10,428 (65.0%)

- Mean inpatient length of stay durations were also statistically different for the MDD cohort at the 3-year post-index mark **(Table 2)**
- No differences were seen between the MDD and Non-MDD cohorts in the mean length of stay from 0.5 years to 3 years post-index **(Table 2)**

FIGURE 1. Mean Number of Procedures

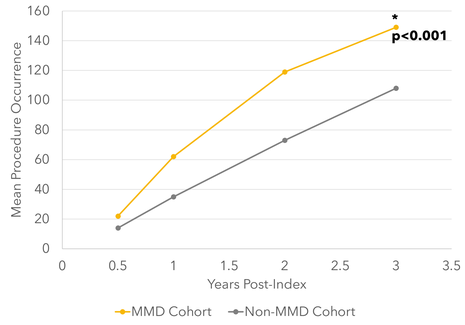

FIGURE 2. Mean Outpatient Visits

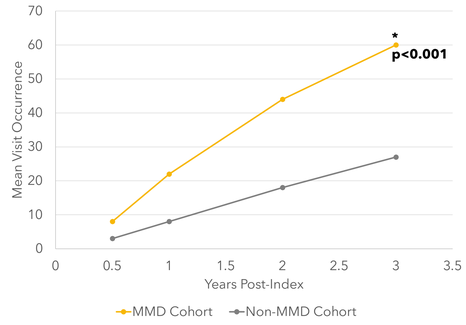

FIGURE 3. Mean Inpatient & Emergency Room Visits

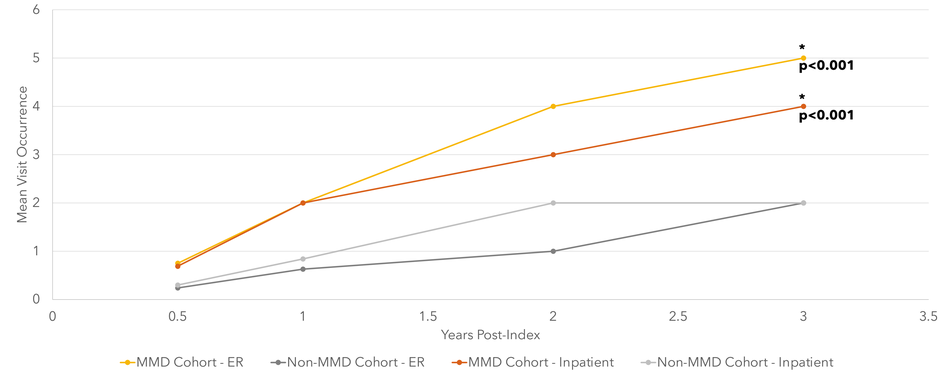

TABLE 2. Mean ± SD Inpatient Length of Stay

Years Post Index	MDD Cohort	Non-MDD Cohort	*p*-value
0.5	5 days ± 11	6 days ± 14	p<0.001
1	6 days ± 15	6 days ± 15	1.0
2	6 days ± 17	6 days ± 15	1.0
3	6 days ± 17	6 days ± 15	p<0.001

CONCLUSIONS

- This study highlights the associations between the *de novo* development of MDD following a TBI and gender, race, and payer type.
- Furthermore, we have found that *de novo* MDD after a TBI is associated with higher all-cause HCRU, as reflected by the number of procedures and visit types.
- Future studies are needed to assess these disparities in other datasets.

REFERENCES

[1] Jorge RE et al. *Arch Gen Psychiatry*, 2006 [2] Fann JR et al. *Journal of Neurotrauma*, 2009 [3] Johnson LW et al. *Brain Sci*, 2023 [4] Nishimura S et al. *Value in Health,* 2022 [5] Kinney AR et al. *J Head Trauma Rehabil*, 2023 [6] Assari S. *Brain Sci*, 2017 [7] Braveman p et al. *Public Health Rep*, 2014 [8] Bombardier CH et al. *JAMA*, 2010