ABI JOURNAL CLUB

"Association of Traumatic Brain Injury With the Risk of Developing Chronic Cardiovascular, Endocrine, Neurological & Psychiatric Disorders"

Izzy S, Chen PM, Tahir Z, et al. Association of Traumatic Brain Injury With the Risk of Developing Chronic Cardiovascular, Endocrine, Neurological, and Psychiatric Disorders. *JAMA Netw Open.* 2022;5(4):e229478. doi:10.1001/jamanetworkopen.2022.9478

Melanie Dunlop, NP: ABI Services

Disclaimer

The goal of the ABI Journal club is to foster skills of research critique, promote interprofessional interaction and encourage the inclusion of evidence-based practice. Please join us in creating a safe and approachable learning environment. Please note that although presenters may have an interest in the article that is presented, they may not necessarily be an expert in that field.

LAND ACKNOWLEGEMENT

The Nova Scotia Rehabilitation & Arthritis Center (NSRAC) is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People, and we acknowledge them as the past, present, and future caretakers of this land.

This territory is covered by the "Treaties of Peace and Friendship" which Mi'kmaq Wəlastəkwiyik (Maliseet), and Passamaquoddy Peoples first signed with the British Crown in 1725. The treaties did not deal with surrender of lands and resources but in fact recognized Mi'kmaq and Wəlastəkwiyik (Maliseet) title and established the rules for what was to be an ongoing relationship between nations. We are all Treaty people.

Mi'kma'ki includes all of Nova Scotia, Prince Edward Island, part of New Brunswick, the Gaspé region of Quebec, part of Maine, and southwestern Newfoundland.

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Association of Traumatic Brain Injury With the Risk of Developing Chronic Cardiovascular, Endocrine, Neurological, and Psychiatric Disorders

Why is this a good paper to read for journal club?

Relevant

Applicable

Highlights the importance of primary prevention & primary care

How/why did you pick it?

Will I get dementia from my TBI?

Library services- Data bases- PUBMED- targeted search

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Traumatic Brain Injury & risk for chronic disease development

Relevant to primary care, acute care, public health, mental health services, ALC, school system, corrections

TBI has estimated worldwide incidence of 64 to 74 million cases per year and is the leading cause of morbidity and mortality.

Registry based studies showed increased risk of cardiovascular & metabolic disorders, Epilepsy, Stroke & Depression in chronic phase

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HISTORICAL INITATIVES

Most previous studies relied on self report, focused on older age groups, or included patients with TBI with pre-existing co-morbidities

2021- the authors found higher risk for developing multisystem medical and behavioral comorbidities in previously healthy patients who sustained a concussion.

WHAT WERE THE INTENDED OUTCOMES OF THIS RESEARCH?

To assess the incidence of cardiovascular, endocrine, neurological and psychiatric comorbidities in patients with mild TBI (mTBI) or moderate to severe (msTBI) and analyze associations between post-TBI comorbidities and mortality

Conditions were based on International Classification of Diseases (ICD-9) or International Statistical Classification of Diseases and Related Health Problems (ICD-10)

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ICD purpose and uses

As a classification and terminology ICD-11:

- allows the systematic recording, analysis, interpretation and comparison of mortality and morbidity data collected in different countries or regions and at different times;
- ensures semantic interoperability and reusability of recorded data for the different use cases beyond mere health statistics, including decision support, resource allocation, reimbursement, guidelines and more.

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Participants

De-identified data

Research patient data registry

Exposed group:

18+ with 1+ visit for mTBI or msTBI between 2000-2015 AND at least 1 follow up visit from 6 months-10 years after TBI event.

Unexposed group: matched for age, race, and sex. Index date was random hospital/outpatient visit

*Hx of TBI or comorbidity of interest excluded

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METHODS

IRB: Mass General Brigham Institution
Followed Observational Studies in Epidemiology (STROBE) Guidelines
No Informed Consent
Patient selection through RPDR
Used mTBI and msTBI definitions from Centers of Disease Control & Prevention criteria
Used ICD-9 & ICD-10 to define 21 comorbidities
Risk & time of development was identified as the first date after the indexed accident that each co-morbidity was first documented in the health record.

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses

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Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time
		Case-control study—Report numbers in each exposure category, or summary measures of exposure
		Cross-sectional study—Report numbers of outcome events or summary measures
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

METHODS

Stats!
Mean & median
Cox proportional models: regression model that looks for associations between the survival time of patients and one or more predictor variables.
Proportional hazards assumption: relative hazard remains constant over time with different predictor or covariate levels.
Compared number of visits before comorbidity diagnosis between groups
Significance was P<.05
Used Rstudio V4.0.2

RESULTS

49000 patients identified, 4351 mTBI & age, sex, frequency, race matched for msTBI & non-exposed

45% women

Most common mechanism of injury: fall

TBI and non-exposed group has similar visit frequency before indexed accident. TBI group > non-exposed group post indexed accident.

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RESULTS

mTBI & msTBI > risk for cardiovascular, endocrine, neurological & psychiatric diseases.

HTN, Hyperlipidemia, obesity, CAD, Diabetes, Dementia, psychotic disorders, risk for TIA & stroke

2/3 outcomes showed no association between number of clinical visits and higher co-morbidity diagnosis (encounter bias)

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Age stratification:

18-40= > risk for cardiovascular disease (HTN), post traumatic seizures, & psychiatric disorders

mTBI= >risk of Hyperlipidemia & Diabetes

41-60 >risk of cardiovascular, psychiatric, and neurological disorders

msTBI= >risk of TIAs & stroke

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Age stratification:

60+= > risk of cardiovascular & neuropsychiatric comorbidities

mTBI= >risk for anxiety

msTBI=>risk of psychosis & seizures

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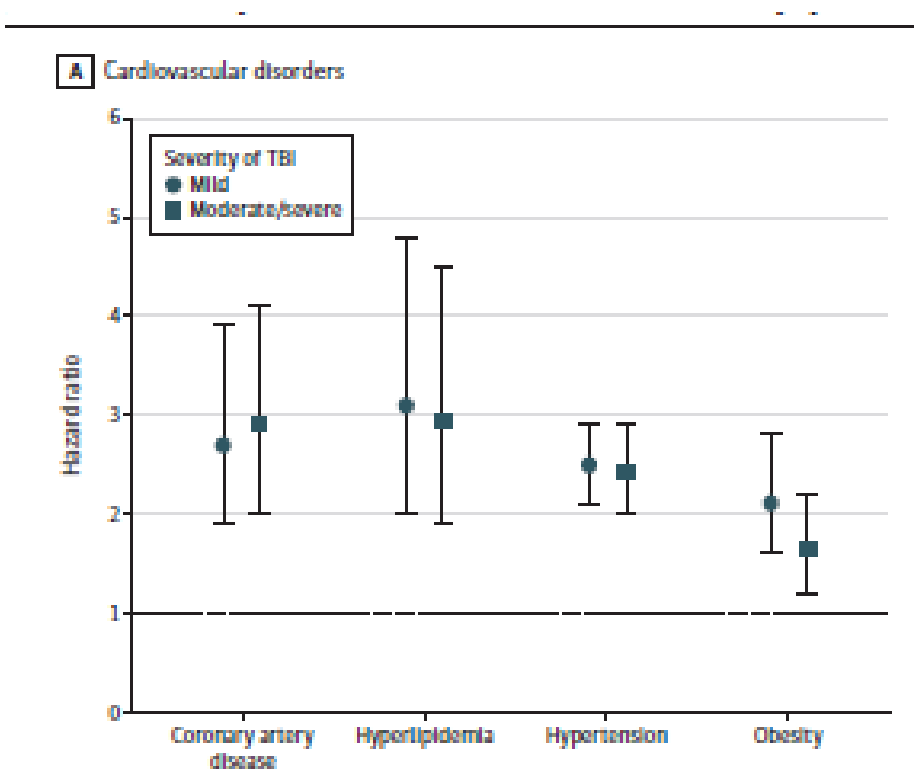
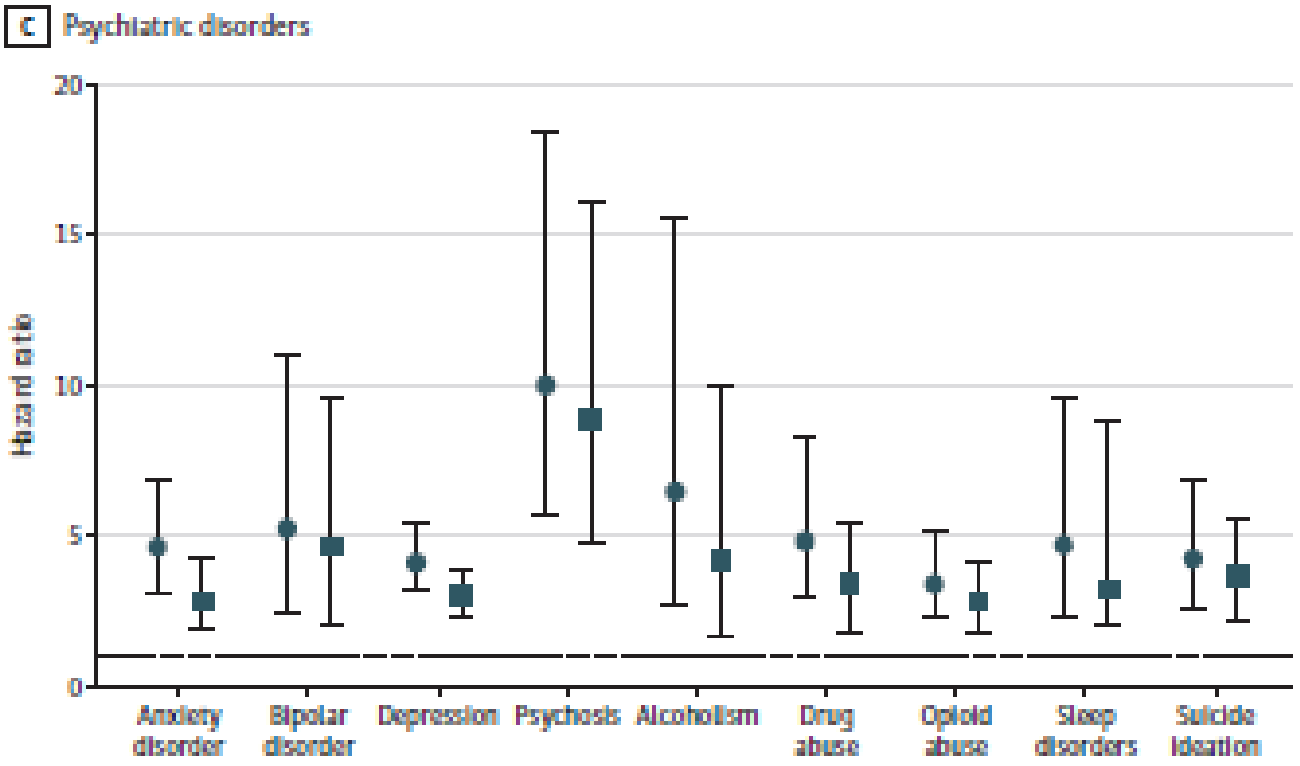
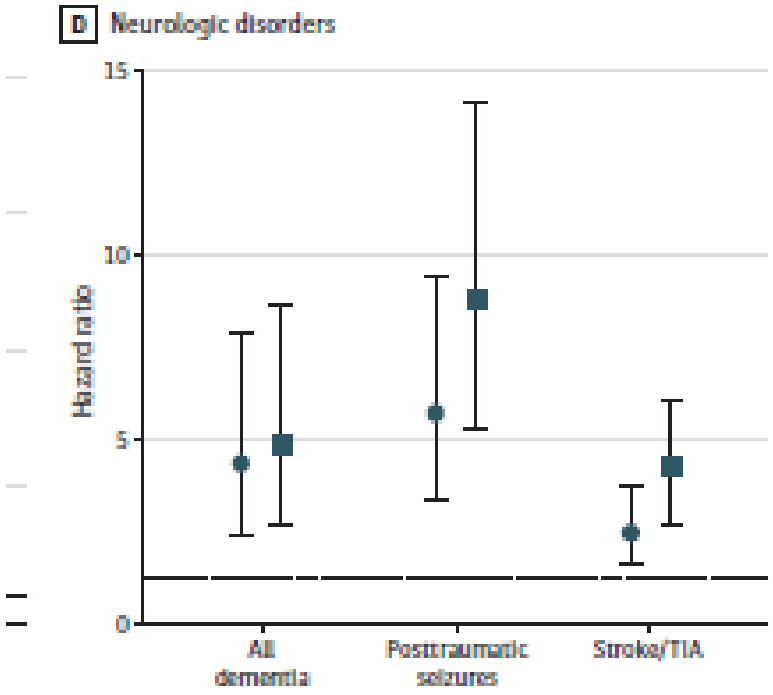
Cardiovascular disorders: Mild & Moderate/Severe TBI



Psychiatric disorders: Mild & Moderate/Severe TBI



Neurological disorders: Mild & Moderate/Severe TBI



AUTHOR'S CONCLUSIONS

This cohort study found that patients with mTBI and msTBI were at increased risk of developing long term cardiovascular, endocrine, psychiatric, and neurological comorbidities.

Possible explanations include behavioral and lifestyle changes, including physical inactivity, unhealthy diet, social isolation, systemic metabolic changes, or increased propensity for other risk diseases, including sleep disorders and depression.

Higher risk of comorbidities after TBI likely represents a combination of direct (hormonal and inflammatory changes caused by injury) and indirect factors (psychosocial risk factors).

These findings suggest a need for proactive screening of chronic systemic diseases after brain injury of any severity.

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JOURNAL ARTICLE EVALUATION

Are the methods described in sufficient detail? Do they make sense? Should they have done something differently?

Did they evaluate the method appropriately?

Did the authors make unrealistic simplifying assumptions?

Were there any issues with sampling? Do the participants adequately reflect that the group that they represent?

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Was this paper published in the right journal to find the audience who should care the most about it?

Can the results be used in your practice setting? How generalizable are the results?

What might come next?

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SUMMARY

REFERENCES & RECOMMENDED READING

INSERT CITATION FOR THIS PAPER AND ANY OTHER SOURCES USED TO SUPPORT BACKGROUND UNDERSTANDING.

Altman, R. & Bagley, S. (2012). BMI Journal Club Template.

Izzy S, Chen PM, Tahir Z, et al. Association of Traumatic Brain Injury With the Risk of Developing Chronic Cardiovascular, Endocrine, Neurological, and Psychiatric Disorders. *JAMA Netw Open.* 2022;5(4):e229478. doi:10.1001/jamanetworkopen.2022.9478

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http://anniesplacecafe.ca/

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CONTACT INFORMATION

Melanie.dunlop@nshealth.ca