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Prevalence of Self-Reported Head Injury in the United States

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TO THE EDITOR:

Head injury is associated with substantial morbidity and mortality,¹ but the extent of the problem in the general U.S. population has not been well characterized. We studied a nationally representative sample in the United States from the 2011–2014 National Health and Nutrition Examination Survey (NHANES) cohort (a description of the methods is provided in the Supplementary Appendix, available with the full text of this letter at [NEJM.org](https://www.nejm.org)) to estimate the prevalence of head injury and its associated risk factors. In a cross-sectional analysis, we assessed head injury among 7399 participants 40 years of age or older with the use of the question, “Have you ever had loss of consciousness because of a head injury?”

The prevalence of self-reported head injury among U.S. adults 40 years of age or older was 15.7% (95% confidence interval, 14.2 to 17.2) (Table 1, and Fig. S1 in the Supplementary Appendix). In estimates from two models, the prevalence was higher among men (20.0%) than among women (12.0%) and was highest among non-Hispanic white respondents (18.0%) and lowest among non-Hispanic black respondents (8.9%). Smoking, health that was reported by the respondent as fair or poor, sleep disorders and shorter nightly sleep duration, heavy alcohol consumption, a history of stroke, and depressive symptoms were associated with head injury. Head injury was most common among respondents with a college education (17.3% of whom reported a head injury) but also occurred at high frequency among those with lower family income (16.4%), as compared with respondents with other levels of education and income.

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Disclosure forms provided by the authors are available with the full text of this letter at [NEJM.org](https://www.nejm.org).

Previous estimates of the prevalence of head injury have ranged from 7% to 60% in selected populations.² Our results, including a prevalence of head injury that was higher in populations with stroke or depression than in those without these conditions, are broadly consistent with those of other population-based studies.³ Because of the cross-sectional nature of our study, we cannot determine whether factors such as sleep disorders, stroke, heavy consumption of alcohol, and depression are causes or consequences of head injury.

Our study was limited by the use of self-reported head injury, which may be subject to recall bias, although self-report definitions of head injury have been validated.^{4,5} We did not have information on the time of injury in relation to the survey, and we may have underestimated the total number of head injuries, since NHANES excluded certain high-risk populations, including active duty military personnel, nursing facility residents, and prisoners.

Approximately 23 million U.S. adults 40 years of age or older reported a history of head injury with loss of consciousness. The high prevalence of head injury in the general population and its links with neurologic and psychiatric conditions suggest that research into the causes and consequences of head injury in the general population and in subgroups would be valuable.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. McMillan TM, Weir CJ, Wainman-Lefley J. Mortality and morbidity 15 years after hospital admission with mild head injury: a prospective case-controlled population study. *J Neurol Neurosurg Psychiatry* 2014;85:1214–20. [PubMed: 24623794]
2. Frost RB, Farrer TJ, Primosch M, Hedges DW. Prevalence of traumatic brain injury in the general adult population: a meta-analysis. *Neuroepidemiology* 2013;40:154–9. [PubMed: 23257914]
3. Corrigan JD, Selassie AW, Orman JA. The epidemiology of traumatic brain injury. *J Head Trauma Rehabil* 2010;25:72–80. [PubMed: 20234226]
4. Wilmoth K, LoBue C, Clem MA, et al. Consistency of traumatic brain injury reporting in older adults with and without cognitive impairment. *Clin Neuropsychol* 2018;32:524–9. [PubMed: 28988512]
5. Corrigan JD, Bogner J. Initial reliability and validity of the Ohio State University TBI Identification Method. *J Head Trauma Rehabil* 2007;22:318–29. [PubMed: 18025964]

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Table 1.

Prevalence of Head Injury with Loss of Consciousness, Overall and According to Risk Categories. *

Risk Factor	Prevalence of Head Injury	Odds Ratio (95% CI)	
		Model 1 [†]	Model 2 [‡]
	<i>percent</i>		
Overall	15.7±0.77	—	—
Age category			
40–49 yr	16.6±1.53	1 (reference)	1 (reference)
50–59 yr	16.3±1.94	1.07 (0.70–1.65)	1.04 (0.66–1.62)
60–69 yr	17.7±1.42	1.35 (0.76–2.40)	1.29 (0.72–2.29)
70 yr	11.4±0.84	0.95 (0.41–2.24)	0.95 (0.40–2.28)
Sex			
Female	12.0±0.82	1 (reference)	1 (reference)
Male	20.0±1.27	1.81 (1.47–2.23)	1.65 (1.27–2.15)
Race or ethnic group			
Non-Hispanic white	18.0±0.91	1 (reference)	1 (reference)
Non-Hispanic black	8.9±0.91	0.44 (0.35–0.55)	0.45 (0.36–0.57)
Mexican American	10.7±1.55	0.49 (0.34–0.72)	0.55 (0.36–0.84)
Other	11.2±1.33	0.55 (0.43–0.70)	0.60 (0.47–0.77)
Education			
Less than high school	11.9±1.18	1 (reference)	1 (reference)
High school or equivalent	14.5±1.07	1.09 (0.84–1.40)	1.18 (0.91–1.54)
Some college or above	17.3±0.92	1.29 (1.02–1.63)	1.52 (1.17–1.99)
Family income			
350% of the federal poverty level	15.9±1.36	1 (reference)	1 (reference)
130–349% of the federal poverty level	14.9±1.33	1.01 (0.79–1.29)	1.07 (0.84–1.37)
<130% of the federal poverty level	16.4±0.91	1.22 (0.96–1.55)	1.37 (1.04–1.81)
Nightly sleep duration			
<6 hr	22.7±2.03	1.86 (1.47–2.36)	1.87 (1.45–2.40)
6–8 hr	14.7±0.80	1 (reference)	1 (reference)
9 hr	14.2±2.19	1.04 (0.69–1.58)	1.04 (0.69–1.56)
History of diagnosed sleep disorder			
No	14.8±0.79	1 (reference)	1 (reference)
Yes	22.6±1.56	1.58 (1.32–1.90)	1.54 (1.28–1.87)
History of diagnosed stroke			
No	15.5±0.83	1 (reference)	1 (reference)
Yes	20.4±2.73	1.72 (1.15–2.58)	1.68 (1.08–2.61)
Alcohol consumption			
Lifelong nondrinker	9.3±1.27	1 (reference)	1 (reference)
Current or former nonheavy drinker	14.9±0.91	1.33 (0.93–1.88)	1.30 (0.91–1.86)
Current or former heavy drinker	24.7±1.54	2.17 (1.47–3.20)	2.17 (1.47–3.20)
Depressive symptoms			

Risk Factor	Prevalence of Head Injury	Odds Ratio (95% CI)	
No	14.8±0.81	1 (reference)	1 (reference)
Yes	25.5±2.06	2.32 (1.78–3.02)	2.26 (1.69–3.02)

* Plus–minus values are estimates ±SE. Data are from the National Health and Nutrition Examination Survey, 2011–2014, and are from respondents 40 years of age or older. All risk factors were reported by the respondent. The prevalence of head injury with loss of consciousness according to additional risk categories is provided in Table S1 in the Supplementary Appendix. CI denotes confidence interval.

[†] Model 1 included adjustment for age (as a continuous variable), sex, and race or ethnic group.

[‡] Model 2 included adjustment for all variables in model 1 plus education, family income as a percentage of the federal poverty level, physical activity, alcohol consumption, and military status.