The Canadian Journal of Neurological Sciences (2025), **52**, 737–738
doi:10.1017/cjn.2024.311

Canadian Journal of Neurological Sciences
Journal Canadien des Sciences Neurologiques

Commentary

Is Intimate Partner Violence a Risk Factor for Alzheimer's Disease?

Nicole Brzozowski[1,2] and Donald F. Weaver[1,2]

[1]University of Toronto, Toronto, ON, Canada and [2]Krembil Brain Institute, University Health Network, Toronto, ON Canada

Keywords: Alzheimer's; dementia; trauma; domestic abuse; intimate partner violence

Introduction

The term "punch drunk" (dementia pugilistica), coined in the 1920s, describes the long-term neuropathological-neuropsychological effects of repeated traumatic brain injuries (TBIs) suffered by boxers and other contact-sport athletes; this condition is now clinically designated as chronic traumatic encephalopathy (CTE). Numerous studies provide evidence identifying TBIs as a risk factor for dementia, including Alzheimer's disease (AD).[1]

Intimate partner violence (IPV) is physical, sexual or psychological abuse by a current or former intimate partner.[2] Nearly one-third of women experience IPV in their lifetime; of those, a vast majority have sustained at minimum one TBI.[3] Beyond impact injury, additional ischaemic-anoxic injury from manual or ligature strangulation is emerging as an increasingly common component of IPV physical abuse. Indeed, a recent US national survey showed that amongst the 16,507 adults surveyed, 9.7% of women reported IPV strangulation.[4] As well, IPV can lead to depressive-, anxiety- and trauma-related psychological disorders, which themselves may also be risk factors for cognitive decline and AD.[3] Additionally, victims of IPV often suffer from substance abuse, which has likewise been linked to cognitive ageing and the progression of AD.[5]

It is now accepted that repetitive head trauma is a risk factor for AD and other dementias;[6] it is also accepted that repetitive head trauma frequently occurs in IPV. And yet, though the relationship between these two is apparent, the AD-IPV connection remains an understudied and unappreciated societal problem. In his 1969 treatise (*Violence, Peace and Peace Research*) on societal violence, Johan Galtung remarked, "When one husband beats his wife, there is a clear case of personal violence, but when one million husbands keep one million wives in ignorance, there is structural violence."[7] Within this context, our society enables structural violence against women.[7] An important question thus arises: Is AD an unacknowledged consequence of IPV?

Traumatic Brain Injuries, Alzheimer's Disease and Dementia

A 1990 case report by Roberts *et al.*[8] describing a 76-year-old woman with dementia connects the topics of IPV and AD. A woman was found unconscious with head contusions; her relatives disclosed that her husband had been abusive for years. A post-mortem brain examination revealed morphological and immunological characteristics typically reported in patients with CTE. These factors suggested that the woman's IPV-associated brain trauma contributed significantly to the development and progression of her dementia. This case report was published a staggering 60 years after studies began to investigate the long-term effects of brain trauma in retired boxers, highlighting the significant time lag and lack of consideration for CTE outside the sports context, especially for women who bear an overwhelmingly higher risk of IPV. However, TBI research remains heavily focussed on contact sports, leaving the victims of IPV seemingly invisible in this important conversation.

The consequences of TBIs are significant, with some authors even suggesting, although controversially, that even a single TBI may double one's likelihood of developing dementia.[1] Repeated TBIs, especially episodes associated with inflicted structural pathologies, have clearly been identified as risk factors for dementia; a study of 2,223 individuals found that people with dementia were twice as likely to report having had multiple TBIs throughout their lifetime, relative to a first-degree control group.[1] This evidence suggests that experiencing repetitive or moderate-severe TBIs is a risk factor for the development of dementia in later life. TBIs have also been associated with the formation of AD-specific pathological proteins, including hyperphosphorylated tau tangles and β-amyloid (Aβ) plaques.[1] TBIs are highly prevalent amongst victims of IPV, arguably leaving hundreds of millions of women worldwide at increased risk for developing dementia.

Depression, PTSD and Related Mental Illnesses

The risks posed by IPV exceed the physical consequences that many victims experience. Psychological abuse, whether alone or in combination with physical or sexual assault, also inflicts serious effects on the brain. IPV can result in long-term psychological trauma. In an assessment of previously battered women, brain injuries were found to be associated with several psychological disorders including depression, post-traumatic stress disorder and anxiety.[3]

Many psychological disorders, including depression, share neurobiological pathways with AD.[4] Dysregulation of the hypothalamic-pituitary-adrenal axis leads to hippocampal atrophy, often resulting in memory impairment and cognitive decline in both AD and depression.[9] Patients with AD and depression also exhibit increased deposition of Aβ plaques and neurofibrillary tangles, compared to controls.[9] Additionally, depression and acute

Corresponding author: Donald F. Weaver; Email: donald.weaver@uhnresearch.ca

Cite this article: Brzozowski N and Weaver DF. (2025) Is Intimate Partner Violence a Risk Factor for Alzheimer's Disease?. *The Canadian Journal of Neurological Sciences* **52**: 737–738, https://doi.org/10.1017/cjn.2024.311

© The Author(s), 2024. Published by Cambridge University Press on behalf of Canadian Neurological Sciences Federation.

https://doi.org/10.1017/cjn.2024.311 Published online by Cambridge University Press

stress can lead to the overproduction of pro-inflammatory cytokines (IL-1β, IL-6, TNF-α), which are characteristic of AD and related dementias.[9]

Women experiencing IPV may not disclose their psychological symptoms out of fear, shame or guilt, ultimately reducing the true salience of the effects of IPV. Furthermore, due to the underrepresentation of IPV in AD research, there are minimal resources for victims. Thus, there is a vital need for more research on the relationship between IPV, depression and AD; the victims of IPV need to be fully aware of possible long-term health consequences.

Addiction

The interconnected nature of substance addiction in IPV victims and its association with AD likewise warrants further study. Perpetrators may use illicit drugs, medications or alcohol as a means of control, preventing the victim from defending themselves physically and financially. Victims may become reliant on their intimate partners for access to these substances. Additionally, victims may self-medicate to cope with the psychological stress of IPV. Addiction is a comorbidity of IPV, with studies revealing that nearly half of the women who visit a shelter after IPV exposure meet the criteria for alcohol use disorder.[3] Additionally, studies have noted that opiate use is four times higher among victims of IPV who seek medical care than in the general population.[3]

Substance abuse increases the risk of AD by impacting memory and cognitive function.[10] For instance, excessive ethanol consumption is associated with the release of pro-inflammatory cytokines, further contributing to neuroinflammation and neurodegeneration. Moreover, opiate abuse is linked to increased brain levels of hyperphosphorylated tau.[5]

Unfortunately, addiction frequently persists long term, predisposing victims to ongoing risk. Addiction may lead to the loss of employment, social isolation and housing instability; accordingly, women who suffer from addiction may find themselves in dangerous situations, in contact with other drug users and potentially exposed to even more IPV. Moreover, the associated social isolation is likewise a risk for AD.[11] Thus, the relationship between IPV, addiction and AD is intricately interconnected and complex.

Concluding Statements

The issue of IPV and its connection to AD is multifaceted with evidence suggesting a potential link between repetitive or moderate-severe TBIs, psychological disorders, addiction and AD in women who have experienced IPV. This commentary, while not exhaustive, highlights a number of crucial observations as well as the need for more research to address the long-term ramifications of this important societal problem. Given the fact that women have a higher risk of developing dementia than men, recognising and addressing the risk factors for AD in women especially in the context of geriatrics and women's brain health is a research priority – a priority that demands tangible results.[12] Primary research to address these important issues is needed. Moreover, possible gender bias in this research must be addressed since TBI research has traditionally focussed on male-centric activities such as contact sports.

Is it time to do something about it? This commentary is a call for research to address these questions. Violence against women is a global problem – an increased risk for AD may be an under-acknowledged consequence of this violence.

Author contributions. DFW originated the concept; NB wrote the first draft; NB and DFW prepared the second draft and subsequent edits.

Funding statement. DFW acknowledges salary support from the Krembil Foundation. The preparation of this document was unfunded.

Competing interests. The authors declare no competing interests.

References

1. Brett BL, Gardner RC, Godbout J, Dams-O'Connor K, Keene CD. Traumatic brain injury and risk of neurodegenerative disorder. *Biol Psychiatry*. 2022;91:498–507.
2. Patra P, Prakash J, Patra B, Khanna P. Intimate partner violence: wounds are deeper. *Indian J Psychiatry*. 2018;60:494–498.
3. Mehr JB, Bennett ER, Price JL, et al. Intimate partner violence, substance use, and health comorbidities among women: a narrative review. *Front Psychol*. 2023;13:1–3.
4. Black MC, Basile KC, Breiding MJ, et al. *The National Intimate Partner and Sexual Violence Survey (NISVS): 2010 summary report*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention; 2011. https://www.cdc.gov/violenceprevention/pdf/nisvs_report2010-a.pd.
5. Majtenyi K, Lutz MI, Hurd YL, Keller E. Heroin abuse exaggerates age-related deposition of hyperphosphorylated tau and P62-positive inclusions. *Neurobiol Aging*. 2015;36:3100–3107.
6. Li Y, Li Y, Li X, et al. Head injury as a risk factor for dementia and Alzheimer's disease: a systematic review and meta-analysis of 32 observational studies. *PLoS One*. 2017;12:e0169650.
7. GaltungJ. Violence, peace, and peace research. *J Peace Res*.1969;6:167–191.
8. Roberts GW, Whitwell HL, Acland PR, Bruton CJ. Dementia in a punch-drunk wife. *Lancet*. 1990;335:918–919.
9. Byers AL, Yaffe K. Depression and risk of developing dementia. *Nat Rev Neurol*. 2011;7:323–331.
10. Hulse GK, Lautenschlager NT, Tait RJ, Almeida OP. Dementia associated with alcohol and other drug use. *Int Psychogeriatr*. 2005;17 Suppl 1: S109–S127.
11. Guarnera J, Yuen E, Macpherson H. The impact of loneliness and social isolation on cognitive aging: a narrative review. *J Alzheimers Dis Rep*. 2023;7:699–714.
12. Fratiglioni L, Viitanen M, von Strauss E, Tontodonati V, Herlitz A, Winblad B. Very old women at highest risk of dementia and Alzheimer's disease: incidence data from the Kungsholmen Project, Stockholm. *Neurology*. 1997;48:132–138.

https://doi.org/10.1017/cjn.2024.311 Published online by Cambridge University Press