



Battered and Brain Injured: Traumatic Brain Injury Among Women Survivors of Intimate Partner Violence—A Scoping Review

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Abstract

Objectives: The objective of this scoping review is to examine the extent, range, and nature of literature targeting health-care professionals on the prevalence and outcome of intimate partner violence (IPV)-related traumatic brain injury (TBI). The purpose is to gain an understanding of prevalence, investigate screening tool use, generate IPV/TBI-specific support recommendations, and identify suggestions for future research. **Method:** The review was guided by Arksey and O'Malley's five stages for conducting a scoping review. A comprehensive search of nine databases revealed 1,739 articles. In total, 42 published research papers that focused specifically on TBI secondary to IPV were included in the study. **Synthesis:** The literature reports inconsistencies in prevalence rates from IPV-related TBI. There are no current standardized screening practices in use, though the literature calls for a specialized tool. Frontline professionals would benefit from education on signs and symptoms of IPV-related TBI. Empirical studies are needed to generate reliable data on prevalence, experience, and needs of brain-injured survivors of TBI. **Conclusions:** Findings from this study demonstrate the need for the development of an IPV-sensitive screening tool, more accurate data on prevalence, an interprofessional approach to care, and raised awareness and education on the diffuse symptoms of IPV-related TBI.

Keywords

traumatic brain injury (TBI), intimate partner violence (IPV), women's health, scoping review

Traumatic brain injury (TBI) is a serious consequence of intimate partner violence (IPV) that is often overlooked or misdiagnosed (Corrigan, Wolfe, Mysiw, Jackson, & Bogner, 2003; St. Ivany & Schminkey, 2016). IPV-related TBI can have debilitating long-term effects on a survivor's overall function and independence and may masquerade as a number of other physical, social, and mental health issues, preventing survivors from receiving appropriate intervention by health and community professionals (Iverson & Pagoda, 2015; Kwako et al., 2011). Research and guidance for professionals working in this community is limited, despite the resounding call throughout the literature for increased awareness of this population across diverse fields of practice, study, and sites of triage.

IPV encompasses physical, sexual, and emotional abuse, and controlling behaviors, inflicted by an intimate partner (World Health Organization [WHO], 2016). While sex workers are often excluded from this group, there are many shared experiences of violent encounters linked to intimate relationships between women exposed to IPV and sex workers (Baumann et al., 2018; Farley, Banks, Ackerman, & Golding, 2018), as such, we have chosen to include sex workers in this review. The WHO estimates one in three women throughout the world

will experience IPV in their lifetime (WHO, 2017). According to recent Canadian statistics, rates of self-reported spousal violence range from 4% to 8% across provinces (Statistics Canada, 2016). It is estimated that 42% of women survivors experience injury as a result of IPV (Statistics Canada, 2016). The most common injuries are from battery to the face, head, and neck, a pattern of violence leaving survivors vulnerable to TBI (Sheridan & Nash, 2007).

TBI is defined as “an alteration in brain function or other evidence of brain pathology, caused by an external force” such as a blow or injury to the head, severe rotation of the neck, and acceleration/deceleration movement (Menon, Schwab, Wright, & Maas, 2010, p. 1638). Classifications of severity are typically assessed through tests measuring loss of consciousness, post-traumatic amnesia, and postincident deficits. It is a leading

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cause of disability worldwide and is more prevalent than breast cancer, spinal cord injury, HIV/AIDS, and multiple sclerosis combined (Haag et al., 2016). While brain injury caused by lack of oxygen through strangulation is technically classified as anoxic or hypoxic injury, resultant challenges closely resemble TBI and both conditions are treated in the same manner (Cullen & Weisz, 2011). As such, we, along with others, have chosen to include IPV-related strangulation injuries (Campbell et al., 2018; Kwako et al., 2011; St. Ivany & Schminkey, 2016; Valera & Kucyi, 2017; Valera et al., 2018).

TBI as a consequence of injuries in football, hockey, soccer, and military service are areas of increasing interest (Schneuer et al., 2018; St. Ivany & Schminkey, 2016; Zetterberg et al., 2018). Public awareness of the concussion crisis in sports and the military has increased, including the long-term effects of a condition found in athletes with a history of repeated brain trauma called chronic traumatic encephalopathy (CTE). However, notwithstanding the mechanism of injury, symptom sequelae, and prognosis of CTE being comparable, IPV-related TBI remains understudied, despite indications of increased prevalence rates (Goldin, Haag, & Trott, 2016; Kwako et al., 2011; St. Ivany & Schminkey, 2016; Valera et al., 2018).

Exposure to TBI through IPV tends to be long term in nature. Women are often exposed to repeated violent encounters before calling police, go through numerous attempts before permanently leaving an abuser, and are at the highest risk of being murdered when attempting to leave or report (Banks, 2007; Car, 2000). Repeated trauma to the head can cause brain tissue degeneration resulting in fatigue, depression and mood changes, memory loss, confusion, aggression, impaired judgment, and difficulty with everyday tasks and can lead to dementia and other chronic health conditions (Langlois, Rutland-Brown, & Wald, 2006). Women exposed to IPV are twice as likely to experience depression, and nearly twice as likely to have alcohol use disorders, compared to women who have not experienced IPV (WHO, 2017).

It is difficult to estimate the impact of this issue and provide appropriate care for survivors without adequate means to measure and understand the relationship between IPV and TBI. Whereas there are distinct bodies of literature examining IPV and TBI, respectively, relatively few studies directly address the correlation between them. While there are some excellent existing literature reviews exploring the link between IPV and TBI, which are informative and relevant in nature and content, they did not use systematic data collection nor do they cover the full scope of the literature available (Banks, 2007; Kwako et al., 2011; Murray, Lundgren, Olson, & Hunnicutt, 2016; St. Ivany & Schminkey, 2016). Since the last literature reviews available, there have been numerous additional studies published on IPV-related TBI. Therefore, we undertook this scoping review with the following objectives: (a) determine how the literature understands the relationship of IPV and TBI, (b) summarize prevalence of IPV-related TBI as reported in current literature, (c) determine what screening tools are being used to identify TBI in IPV survivors, (d) develop IPV/TBI support recommendations

for health-care professionals and support personnel, and (e) identify suggestions for future research.

Method

Scoping review methodology (Arksey & O'Malley, 2005; Levac, Colquhoun, & O'Brien, 2010) is used to collect all relevant studies and determine whether a full systematic review is warranted when the scope of existing literature is known to be limited. The systematic nature of this approach to sampling ensures that the search is repeatable and comprehensive, while identifying gaps in knowledge and areas of future study (Arksey & O'Malley, 2005). Although the authors acknowledge that IPV takes many forms and affects other related populations, the study focused on IPV-related TBI in women, addressing a previously identified need to highlight gender differences and complications unique to women and TBI (Haag et al., 2016).

The study followed five major steps of scoping review as outlined by Levac, Colquhoun, and O'Brien (2010): (a) identify the research question, (b) identify relevant studies, (c) select studies, (d) chart data, and (e) collate, summarize, and report the results. Our preliminary search for data was guided by the following research question: To what extent does health-care literature recognize the correlative relationship of TBI and IPV?

The search strategy was designed in consultation with an expert librarian. Nine major health science databases were searched: OVID Medline, Cochrane, CINAHL, EBSCO, Embase, ASSIA, PsycINFO, Scopus, and Web of Science. To qualify for inclusion, each article was required to be peer reviewed, available in English, and explicitly address the intersection of TBI and IPV. In an effort to draw all relevant literature, our search was delimited by time frame. Articles selected corresponded with a paired combination of the following two key word categories:

- domestic violence, spousal abuse, intimate partner violence (IPV), interpersonal violence, battered women, intimate violence,
- traumatic brain injury (TBI), concussion, head injury, post-concussion syndrome, strangulation, choking, face injury, neck injury

An additional manual search was conducted from the reference lists of each included study. The research team developed specific inclusion and exclusion criteria and a three-stage process was completed to identify all relevant articles. In the first stage, two researchers independently completed an initial title review and articles were included based on appropriateness of the title. In the case consensus could not be reached, a third author was consulted and/or it was included in the abstract review. Articles were primarily excluded because they (a) lacked relevance to TBI and IPV, (b) focused on children, (c) addressed IPV or TBI as distinct or unrelated, or (d) emphasized the perpetrator role. Once the title review was completed,

an abstract review was done following the same procedures, and then, full consideration of each remaining article, to determine final suitability for inclusion.

Results

The initial search returned 1,739 articles and, with the addition of a hand search by three authors, 42 articles were included in the final sample. Three researchers independently extracted data and compared findings to ensure consistency, using a charting form to organize key variables. The extracted data were then organized into the following four key domains: (a) estimates of prevalence, (b) screening tools and identification procedures for IPV-related TBI, (c) recommendations for health-care professionals, and (d) recommendations for future research. The results provided below are organized into these domains for clarity of reporting. Article summaries reporting original research are listed in Table 1. Literature reviews, editorials, and invited commentary are reported in Table 2.

Estimates and Reports of Prevalence

Empirical studies reported original prevalence data figures of IPV-related TBI ranging from 19% (Iverson, Dardis, & Pogoda, 2017) to 75% (Valera et al., 2018) and as high as 100% in studies that included only survivors who reported injuries to the head (Roberts & Kim, 2005; St. Ivany et al., 2018a), itemized by study in Table 1. Diagnostic criteria for TBI-related IPV focused on positive history of physical blows to the head, face, and neck, altered or lost consciousness, TBI symptom sequelae, or a combination of these elements. For example, in one study, 100% of the respondents were positive for both history and lasting TBI symptoms (Roberts & Kim, 2005), while another study reported 92% of respondents had a positive history of blows to the head with 40% losing consciousness (Jackson, Philp, Nuttal, & Diller, 2002). In both cases, a TBI diagnosis was inferred. Studies also referred to IPV-related TBI by a number of different words including TBI, mild TBI, head injury, and concussion, so a positive screen may be named in different ways based on different criteria. History of physical violence to the head, face, and neck was found in anywhere from 35% to 100% (Monohan & O'Leary, 1999; Roberts & Kim, 2005) of respondents in this sample. Estimates of lost consciousness during episodes of physical violence were reported to range from 30% to 81% (Corrigan et al., 2003). One study distinguished between single and multiple episodes of violence resulting in TBI, 100% and 75%, respectively, with strangulation in 25% of these cases (Valera & Kucyi, 2017). Population types included shelter populations (Gutman et al., 2004; Jackson et al., 2002; Monohan & O'Leary, 1999; Roberts & Kim, 2005; Valera & Berenbaum, 2003; Valera & Kucyi, 2017), emergency department and hospital users (Corrigan et al., 2003), survivors in contact with law enforcement (Gagnon & DePrince, 2017), women seeking services in non-IPV specific health-care clinics (Anderson, Stockman, Sabri, Campbell, & Campbell, 2015; Campbell et al., 2018), sex

workers (Baumann et al., 2018; Farley et al., 2018), and veterans (Iverson et al., 2017; Iverson & Pogoda, 2015). Many studies recruited for participants who were undiagnosed but suspected of TBI, some selected only on history of IPV, and others were included based on known TBI diagnosis, which may contribute to the variance of reported rates of prevalence.

A number of nonsystematic literature reviews and editorials were also included. Most reported statistics from empirical studies mentioned above. One study combined empirical data and extrapolations from studies concluding that 30–74% of women exposed to IPV and reporting to emergency departments may have an undiagnosed TBI (Kwako et al., 2011).

Screening Tools and Identification Procedures for IPV-Related TBI

While there are currently no validated tools designed specifically to detect IPV-related TBI, two have been developed by researchers (Ackerman & Banks, 2002; Valera & Berenbaum, 2003), and the HELPS tool has been adapted for use in an IPV context. A recent study examining existing TBI screening tools found that the Ohio State University TBI-Identification Method (OSU-TBI-ID) and the Brain Injury Screening Questionnaire were the two most adaptable for this specialized population as they met the following criteria set out by the authors:

- (1) include prompts relevant to the events that can result in TBI in this population;
- (2) allow for safe and private endorsement of an event;
- (3) offer ease of administration by IPV knowledgeable staff without the need for special training in TBI. (Goldin et al., 2016, pp. 2–3)

Reflecting this gap, many different options were present in the studies reviewed. Four studies used the original HELPS Brain Injury Screening Tool, developed by head trauma specialists for use by individuals without a neurology background (Gagnon & DePrince, 2017; Hux, Schneider, & Bennett, 2009; Jackson et al., 2002; Ziemann, Bridwell, & Cardenas, 2017). The OSU-TBI-ID was used by Baumann and colleagues (2018), while Iverson and colleagues (2017, 2015) used the Modified Veterans Affairs TBI Screening Tool. Other tools included TBI-specific measures, magnetic resonance imaging, neuropsychological batteries, and mood or trauma measures. Self-report demographics and history as well as clinical observation were also frequently used.

Recommendations for Frontline Professionals

The onus of screening, assessment, and triage for IPV largely falls on frontline professionals in health-care and community contexts. As early screening and intervention can lead to improved outcomes, routine screening for TBI when IPV is disclosed or suspected was encouraged by a number of authors (Ackerman & Banks, 2009; Amoroso & Iverson, 2017; Baumann et al., 2018; Campbell et al., 2018; Corrigan et al., 2003; Davis, 2014; Farley et al., 2018; Iverson et al., 2017; Iverson &

Table 1. Data Chart Original Research.

Article	Purpose	Study Design/Population	Key Findings	Screening/Intervention Methods Used	Recommendations for Health Professionals	Recommendations for Future Research
Monohan and O'Leary (1999) USA	Call attention to IPV-related TBI and how social workers can intervene	Descriptive 26 residents of domestic violence shelter	35% of battered women experienced head injury during battering incident	Demographic self-report Assessment of depression self-report Medical history self-report Interview questions related to head trauma Extensive clinical observation	Awareness that battered women rarely report abuse may present as normal or near normal on neuropsychological testing Increase training of shelter workers to screen Advocacy for assessment and medical care by social workers	Use neurological assessment and standardized instruments Compare to control group, community sample of battered women
Jackson, Philip, Nuttall, and Diller (2002) USA	Establish IPV/TBI correlation and illustrate need for appropriate screening and intervention	Descriptive 53 women attending support groups at three battered women's shelters and four community support programs	92% reported having received blows to the head 40% reported loss of consciousness 77% report symptoms consistent with post-concussive symptom(PCS)	HELPS Brain Injury Screening Tool	Routine screening Attend to history of repetitive assaults to head and face Neuropsychological testing Interventions for cognitive, affective, and social impairments Psychosocial and rehabilitation treatment Prescribe medications with caution	Examine effectiveness of psychotherapy in mTBI Develop treatment strategies specific to IPV-related TBI Diverse samples and comparison groups Neurological testing Longitudinal studies considering long-term implications
Corrigan, Wolfe, Mysiw, Jackson, and Bogner (2003) USA	Estimate incidence of IPV-related TBI, identify barriers to identification and intervention and report on impact and consequences	Observational 51 emergency department users	35% were identified as potentially having sustained mTBI 30% reported loss of consciousness 67% report residual problems	Brief survey used during focused interview administered by domestic violence staff	Early evaluation of IPV survivors to identify TBI Prevention of subsequent episodes of TBI	Long-term neurobehavioural and vocational consequences of mTBI Address identified methodological challenges
Valera and Berenbaum (2003) USA	Examine if battered women are sustaining TBI and whether such TBIs are associated with abuse severity, cognitive functioning, or psychopathology	Descriptive 99 shelter and nonshelter women exposed to IPV	74% sustained brain injury from their partner 50% sustained multiple brain injuries TBIs not restricted to shelter population TBI associated with diminished cognitive abilities TBI associated with psychopathology	Conflict Tactics Scale Severity of Violence Against Women Scale Semi-structured Interview Neuropsychological battery PTSD Checklist-5 (PCL-5) Mood and Anxiety Symptom Questionnaire The Penn State Worry Questionnaire Modified Psychoactive Substance Use model	Increased awareness of potential dangers of physically abusive relationships Professionals to learn more about potential effects of brain injury and choking mTBI can be present without any abnormal signs revealed by imaging or neurological examination	Study designs capable of elucidating relationship between number and nature of brain injuries, severity of partner abuse, and cognitive functioning including longitudinal studies and control groups Use of reliable information on past TBI not reliant on self-report Impact on women's functioning Prevalence rates

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Table 1. (continued)

Article	Purpose	Study Design/Population	Key Findings	Screening/Intervention Methods Used	Recommendations for Health Professionals	Recommendations for Future Research
Gutman et al. (2004) USA	Assessment of an intervention for cognitive deficits following IPV-related TBI	Quasi-experimental 26 women with past or present IPV exposure	81% indicated achieving their most favorable outcome postintervention	Intervention addressed cognitive-deficit remediation to support abuse-free living Goal Attainment Scale	Shift of health-care paradigm of treating this population as psychiatric patients to address cognitive deficits of brain damage	Epidemiological studies to determine prevalence rates Develop and assess treatment for resultant cognitive impairment
Roberts and Kim (2005) USA	Examine link between chronic woman battering and head injuries	Qualitative 52 participants randomly selected from a larger exploratory study of 160 chronically battered women which was completed by the first author	100% cases reported injury to the head, face, and neck, and symptoms of mTBI 61% contacted police following worst incidence of violence 38% did not call police or get medical care despite injury severity	Semi-structured interviews	Interprofessional recognition of TBI that may present as mental disorder Computed tomography/neuropsychological tests Biopsychosocial assessment Standardized screening Evidence-based intervention checklist Consent to photograph form and digital camera for documenting injuries Interprofessional workers need accurate information about TBI and its educational, vocational, cognitive, social, emotional, and physical implications	Use variety of data sets from National Crime Victimization Survey and quality assurance records at large medical centers
Hux, Schneider, and Bennett (2009) USA	Document TBI prevalence among high risk populations including IPV survivors	1999 participants in a Midwest state requesting services from any of four organizations in a 6-month period	27% positive for possible history of TBI overall 52% positive for possible TBI in IPV-specific sample	HELPS Brain Injury Screening Tool		N/A
Linton and Kim (2014) USA	Understand demographic characteristics of people who experience violence-resultant TBI	Secondary data analysis of the Arizona Trauma Database consisting of 18 868 cases of TBI between 2008 and 2010	Native Americans and Blacks more likely to experience violent TBI Females, children, and older adults have significantly lower odds of violent TBI	Self-report demographics Medical professional report of etiology	Awareness among professionals of TBI differences among Native Americans and Blacks Encourage patients that experience blunt traumas to receive assessments and treatment for TBI	Data on reasons for blunt trauma Explore factors associated with violent TBI such as perpetrators of traumas, socioeconomic status among Native Americans and Blacks across the life span

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Article	Purpose	Study Design/Population	Key Findings	Screening/Intervention Methods Used	Recommendations for Health Professionals	Recommendations for Future Research
Anderson, Stockman, Sabri, Campbell, and Campbell (2015) USA	Examine the prevalence of injury (including head injury) in African American and Caribbean women who reported IPV	Multisite, case-control study 738 Women between the ages of 18 and 55 years who self-identified as being of African descent	380 women reported experiencing IPV or sexual violence in the last 2 years Head injuries with loss of consciousness were 7.21 times more likely in women reporting recent IPV than in those who not report recent IPV	Abuse Assessment Screen Miller Abuse Physical Symptoms and Injury Scale (MAPSAIS) Women's Experiences of Battering Scale, Danger Assessment, and Severity of Violence Against Women Scale	Women seen in emergency departments with injuries to the head, face, and neck or alterations in consciousness or memory should be considered high risk of IPV and screened in a safe location Standardized IPV screening in hospital settings Continued education for health-care providers in screening, brief intervention, and referral	Develop and test easy to implement hospital and emergency department-based IPV screening and interventions Computer-based methods for screening and referrals
Iverson and Pogoda (2015) USA	Identify occurrence and impact of IPV-related TBI in sample of women veterans	Cross-sectional mail survey 176 women veterans	19% with IPV-related TBI history Increase in depression/PTSD	Modified Veterans Affairs Screening Tool	Routine screening for women for IPV Further screen for IPV-related TBI	Health consequences of IPV including exposure to multiple concussions Longitudinal studies
Linton (2015) USA	Assess odds of experiencing TBI as a result of interpersonal violence among Native Americans	Secondary data analysis of Arizona Trauma Database of 18,944 cases of TBI in Arizona State 2008–2010	Native Americans or other race category patients, females, and those who were insured had higher odds of experiencing interpersonal violence-related TBI	Self-report demographics Medical professional report of etiology	Preventive efforts should be made by educators, elders, and leaders in Native American communities Interprofessional identification and intervention efforts	Collaborate with hospitals to collect primary data about IPV and suspected IPV cases not reported by patients Address association of Native Americans, interpersonal violence, and TBI using national data with larger samples Longitudinal studies to examine prevalence, duration, and course of head injuries and symptoms Neurological/cognitive impact of head injuries on women who have experienced IPV Advance interventions for survivors of IPV with head injuries
Gagnon and DePrince (2017) USA	Screening for lifetime exposure to TBI among women recently exposed to IPV	225 women whose IPV experiences were reported to law enforcement	80% reported lifetime head injury 56% screened positive for mTBI 13% reported injuries to the head during the recent target IPV incident	Demographics HELPS Brain Injury Screening Tool Revised Conflict Tactics Scale	Screening for TBI and PCS should occur at diverse points (e.g., mental health, community-based, criminal justices services) Refer for neuropsychological evaluation and/or appropriate treatment Awareness of cognitive changes associated with TBI	

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Article	Purpose	Study Design/Population	Key Findings	Screening/Intervention Methods Used	Recommendations for Health Professionals	Recommendations for Future Research
Iverson, Dardis, and Pogoda (2017) USA	Identify occurrence of IPV-related TBI and associated PTSD symptoms among young women veterans	Web-based survey of national sample of 224 U.S. women veterans	IPV-related TBI history: 28% IPV-related TBI with current symptoms: 12% Women with IPV-related TBI with current symptoms were 6 times more likely to meet screening criteria for PTSD	30-min anonymous web survey Modified Veterans Affairs Screening Tool Modified HARK Tool PTSD Checklist-5 (PCL-5)	Screening and assessment of both TBI and PTSD Treatment modalities may be integrated or delivered sequentially to address both conditions Neurobehavioural Symptom Inventory Refer for more in-depth diagnosis and treatment	Examine a range of physical and mental health needs to inform clinical practice, with emphasis on depressive symptoms Longitudinal studies examining contextual variables (timing and # of TBIs, health-care utilization) Account for array of etiologies and symptoms of TBI in women veterans
Linton and Perrin (2017) USA	Assess effects of substance use at the time of violent TBI on injury severity and potential mediations by interpersonal violence etiology, BAC, and American Indian race	Secondary data analysis of Arizona Trauma Database of 3,351 cases of violence-related TBI in Arizona State 2008–2010	American Indians with TBI were more likely to experience interpersonal violence and had significantly higher blood alcohol content (BAC) level than other racial groups.	Self-report demographics Medical professional report of etiology Injury Severity Score Abbreviated Injury Scale Toxicology results/BAC level	IPV survivors may have more severe forms of TBI Interprofessional education on IPV-TBI be equipped to identify and obtain resources for survivors Violence prevention strategies should include TBI information	Use post-traumatic amnesia to minimize confound of injury severity and symptoms of intoxication Larger generalizable sample Collect information on specific circumstances of TBI to tease out causal influences
Valera and Kucyi (2017) USA	Examination of brain-network organization associated with TBI and its cognitive effects	Retrospective 20 women recruited from women's shelters, domestic violence programs, and word of mouth	100% reported at least 1 IPV-related TBI 75% reported multiple TBIs 30% reported anoxic or hypoxic effects of strangulation	Semistructured interviews Rivermead Post-Concussion Symptom Questionnaire Neuropsychological battery Conflict Tactics Scale Mood and Anxiety Symptom Questionnaire Clinician Applied PTSD Scale IV Childhood Trauma Questionnaire	Interprofessional consideration of TBI-related cognitive sequelae in context of IPV interventions Neuropsychological assessment Consider neuroimaging IPV-specific neurorehabilitation	Control group comparisons Larger sample sizes Potential long-term impacts of repetitive IPV Need to better characterize the neural mechanisms leading to cognitive impairment
Zieman, Bridwell, and Cardenas (2017) USA	Improve understanding of TBI as a result of domestic violence to improve care for this population	Retrospective chart review of 115 patients with IPV-related TBI at subspecialty TBI clinic	88% reported multiple injuries 81% reported loss of consciousness 21% sought medical help	magnetic resonance imaging Self-report history and symptoms. HELPS Brain Injury Screening Tool	Improved identification, education, and medical treatment for survivors Better understanding of injuries by interprofessional care providers	N/A

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Table 1. (continued)

Article	Purpose	Study Design/Population	Key Findings	Screening/Intervention Methods Used	Recommendations for Health Professionals	Recommendations for Future Research
Baumann et al. (2018) CANADA	Understand experiences of violence and head injury of women and transgender women sex workers	Mixed method-study 10 participants recruited from Elizabeth Fry Toronto	90% report at least one lifetime TBI 100% report at least 1 head injury related to violence in sex work Participants report widespread stigma and discrimination as barriers to care	Qualitative semi-structured interview protocol Ohio State University TBI Identification Method (OSU TBI-ID)	Screen for TBI Need to educate sex workers on TBI Provide culturally safe care Peer-support programs may improve outcomes Anti-oppressive education for service providers	Prevalence numbers are needed Appropriate screening tool required Compare ways to elicit stories of violence and head injury during screening (e.g., standardized vs. storytelling) More investigation of TBI in transgendered women and men sex workers
Campbell et al. (2018) USA	Examine prevalence of and associations between reported probable TBI and central nervous system (CNS) symptoms	Convenience sample of 901 women (543 IPV cases and 358 non-IPV controls) of African descent from outpatient non-IPV clinics in Baltimore MD and the U.S. Virgin Islands	50% of IPV sample reported probable TBI Women with IPV and probable TBI more likely to report CNS symptoms	Abuse Assessment Screen MAPSAIS Primary Care-PTSD Screen Center for Epidemiologic Studies Depression Scale-10	Screening in nonacute settings as well as across medical settings Education needed for frontline staff in support organizations	Development of appropriate screening tools is critical Risk/benefit analysis of screening needed Development of treatment protocols for various health care and IPV settings is needed
Farley, Banks, Ackerman, and Golding (2018) USA & Canada	Estimate the prevalence and demographic correlates of TBI in women and transwomen sex workers	Qualitative focus groups Survey with statistical analysis Sample of 65 sex workers	95% report lifetime injuries to the head of which 65% sustained injury during prostitution 38% who report head injury during prostitution also report childhood head injury 88% report injuries severe enough to warrant urgent medical treatment and 63% of those received care	Questionnaire developed by the authors to elicit information regarding occurrence of head injuries, symptoms experienced, and health consequences Broad focus group discussions included TBI information, violence-related injuries, general health information, and referrals	Screening for head injury and TBI recommended for this population Health-care professionals have opportunity for intervention Treatment for pain and/or sleep disturbance may be beneficial Accurate diagnosis, particularly between TBI and PTSD, is critical to inform treatment path	Larger samples Inquiry to include questions regarding length of time in prostitution, locations where prostitution occurred, and locations where violence occurred Further investigation into childhood TBI and the possible relationship with sex work and adult TBI More research into PTSD and TBI and how to recognize each from the other is necessary

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Table 1. (continued)

Article	Purpose	Study Design/Population	Key Findings	Screening/Intervention Methods Used	Recommendations for Health Professionals	Recommendations for Future Research
St. Ivany et al. (2018a) USA	Expand knowledge of the impact of IPV/TBI on women's lives	Qualitative design Purposive and snowball sampling (n = 19) Primary data: 10 from community settings Secondary data: Nine from the DOVE program	100% of sample reported a TBI previous to first IPV event Need for screening Structural violence, institution control, and exposure to violence create feeling of living in fear and need to prioritize safety	Positive response to DOVE questionnaire: "Have you ever passed out from being hit in the head by your partner?"	Women at high risk of IPV-related TBI should be screened for depression Women receiving treatment for depression should be screened for history of IPV and TBI Interdisciplinary approaches to IPV/TBI care to be fostered Low stimulation areas available for IPV clients with TBIs	Long-term effects of IPV-related TBI Exploration of employment related challenges experienced by women and how to alleviate them Investigate possible increased risk of entering abusive relationship for girls with TBI Increase education for health-care providers
St. Ivany, Kools, Sharps, and Bullock (2018b) USA	Understand the social context of the lives of women who experienced a head injury from IPV	Qualitative method 21 interviews from 9 participants in the DOVE program who self-reported passing out from hits to the head during IPV	Instability related to cycles of incarceration, drug/alcohol use & fear of losing their children Access to medical care as method of control Relationship between forced sex and head injury	Self-report loss of consciousness from hits to the head during IPV	Routine TBI screening of women experiencing IPV should be implemented Interdisciplinary approaches to care should be encouraged Health-care workers need to be aware of relationship between increased risk of forced sex, escalating violence, and higher levels of control	Need to explore relationship between TBI and psychological abuse Focus on neurobiological changes that occur as a result of TBI and the impact they have on women's health and well-being Development of a TBI screening tool appropriate for use in an IPV context to include syndemics
Valera et al. (2018) USA	Increase understanding of neural mechanisms underlying mild TBI and cognitive functioning in women experiencing IPV using diffusion MRI	20 women recruited from women's shelters, domestic violence programs, and word of mouth	Demonstrate associations between white matter microstructure and IPV-related TBI IPV-related TBI can negatively impact cognitive function	Semi-structured Interviews Neuropsychological battery Conflict Tactics Scale Mood and Anxiety Symptom Questionnaire Clinician Administered PTSD Scale IV Childhood Trauma Questionnaire Diffusion MRI Imaging	Increase awareness of implications of mild TBI on cognitive functions Support workers need to understand that what may appear as lack of effort or follow through by survivors may be related to impairments from mild TBI TBI sensitive care needs to be undertaken	Further research needed with a larger sample to see if relationship between white matter diffusion anisotropy and IPV-resultant mild TBI still exists Long-term studies exploring potential long-term consequences are needed

Note. IPV = intimate partner violence; TBI = traumatic brain injury; mTBI = mild traumatic brain injury; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders; DOVE Program = Domestic Violence Home Visitation study; CAPS-2 = Clinician-Administered PTSD Scale for DSM-IV.

Table 2. Data Chart Review Articles.

Article	Purpose	Recommendations for Health Professionals	Recommendations for Future Research
Banks and Ackerman (2002) USA	Raise awareness of specific challenges faced by African American women experiencing IPV/TBI	<ul style="list-style-type: none"> • Neuropsychological assessments for Black women experiencing IPV • Psychotherapy should be TBI informed 	N/A
Ackerman and Banks (2003) USA	Overview of two treatment modalities for mild traumatic brain injury (mTBI)	<ul style="list-style-type: none"> • Psychotherapists should determine if clients have sustained head injury and assess neuropsychological status • Use of biofeedback as adjunct to feminist psychotherapy 	N/A
Plichta (2004) USA	Review of research findings on IPV and women's physical health and use of health services	<ul style="list-style-type: none"> • Universal screening for IPV 	<p>Longitudinal studies needed to explain how violence is related to disability, TBI, substance use, unmet needs for care</p> <p>Interprofessional approaches to care</p>
Stern (2004) USA	Invited commentary	<ul style="list-style-type: none"> • Routine screening and assessment of physical abuse that is thorough enough to detect head trauma and TBI 	<p>Longitudinal studies on survivors with and without TBI</p> <p>IPV/TBI integrated into education of health-care professionals</p>
Banks (2007) USA	Review IPV-related injury literature and examines research on equivalent injuries sustained by athletes	<ul style="list-style-type: none"> • Practitioners should screen for head injury and symptoms of mTBI • Refer for neuropsychological assessment and rehabilitation 	<p>Outcome studies to determine effectiveness of culturally relevant neuropsychological rehab</p> <p>Specific focus on reduction of murder rates</p>
Ackerman and Banks (2009) USA	Overview of types of injuries sustained by IPV survivors and discussion on need for accurate assessment and appropriate treatment	<ul style="list-style-type: none"> • TBI screening and evaluation should be standard in IPV contexts (IPV/TBI screen tool developed by authors) • Refer for neuropsychological assessment and care • Increase awareness and understanding of impact of TBI in IPV • Therapy should focus on community reintegration 	<p>Focus on culturally appropriate assessments and interventions</p> <p>Encourage interdisciplinary approaches</p>
Kwako et al. (2011) USA	Highlight gaps in current findings related to neuropsychological complications and medical and psychosocial symptoms, societal costs of failing to acknowledge association of IPV and TBI in women	<ul style="list-style-type: none"> • Increased access to mental and physical health care for survivors • Collaboration between health care and legal institutions • Training for first responders, ER nurses, and physicians • Interventions to consider neuropsychological functioning and include individuals and family in education and treatment 	<p>Assess-specific domains of functioning post TBI</p> <p>Use objective, well-established measures</p> <p>Document chronicity and acuity of abuse and TBI</p>
Davis (2014) USA	Examine relationship between mTBI and cognitive, emotional, and psychological disorders in women exposed to violence and raise awareness of the issue	<ul style="list-style-type: none"> • Increase awareness of mTBI-related triad of disorders, including post-concussion syndrome, depression, and acute stress disorder leading to post-traumatic stress disorder(PTSD) in women survivors of violence • Support for IPV screening in health-care settings • Support for TBI screening in IPV settings 	<p>Need to develop an appropriate IPV/ mTBI screening tool for use in variety of settings may need to make them location/purpose specific depending on population being screened</p>

(continued)

Table 2. (continued)

Article	Purpose	Recommendations for Health Professionals	Recommendations for Future Research
Wong and Mellor (2014) Australia	Explore prevalence of health consequences related to IPV including TBI	<ul style="list-style-type: none"> • Nurse recognition of IPV and physical and mental health outcomes, cultural implications, association with child sexual abuse, decision of women to stay in IPV relationship 	Investigate how different types of IPV might interact with other social and psychological factors to predict health outcomes
Wong, Fong, Lai, and Tiwari (2014) Hong Kong	Establish neurological impact and cognitive dysfunction connection in women with history of IPV	<ul style="list-style-type: none"> • Train interprofessional workers re: Brain function and assessment of neurological functioning, acquire skills of caring for women with neurological or neuropsychological damage 	Gain scientific evidence of impacts of IPV through neuroimaging studies to provide relevant information to develop cost-effective interventions for women survivors of IPV
Goldin, Haag, and Trott (2016) USA	Propose framework for screening for history of TBI in women exposed to IPV, investigate applicability of TBI-screening instruments	<ul style="list-style-type: none"> • Neuroimaging recommended • No screening tools meet full criteria • Recommends Brain Injury Screening Questionnaire and OSU TBI-ID as tools best suited to detect IPV-related TBI, particularly if modified 	<p>Empirical evaluation of proposed criteria</p> <p>Development/refinement and validation of brain injury screening tools for IPV-related TBI</p> <p>Empirical development of uniform screening guidelines</p>
Murray, Lundgren, Olson, and Hunnicutt (2016) USA	Consolidate current research and present guidelines for professionals working with clients who may have IPV-related TBI	<ul style="list-style-type: none"> • TBI education and screening required in IPV settings • Sensitize IPV services to TBI challenges • Increase awareness of similarities between TBI and PTSD • Familiarize with local TBI treatment/support options for referral • Encourage clients to get TBI treatment • Safety planning should include consideration of TBI • Support TBI sensitive problem solving skills • Help survivors adapt to life with TBI • Avoid revictimizing and stigmatizing survivors 	Revise recommendations to promote best practice as new information emerges
St. Ivany and Schminkey (2016) USA	Raise awareness of IPV/TBI link to provide appropriate treatment and improve health of women and families	<ul style="list-style-type: none"> • TBI should be anticipated as an outcome from IPV and actively screened for • Increase TBI knowledge/training of community health professionals and implementing screening among IPV survivors 	<p>Reliable and valid screening tool</p> <p>More research to understand the prevalence</p>
Amoroso and Iverson (2017) USA	Acknowledge additional and nondeployment risk factors for TBI such as IPV for women service members and increase awareness and knowledge of TBI among women veterans	<ul style="list-style-type: none"> • Awareness of TBI risk among women veterans • Screening for IPV-related TBI among VA and non-VA health practitioners treating women veterans during service and after exiting the military 	<p>Evaluate potentially additive effects of TBI in women veterans and increase women in chronic traumatic encephalopathy (CTE) research</p> <p>Increased data on unique effects of IPV that can exacerbate and prolong post-concussion symptoms and/or complicate and delay recovery</p>

(continued)

Table 2. (continued)

Article	Purpose	Recommendations for Health Professionals	Recommendations for Future Research
Foushee (2017) USA	Role of medical imaging professionals with IPV-related concussion injuries	Recommends taking detailed history including TBI-specific questions	Determine if TBI causes long-term challenges
Hunnicutt, Lundgren, Murray, and Olson (2017) USA	Consider relationship of IPV and TBI, difficulty in detecting and measuring, ethical concerns Present socio-ecological contextual framework to guide interdisciplinary research	<ul style="list-style-type: none"> • Identification of IPV-related TBI and integration into clinical practice • Interprofessional workers to be sensitive to complicated terrain of IPV-related TBI in diverse environmental contexts 	Assess for TBI in IPV survivor studies Study developmental trajectory of IPV-related TBI Examine symptom patterns and practice implications for different severity levels Examine challenges in daily life for survivors Examine sociodemographic variables IPV/TBI training and education in schools of social work
Monohan (2018) USA	Invited commentary	<ul style="list-style-type: none"> • Ask questions to elicit information re head injury and strangulation and if present, discuss TBI and importance of being assessed • Safety planning should include brain safety • Self-education re IPV-related TBI 	IPV/TBI training and education in schools of social work
Smith and Holmes (2018) USA	Overview of IPV/TBI intersection and provide suggestions for counselors treating IPV survivors	<ul style="list-style-type: none"> • Recommends initial TBI screening • Incorporate TBI and PTSD-specific trauma-informed therapy approach 	N/A
Valera (2018) USA	Invited commentary	<ul style="list-style-type: none"> • IPV/TBI education among researchers, medical professionals, psychologists, IPV advocates, law enforcement, and judicial personnel is recommended 	Systematic studies examining health outcomes of TBI in women exposed to IPV are needed
Valera, Campbell, Gill, and Iverson (2019) USA	Summarize existing research focusing on women in shelters or primary care, from the community and veterans	<ul style="list-style-type: none"> • Screening should be done in IPV settings • TBI conscious risk and safety planning • IPV-related TBI education for health-care and frontline workers • Raise awareness of TBI among IPV survivors 	Larger samples with broader range of neuropsychological and neuroimaging measures Blood-based biomarkers Long-term health considerations such as Alzheimer's Disease, dementia, and CTE Better understanding of short- and long-term consequences of IPV-related TBI

Note. IPV = intimate partner violence; TBI = traumatic brain injury; ER = emergency room.

Pagoda, 2015; Jackson et al., 2002; Monohan & O'Leary, 1999; Murray et al., 2016; Smith & Holmes, 2018; Stern, 2004; St. Ivany, Kools, Sharps, & Bullock, 2018b; Zieman et al., 2017). Some authors also emphasized the need for increased training for workers around identification of TBI in IPV survivors and its effects (Ackerman & Banks, 2009; Anderson et al., 2015; Baumann et al., 2018; Farley et al., 2018; Hux et al., 2009; Kwako et al., 2011; Linton & Perrin, 2017; Wong, Fong, Lai, & Tiwari, 2014). Recommendations for training included administering standardized assessments, responding to positive screens, differentiating TBI symptoms from related comorbidities, and neurological from psychiatric.

Several studies advocated for improved awareness of the intricacies of this unique population (Amoroso & Iverson, 2017; Hunnicutt, Lundgren, Murray, & Olson, 2017;

Hux et al., 2009; Linton & Kim, 2014; Monohan & O'Leary, 1999; Roberts & Kim, 2005; Stern, 2004; St. Ivany & Schminkey, 2016; Valera & Berenbaum, 2003; Valera & Kucyi, 2017; Wong & Mellor, 2014; Zieman et al., 2016). Examples included awareness of IPV and its associated dangers, IPV survivors rarely reporting without being asked, and IPV-related TBI presenting as mental health and/or addictions issues. Even when neuropsychological testing is completed appropriately, it is possible survivors with IPV-related TBI may present as normal or near normal (Monohan & O'Leary, 1999; Valera & Berenbaum, 2003). Support approaches should include referral for assessment and/or external programs for clients who screen positive or are suspected of TBI (Banks, 2007; Campbell et al., 2018; Iverson & Pogoda, 2015; Jackson et al., 2002).

Some authors cited the need for health professionals to support safety planning in an effort to reduce subsequent and repetitive assaults that may have a cumulative effect on the brain (Corrigan et al., 2003; Jackson et al., 2002; Banks, 2007). Suggestions for practice included provision of transportation vouchers to aid women in finding emergency shelter and support and keeping emergency hospital or security staff in view and/or accessible at all times (Roberts & Kim, 2005). Health professionals are encouraged to maintain quality documentation and use an interprofessional approach, providing services for community reintegration and follow-up counseling in a healthy and safe atmosphere (Banks, 2007; Davis, 2014; Murray et al., 2016; Roberts & Kim, 2005; Sheridan & Nash, 2007; St. Ivany & Schminkey, 2016). Authors indicated that workers should gain competence in addressing the physical, cognitive, and psychosocial factors that may influence the experience, function, and recovery of IPV-related TBI rather than focusing purely on a medical model (Davis, 2014; Farley et al., 2018; Gutman et al., 2004; Jackson et al., 2002; Murray et al., 2016; Roberts & Kim, 2005; St. Ivany et al., 2018a).

Health-care professionals who suspect or are aware of IPV should anticipate a TBI outcome, remaining cognizant that survivors tend to report psychosomatic symptoms of abuse such as headaches, fatigue, nausea, memory issues, cognitive changes, or dizziness rather than the violence itself (Monohan & O'Leary, 1999; St. Ivany & Schminkey, 2016; St. Ivany et al., 2018a, 2018b; Valera et al., 2018). Physical symptoms include headaches, fatigue, sleep disturbances, vertigo, and pain, while cognitive symptoms affect attention, concentration, and executive functioning, suggesting interventions should serve to strengthen the capacity of the survivor to process and interpret information (Corrigan et al., 2003; Jackson et al., 2002; Murray et al., 2016; Valera & Berenbaum, 2003; Valera et al., 2018).

Some studies noted that health professionals should seek education on patterns of brain function and dysfunction, as medical treatment and intervention for TBI may be different and more varied than a psychiatric disorder (Banks, 2007; Farley et al., 2018; Gagnon & DePrince, 2017; Gutman et al., 2004; Roberts & Kim, 2005; Valera & Kucyi, 2017; Valera et al., 2018; Ziemann et al., 2017). Recommended psychosocial interventions included providing support and reassurance to survivors and facilitating development of important skills such as problem-solving, self-esteem, and coping strategies (Banks, 2007). The need to reduce the experience of isolation and for education on available resources was also emphasized (Jackson et al., 2002; St. Ivany & Schminkey, 2016). Other educational topics identified included information on the effects of head injuries, monitoring worsening symptoms, and encouraging health-promoting behaviors (Corrigan et al., 2003; Jackson et al., 2002; Murray et al., 2016).

Recommendations for Future Research

The literature highlighted key recommendations for future research that would advance this field of study while also

improving frontline approaches to care. Many authors cited the need to establish a reliable, valid, and standardized screening tool to identify TBI in survivors of IPV (Anderson et al., 2015; Baumann et al., 2018; Campbell et al., 2018; Corrigan et al., 2003; Davis, 2014; Goldin et al., 2016; Iverson & Pogoda, 2015; Kwako et al., 2011; Monohan & O'Leary, 1999; St. Ivany & Schminkey, 2016; St. Ivany et al., 2018b; Valera & Berenbaum, 2003). A population-specific tool may inform triage and eventual outcomes for survivors while also contributing more accurate estimates of prevalence to the literature (Davis, 2014). A few studies demonstrated the potential value of neuroimaging in research and diagnosis of IPV-related TBI (Valera & Kucyi, 2017; Valera et al., 2018; Wong et al., 2014). Several called for research on the long-term effects of IPV-related TBI (Amoroso & Iverson, 2017; Corrigan et al., 2003; Foushee, 2017; Gagnon & DePrince, 2017; Hunnicutt et al., 2017; Iverson et al., 2017; Kwako et al., 2011; Plichta, 2004; Stern, 2004; St. Ivany et al., 2018a; Valera & Berenbaum, 2003; Valera et al., 2018; Wong & Mellor, 2014). Evaluation of effectiveness of specific interventions in this population to guide practice was also discussed (Banks, 2007; Baumann et al., 2018; Gutman et al., 2004; Jackson et al., 2002; Wong & Mellor, 2014).

The literature called for researchers to address methodological problems including sample size, population, and generalizability. Authors specifically noted the need for larger population samples and/or inclusion of control groups (Farley et al., 2018; Linton, 2015; Linton & Perrin, 2017; Monohan & O'Leary, 1999; Roberts & Kim, 2005; Valera & Berenbaum, 2003; Valera et al., 2018), longitudinal studies (Gagnon & DePrince, 2017; Iverson et al., 2017; Stern, 2004; Wong & Mellor, 2014; Valera et al., 2018), and more reliable information on past incidences of IPV-related TBI than self-report (Linton, 2015; Valera & Berenbaum, 2003).

Further epidemiological study into the incidence of IPV-related TBI was recommended (Baumann et al., 2018; Gagnon & DePrince, 2017; Gutman et al., 2004; St. Ivany & Schminkey, 2016). Documentation of the chronicity and acuity of these injuries is needed (Amoroso & Iverson, 2017; Farley et al., 2018; Foushee, 2017; Gagnon & DePrince, 2017; Hunnicutt et al., 2017; Iverson et al., 2017; Kwako et al., 2011; Linton & Perrin, 2017; St. Ivany et al., 2018a, 2018b; Valera et al., 2018; Wong et al., 2014), as well as inquiry into the causal influences and reasons for blunt trauma (Linton & Kim, 2014). A few authors noted a possible relationship between childhood TBI and subsequent involvement in violent relationships, suggesting further research may provide insight into prevention as well as treatment (Farley et al., 2018; St. Ivany et al., 2018a). A final key recommendation is to increase research grant money to enable future study of IPV-related TBI (Gutman et al., 2004; Roberts & Kim, 2005).

Discussion

The 42 articles sampled in this study provide an excellent foundational understanding of IPV-related TBI. However, with

only 22 empirical studies, most of which gathered American data with limited sample size and diversity, the need for a broader understanding and exploration into these intersecting conditions is apparent. Professionals in a number of diverse fields including medicine, occupational therapy, radiological science, and psychotherapy have called attention to this issue and unilaterally agreed that increased awareness and understanding of this population are paramount. Further investigation into prevalence, long-term implications for women's health and social integration, IPV/TBI-specific interventions, and approaches to prevention are all warranted, particularly with respect to cultural and geographical diversity.

Challenging knowledge synthesis, this field of study is plagued by the abundance of terms for both TBI and IPV used in various contexts, functionally referring to the same group of survivors. Even in this targeted effort to collect all that is known on the topic, extensive hand searching was necessary to account for differences in terminology across time periods and fields of study that would have otherwise been excluded or missed entirely. Professionals and the public are similarly unlikely to have shared language to identify IPV-related TBI or find what limited resources exist. This gap in knowledge and understanding leaves women at risk of continued violence and ongoing exposure to increased physical and psychological trauma as health-care practitioners are without clear protocols, service providers are without a dedicated screening tool, and support personnel remain unaware of the unique challenges faced by brain-injured women survivors of IPV. Further action by researchers and direct service providers, combined with increased social awareness, is critical to developing effective supports.

The limited amount of literature may be due to the sensitive nature of IPV. Survivors may be reluctant to disclose violence due to stigma and fear of retribution making locating this population very difficult. Complicating the issue further, the long-term effects of TBI itself may hinder a survivor's awareness and insight into her own deficits, preventing her from seeking help or being capable of leaving an abusive situation independently, thereby remaining vulnerable to repeat and/or chronic violence. It is important to note that allowing TBI to go undetected in IPV survivors increases the probability of cumulative effects of repeated injury to the head, face, and neck (Banks, 2007; Campbell et al., 2018; Davis, 2014). Violence-related TBI has poorer outcomes than nonviolence-related TBI (Kim, Colantonio, Dawson, & Bayley, 2013), and repeated injury further compounds negative outcomes making it critical to identify and support survivors at the earliest possible point of contact.

Raising awareness and challenging outdated assumptions among health-care practitioners and society at large around who is likely to suffer a head injury, how that injury will present, and the considerable risk for IPV-related TBI may lead to improved outcomes for women survivors. Even when a woman presents with an obvious injury to the head, face, or neck and is suspected of being involved in IPV, a TBI diagnosis is often not made (Banks, 2007). One explanation offered is

that emergency departments are simply not aware that survivors of IPV are at great risk of TBI (Jackson et al., 2002). They tend to see brain injury in young men as a result of high-risk behaviors. Additionally, IPV/TBI survivors may initially present with addiction and/or mental health issues rather than an obvious trauma, as they are nearly twice as likely to have challenges with alcohol use and self-medication with drugs, potentially masking TBI symptoms (WHO, 2017). Professionals are urged not to wrongfully assume that a person presenting with symptoms such as headaches, depression, agitation, and suicidal behavior is suffering from mental illness and requires psychiatric medication (Campbell et al., 2018; Car, 2000; Farley et al., 2018; Smith & Holmes, 2018). In fact, medication carries its own risks in TBI populations, as survivors can be particularly vulnerable to side effects (Jackson et al., 2002). Awareness of this comorbidity can improve screening and avoid misdiagnosis.

Interprofessional workers providing direct services to IPV survivors across the care continuum and researchers are encouraged to advocate for the needs of this vulnerable population. Health-care costs can be prohibitive, and preventing women from gaining access to services and financial dependency is often a mechanism of control for abusers. Increased financial assistance through social programming may encourage or enable more survivors to seek adequate health care (Banks, 2007; Car, 2000). Frontline workers are often the first line of contact for women exposed to IPV and are well positioned to combat the socially derived culture of shame and blame often associated with both IPV and TBI. Advocating for the development of supports sensitive to this population could substantially contribute to improved service provision, reduction of stigma and isolation, and overall progress in psychosocial outcomes.

Screening and assessment remain a priority in the advancement of this field of research and practice. While a number of screening tools were used, discussed, and recommended in this review, development and validation of a specific tool is recommended as a primary directive in future research. An effective tool should take into account unique aspects of this population such as the role of sex and/or gender (e.g., hormones and/or expectations around childcare and employment), impact of socially derived stigma and shame, chronicity and form of violence, implications for personal safety, and contexts of structural violence and intersectional marginalization (Corrigan et al., 2003; Goldin et al., 2016; Iverson & Pogoda, 2015; St. Ivany & Schminkey, 2016; St. Ivany et al., 2018a, 2018b; Valera & Berenbaum, 2003). Additionally, emerging data suggest not enough is currently known about the associated risks and benefits of screening for TBI within an IPV context (Campbell et al., 2018). Current investigation by the authors of this review also revealed the potential risk of increased vulnerability to manipulative partners and potentially non-TBI sensitive legal and child welfare systems. As formal diagnosis is difficult to achieve without expensive testing largely inaccessible to IPV survivors and little-to-no supports for them exist, the immediate benefit of formal TBI

identification is not to be assumed. We concur with Campbell and colleagues' (2018) recommendation that further investigation into the benefits and risks of screening take place, including extensive discussion with survivors, to determine best practices.

Until standardized screening protocols have been implemented, a first step toward identifying TBI in women survivors of IPV may be in simply recognizing a cluster of diffuse symptoms with no originating incident reported, as the survivor may be unwilling to disclose. This review suggests that women exposed to IPV are unlikely or unable to report violence to health-care workers without being directly asked (Campbell et al., 2018; Foushee, 2017; Monohan & O'Leary, 1999; St. Ivany et al., 2018b). Professionals may elucidate a more complete history of trauma by asking if there was ever a time when a patient felt she should have sought medical treatment for head injury but did not (Monohan & O'Leary, 1999; St. Ivany et al., 2018b). It is recommended to bear in mind that many survivors may appear as "normal" leading to the exclusion of a TBI diagnosis (Monohan & O'Leary, 1999; Valera & Berenbaum, 2003). Until we have a more nuanced understanding of the issues at hand, it may be useful to adopt a default suspicion of TBI in the presence of a history of IPV, particularly when coupled with mental health and addictions comorbidities. Specific questions or lines of questioning for frontline use are suggested (Foushee, 2017; Gagnon & DePrince, 2017; Smith & Holmes, 2018).

In addition to documenting the symptoms and experiences of survivors, a few authors have emphasized the value of incorporating more verifiable information from imaging and medical professionals about IPV-related TBI and its effects (Linton & Perrin, 2017; Valera & Berenbaum, 2003; Wong et al., 2014). They, and others, note the challenge in achieving such documentation given the expense required to obtain them, the nature of IPV episodes, and the lack of reporting by survivors. However, by establishing and raising awareness of a physiological basis for the sometimes diffuse somatosensory and emotional symptoms experienced by people with IPV-related TBI, we may minimize stigma and further improve disclosure rates. Empirical studies are needed to generate reliable data on the prevalence, experience, and needs of brain-injured survivors of IPV to be used in health care and community settings and inform policy decisions. As nearly all current data were gathered in the United States, there is particular need for original studies situated in contrasting social, political, and economic contexts, and, in specific, from within a public health-care model. It is possible a publicly funded system of health care and social supports for women survivors of IPV and TBI may be able to develop and implement protocols more quickly and efficiently than one that is not.

Finally, in order to address barriers to adequate health care and support, broader knowledge of currently unexamined contexts is needed. As few authors explore the intersectional complexities experienced by women IPV/TBI survivors of diverse cultural/ethnic backgrounds (Anderson et al., 2015; Campbell et al., 2018; Linton, 2015; Linton & Kim, 2014; Linton &

Perin, 2017; Oden, 2000) and fluid gender identities (Baumann et al., 2018; Farley et al., 2018), further research considering the implications of the layers of marginalization experienced by these women is critical. Additionally, capturing this issue beyond shelter populations and emergency rooms is needed and should include police offices, courthouses, mental health centers, or family counseling centers, as well as the dentist office and eye doctor, all of which are important sites of triage for this population (Roberts & Kim, 2005).

An unexpected outcome of this review was the identification of articles calling attention to the importance of the dentistry profession in the detection of IPV survivors and advocating for vigilance in head injury screening, although the potential for TBI was not discussed (Arosarena, Fritsch, Hseuh, Aynehchi, & Haug, 2009; Gwinn, McClane, Shanel-Hogan, & Strack, 2004; Lincoln & Lincoln, 2010; Mishra, 2012; Nelms, Gutmann, Soloman, Dewald, & Campbell, 2009). Dentists routinely examine the head, face, neck, and mouth (HFNM) and may be able to detect physiological signs of IPV, including strangulation, potentially invisible on other medical exams (Arosarena et al., 2009; Lincoln & Lincoln, 2010). Dentists and dental assistants have a unique opportunity for early identification of survivors of IPV seeking routine treatment (Gwinn et al., 2004). Furthermore, forensic odontologists play a significant role in the investigation of violence and abuse and are cited as appropriate multidisciplinary leaders in the training of dentistry in the detection of HFNM injuries (Gwinn et al., 2004; Lincoln & Lincoln, 2010). This review also returned one article outlining a similar role for ophthalmologists detecting injuries to the eye that indicate violence to the head, face, and neck (Beck, Freitag, & Singer, 1996). As these professions emerge as stakeholders in IPV/TBI survivors care, more investigation into best practices is needed.

Conclusion

This review was conducted to update and continue the discussion on the link between IPV and TBI, systematically capturing and synthesizing all of the available current literature exploring this intersection. We also seek to amend the interprofessional approach recommended by the literature by highlighting unique roles and perspectives in this developing field of study. More research is needed including exploration of head injuries and mental health disorder outcomes, efficacy of neuropsychological assessment, strategies for access to appropriate care, establishing premorbid functioning, and the role of dentistry and ophthalmology in identification of IPV-related TBI. Other frontiers for future work include determining what is understood about IPV/TBI among frontline workers in nonmedical settings, motivations/deterrents for disclosure, and strategies for fostering interprofessional alliances in support of survivors across community and health-care settings.

Research generating accurate prevalence figures may lead to a greater understanding of the impact of this issue and inform approaches to detection and care, leading to fewer overall repeated episodes of IPV, appropriate medical intervention,

and ongoing support. While development and/or validation of a TBI screening tool, sensitive to the IPV context is critical, further research into the risks and benefits of screening should be undertaken. Cross-sector collaboration is essential to develop appropriate processes and programming for this unique population. It is our hope that with increased research and awareness, fewer women will be at risk of TBI as a result of IPV.

Key Findings

- IPV can cause brain injury resulting in fatigue, depression, memory loss, confusion, impaired judgment, and difficulty with tasks that may impair ability to leave an abuser.
- Presenting with an obvious injury to the head, face, or neck, and suspected IPV does not always lead to a TBI diagnosis.
- Survivors of IPV-related TBI may initially present with addiction and/or mental health issues rather than an obvious trauma potentially masking TBI symptoms.
- Disclosure is a key step in the care of this population. Women survivors of IPV are unlikely to report violence to frontline workers unless directly asked.
- A wide range of prevalence estimates are published based on diverse samples.
- It is critical that IPV survivors with TBI are identified and supported at the earliest possible point of contact to avoid repetitive trauma to the brain and related outcomes.

Implications for Practice, Policy, and Research

- Professionals offering direct services to women survivors of IPV (e.g., police, health care, counseling, shelter staff) should adopt a default suspicion of brain injury in the presence of a history of intimate violence, particularly when coupled with diffuse physical symptoms, somatic complaints, and/or mental health and addictions comorbidities.
- TBI-specific IPV supports may improve psychosocial outcomes.
- Investigation into the benefits and risks of screening for IPV-related TBI is needed.
- Development and/or validation of a TBI screening tool for an IPV context is critical.
- Empirical studies using larger sample sizes and diverse populations are needed.


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Tracey Joseph, MScOT, completed her masters in occupational therapy at the University of Toronto under the supervision of Dr. Angela Colantonio. Her interest in women's experiences of traumatic brain injury and intimate partner violence led her to contribute to the ongoing work in this area of the Acquired Brain Injury Research Lab.

Angela Colantonio, PhD, OT Reg. (Ont.), FCAHS, FACRM is the director of the Rehabilitation Sciences Institute at the University of Toronto and a professor in the Department of Occupational Science and Occupational Therapy, Dalla Lana School of Public Health. She is also a senior research scientist at the Toronto Rehabilitation Institute-University Health Network where she was the inaugural Saunderson Family Chair in Acquired Brain Injury Research and is currently leading the acquired brain injury and society team.