Head Injury 25 Years Later – Penn Study Finds Increased Risk of Dementia

Penn Medicine Research Reveals Stronger Associations Between Head Injuries and Dementia Among Women Compared to Men, and Among White Participants as Compared to Black Participants

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PHILADELPHIA—Head injury in the United States is common, with over 23 million adults age 40 or older reporting a history of head injury with loss of consciousness. Many head injuries can be caused by a host of different situations – from car and motorcycle accidents to sports injuries. What's more, it has become increasingly recognized that the effects from head injuries are long-lasting. New research led by the Perelman School of Medicine at the University of Pennsylvania shows that a single head injury could lead to dementia later in life. This risk further increases as the number of head injuries sustained by an individual increases. The findings also suggest stronger associations of head injury with risk of dementia among women compared to among men and among white as compared to among Black populations.

The researchers, whose findings were published today in *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, conducted the investigation using data from the Atherosclerosis Risk in Communities (ARIC) Study, which aimed to uncover associations between head injury and dementia over the span of 25 years in a diverse population in the United States. Previously, data on traumatic brain injury has been limited to select populations, such as military and medical claims databases. These are among the first findings to specifically investigate head injury and dementia risk in both Black and white populations, as well as among both males and females, in a community-based setting.

"Head injury is a significant risk factor for dementia, but it's one that can be prevented. Our findings show that the number of head injuries matter – more head injuries are associated with greater risk for dementia," said lead investigator, **Andrea L.C. Schneider, MD, PhD**, an assistant professor of Neurology at Penn. "The dose-dependence of this association suggests that

prevention of head injury could mitigate some risk of dementia later in life. While head injury is not the only risk factor for dementia, it is one risk factor for dementia that is modifiable by behavior changes such as wearing helmets and seat belts."

The findings show that compared to participants who never experienced a head injury, a history of a single prior head injury was associated with a 1.25 times increased risk of dementia, and a history of two or more prior head injuries was associated with over 2 times increased risk of dementia compared to individuals without a history of head injury. Overall, 9.5 percent of all dementia cases in the study population could be attributed to at least one prior head injury.

To illustrate the relationship between dementia and head injuries, the authors gathered data from a diverse cohort with a mean baseline age of 54 years, comprised of 56 percent female and 27 percent Black participants from four different communities across the United States. Participants were followed for a median of 25 years through up to six in-person visits and semi-annual telephone follow-ups. Data on head injuries of participants was drawn from hospital records, as well as self-reporting from some participants.

Previous research on dementia and traumatic brain injuries suggests that women are at higher risk for dementia compared to men. Additionally, Black populations overall are at higher risk for dementia compared to people who are white. However, few prior studies have evaluated for possible differences in associations of head injury with dementia risk by sex and race.

This data from the ARIC study found evidence that females were more likely to experience dementia as a result of head injury than males. Further, the study showed that although there is increased dementia risk associated with head injury among both White and Black participants, White participants were at higher risk for dementia after head injury compared to Black participants. The authors conclude that more research is needed to better understand reasons for these observed sex and race differences in the association of head injury with dementia risk.

"Given the strong association of head injury with dementia, there is an important need for future research focused on prevention and intervention strategies aimed at reducing dementia after head injury," Schneider said. "The results of this study have already led to several ongoing research projects, including efforts to uncover the causes of head injury-related dementia as well as investigations into reasons underlying the observed sex and race differences in the risk of dementia associated with head injury."

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