Psychology of Violence

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Traumatic Brain Injury Effects on Neuropsychological Measures and Recidivism in Intimate Partner Violence Against Women Perpetrators

Antonio Gheorghe[1], Javier Comes-Fayos[2], Patricia Mesa-Gresa[1], Isabel R. Moreno[2], Marisol Lila[3], Ángel Romero-Martínez[1], and Luis Moya-Albiol[1]

[1] Department of Psychobiology, University of Valencia
[2] Faculty of Health Sciences, Valencian International University
[3] Department of Social Psychology, University of Valencia

Objective: Traumatic brain injury (TBI) has been linked to neuropsychological dysfunction and the risk and development of violence and recidivism. In this context, it is relevant to understand its impact on perpetrators of intimate partner violence against women (IPVAW), given the potential role of cognitive deficits or impairments in recidivism. This study aims to understand how neuropsychological dysfunction associated with TBI contributes to the recurrence of violence in IPVAW perpetrators. ***Method:*** This study examined neuropsychological functions and recidivism risk in 105 participants, including IPVAW perpetrators with TBI ($n = 26$), without TBI ($n = 37$), and individuals with no records of IPVAW ($n = 42$). Neuropsychological assessments focused on impulsivity and inattention, measured with the Continuous Performance Test-III, verbal fluency, measured with the phonetic and semantic FAS test, and emotional decoding, assessed using the Reading the Mind in the Eyes Test. The extent to which TBI and these neuropsychological functions affect recidivism risk was also analyzed. ***Results:*** IPVAW perpetrators with TBI exhibited greater neuropsychological deficits compared to those without TBI and nonoffenders, including higher impulsivity, inattention, and poorer verbal fluency and emotional decoding. In addition, the effect of these variables on recidivism risk changes depending on the history of TBI. ***Conclusions:*** Addressing TBI and neuropsychological dysfunctions in IPVAW perpetrators is crucial. Early cognitive rehabilitation is vital for effective intervention. Future research should monitor changes in neuropsychological profiles over time, use diverse samples and complementary assessment methods, and include official recidivism data to enhance the validity of the findings.

Public Significance Statement
This study highlights that traumatic brain injury may not only increase the risk of repeated intimate partner violence but could also contribute to the exacerbation of neuropsychological deficits, such as difficulties with attention, impulse control, and emotional understanding. Traumatic brain injury appears to interact with these deficits, potentially amplifying their influence on violent behavior. These findings underscore the importance of considering both the direct effects of brain injuries and their interaction with cognitive impairments when developing interventions aimed at reducing recidivism and supporting rehabilitation.

Keywords: intimate partner violence against women, traumatic brain injury, neuropsychological functioning, risk of recidivism

Intimate partner violence against women (IPVAW) is internationally acknowledged as a pervasive problem resulting in physical, psychological, or sexual harm inflicted by current or former male partners (United Nations, 1993, 1995; World Health Organization, 2022). The latest estimates suggest that, globally, 26% of ever-partnered women aged 15 years or older have experienced IPVAW at least once in their lifetime (World Health Organization, 2024), leading to both short- and long-term physical, psychological, and social consequences (White et al., 2024). To address this issue, research has identified several risk factors for IPVAW, including contextual elements such as structural sexism (Ubillos-Landa et al., 2020), as well as psychological traits like antisocial cognitive

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Antonio Gheorghe https://orcid.org/0009-0006-5962-6130
Javier Comes-Fayos https://orcid.org/0000-0003-0208-8205
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Correspondence concerning this article should be addressed to Javier Comes-Fayos, Faculty of Health Sciences, Valencian International University, 21 Pintor Sorolla Street, Ciutat Vella, 46002 Valencia, Spain. Email: javier.comes@professor.universidadviu.com

patterns (Gracia et al., 2020), poor emotional regulation (Birkley & Eckhardt, 2015; Comes-Fayos et al., 2022), and substance abuse (Vitoria-Estruch et al., 2018). These studies underscore the importance of the biopsychosocial model, a holistic approach that integrates biological elements with psychosocial risk factors to better understand how perpetrators process environmental information and develop violent dynamics (Frieze et al., 2020; Moya-Albiol & Romero-Martínez, 2020).

In this regard, traumatic brain injury (TBI), defined as a neurological dysfunction caused by external force (Garcia-Barrera et al., 2019), has been identified as a prevalent health concern. TBI directly impacts an individual's neuropsychological functioning (Siever, 2008; Tateno et al., 2003). Previous research has found that attentional disorders, particularly difficulties with divided attention, are common among TBI survivors in the general population, with 56.7% reporting these challenges (Dymowski et al., 2015). Due to the vulnerability of the frontal lobes and anterior brain networks, TBI also results in executive function deficits, affecting planning, mental flexibility, and inhibition, even 4 years postinjury (Azouvi et al., 2017). Furthermore, impairments in social cognition, including emotion decoding, perspective-taking, and empathy, have also been identified (McDonald, 2013). These deficits result in significant behavioral changes that affect family dynamics, social relationships, and overall quality of life (Benedictus et al., 2010). These changes encompass disinhibition, impulsivity, irritability, aggressiveness, and abulia, as well as heightened urgency, lack of premeditation, and dysregulated sensation seeking (Azouvi et al., 2017).

W. H. Williams et al. (2018) exposed that TBI, in addition to often resulting in impairments in executive functions, it also may heighten the likelihood of violent behavior, as TBI is common among offenders (Linden et al., 2021). Various cohort studies have found that childhood TBI increases the risk of offending in adulthood (Katzin et al., 2020; Matheson et al., 2020; Timonen et al., 2002). Indeed, these brain injuries, which often remain untreated, have been consistently associated with elevated rates of violent criminality (León-Carrión & Ramos, 2003), and have frequently been observed to occur prior to the onset of criminal behavior (Timonen et al., 2002). Recently, it has been reported that TBI survivors are at a heightened risk of engaging in antisocial and criminal behavior due to deficits in behavioral regulation caused by the injury (Gordon et al., 2017). Specifically, these deficits include difficulties with impulse control, planning and organization, impaired behavioral and emotional regulation, and poor decision making (Linden et al., 2020). This is particularly relevant, as these neuropsychological deficits are known to contribute to violence and criminal behavior (Haller, 2020). Increased impulsiveness, linked to emotional regulation and risky decision making, is a key factor in violent behavior (Garofalo et al., 2018; Kuin et al., 2015), and attention difficulties impair the ability to identify relevant stimuli and assess future consequences, further associated with violence (Young et al., 2023). Moreover, deficits in verbal fluency hinder the capacity to understand and respond in emotionally charged situations (Adjorlolo & Egbenya, 2016; Burgess, 2020; Humenik et al., 2020), and impaired emotional regulation can lead to maladaptive reactions, facilitating violence (Romero-Martínez et al., 2023a).

The I-cubed theory (Finkel & Hall, 2018) offers a comprehensive framework for understanding aggression (Finkel et al., 2012). According to this model, aggression is most likely when three elements converge: strong instigating triggers (e.g., perceived partner provocation), strong impelling forces (e.g., a predisposition toward aggressive behavior), and weak inhibiting factors (e.g., executive function deficits, potentially worsened by TBI). The interaction of these three factors creates what the authors call a "perfect storm," where the likelihood of violence increases significantly when all three elements converge, even in cases of IPVAW (Finkel et al., 2012). While it is known that perpetrators display greater neuropsychological deficits than nonoffender, those with TBI may exhibit even more pronounced impairments, which are likely to interact with TBI to further weaken their capacity for inhibition, leading to an increased risk of recidivism.

Even in the absence of TBI, cognitive deficits are already prevalent among IPVAW perpetrators. Impulsivity is a consistent risk factor (Bueso-Izquierdo et al., 2015; Mannarini et al., 2021), with impulsiveness levels potentially predicting sexual and psychological violence (Tharp et al., 2013). Both sustained and divided attention are also impaired (Arrondo et al., 2023). Higher inattention correlates with increased rates of psychological and physical IPVAW (Horne et al., 2020; Romero-Martínez et al., 2023a). Verbal fluency deficits, common in this population, are related to higher recidivism and may obstruct conflict resolution through verbal expression (Romero-Martínez et al., 2019; Vitoria-Estruch et al., 2018). Furthermore, IPVAW perpetrators score lower in emotional decoding than nonoffender men (Romero-Martínez et al., 2016). These cognitive dysfunctions heighten risk factors for IPVAW, leading to inadequate behavioral responses and emotional dysregulation (Martel, 2019), ultimately increasing the likelihood of engaging in IPVAW (Cruz et al., 2020; Romero-Martínez et al., 2019).

In nonforensic populations, the global incidence of TBI is estimated at approximately 200 cases per 100,000 inhabitants, a rate that remains consistent in Spain (Charry et al., 2017). In contrast, among IPVAW perpetrators, 33% have a history of TBI, indicating a significantly higher prevalence in this population (Farrer et al., 2012). More recently, estimates of TBI among perpetrators of IPVAW range from 5% to 75%, and this overrepresentation suggests that TBI-related neuropsychological impairments may contribute to an increased likelihood of violence against the partner (Campbell et al., 2022). Nonetheless, there is still limited research on IPVAW perpetrators with TBI in relation to neuropsychological performance (Bueso-Izquierdo et al., 2015), particularly concerning neuropsychological functioning and its influence on recidivism despite the higher prevalence of TBI compared to the general population (Gabbe et al., 2018), with individuals suffering from TBI also being more prone to committing IPVAW (Pinto et al., 2010).

This gap is significant, as TBI can exacerbate deficits in executive functioning, impulse control, and emotional regulation, contributing to persistent violent behaviors. Given the importance of these factors, studying TBI in IPVAW is crucial for understanding risk factors and developing effective, long-term intervention strategies (Catalá-Miñana et al., 2013), ultimately reducing recidivism and improving rehabilitation efforts. This personalized approach not only increases the chances of successful rehabilitation but also aligns with best practices in offender management, which advocate for interventions that are responsive to the unique characteristics of each offender (Expósito-Álvarez et al., 2023; Travers et al., 2021).

Taking all this into account, the main objective of this study was twofold:

1. Analyze whether IPVAW perpetrators with TBI show differences in neuropsychological variables, such as attention capacity, impulsivity, verbal fluency, and emotion decoding, compared to IPVAW perpetrators without TBI and men without criminal records. It is expected that IPVAW perpetrators will show significantly greater neuropsychological deficits compared to nonoffender, regardless of the presence of TBI (Horne et al., 2020). Nonetheless, IPVAW perpetrators with TBI will exhibit more pronounced neuropsychological deficits compared to perpetrators without TBI (Logue & Gould, 2014).

2. We aimed to assess how the presence of TBI and neuropsychological dysfunctions can influence the risk of recidivism in perpetrators. Akerele et al. (2017) found that IPVAW perpetrators with a self-reported history of head injury had higher recidivism. Therefore, we expect that IPVAW perpetrators with TBI will show a higher recidivism risk compared to those without TBI. Moreover, it is hypothesized that deficits in these neuropsychological functions, combined with the presence of TBI, will significantly increase the likelihood of recidivism among IPVAW perpetrators (Meijers et al., 2017). The important aspect is not just to determine if there is higher or lower recidivism, but rather to understand if there is a differential explanation of recidivism risk provided by neuropsychological variables.

Method

Participants

The study involved a sample of 105 healthy male participants, which included 42 men with no criminal records and 63 IPVAW perpetrators. The IPVAW group was divided based on the presence or absence of TBI, resulting in 37 subjects without TBI and 26 subjects with TBI (for more details, see the measures subsection). All IPVAW perpetrators were recruited from the CONTEXTO Program, a community-based intervention program for men convicted of IPVAW, with sentences of up to 2 years. Their participation in the intervention program was mandated by court order and verified through official judicial records provided by the *Spanish General Secretariat of Penitentiary Institutions*. Recruitment took place prior to the start of the intervention.

The nonoffender group was recruited in Valencia (Spain) through targeted advertisements posted on social media platforms. Participants for this group were selected based on sociodemographic characteristics comparable to those of the IPVAW perpetrators (i.e., age, employment, annual income, nationality, marital status, and level of education). In addition, they were required not to have been found guilty or convicted of IPVAW. These characteristics were verified through a preliminary telephone interview.

The exclusion criteria for all groups included illiteracy, diagnosis of substance use disorder, other neurological disorders (like epilepsy or severe cognitive impairments), psychiatric diagnosis, or other significant medical conditions such as advanced cardiovascular disease or chronic pain syndromes. Before participating in the quasi-experimental session, each individual underwent a screening phase conducted by psychologists specialized in social intervention and working with this population to ensure that they met the inclusion criteria: (a) the absence of mental or neurological disorders, (b) proficiency in Spanish, and (c) the cognitive and volitional capacities necessary for full participation in the intervention program and experimental tasks. Those participants with resolved conditions that no longer impaired functioning were eligible. Proficiency in Spanish was mandatory to comprehend the intervention's objectives and tasks.

The experiment was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee (Procedure No. 1563895). All participants were informed about the study, ensuring they understood that their decision to participate would have no impact on their legal status. They voluntarily agreed to participate and provided written informed consent.

Procedure

Data collection was conducted in two separate sessions, each lasting 60 min, at the Psychobiology Laboratories of the faculty of psychology, located at the University of Valencia. During the first session, participants signed an informed consent form. Subsequently, a semistructured interview was administered to gather sociodemographic information, alcohol use, and assess potential TBI. This session also included the administration of a neuropsychological battery to assess various cognitive functions, including impulsivity, attention, and information processing. Upon completion of the protocol, an analysis of the judicial convictions and a comprehensive risk assessment for recidivism was conducted for each IPVAW perpetrator by two trained psychologists from the CONTEXTO Program. This was conducted in accordance with the Individualized Motivational Plan, an intervention technique based on personalized motivational interviews designed to assess the risk factors of the aggressors and to enhance their motivation toward intervention (Lila et al., 2018).

Measures

TBI Assessment

A semistructured interview was conducted with all participants to assess the presence of TBI similar to the Ohio State University Traumatic Brain Injury Identification Method (OSU TBI-ID; Bogner & Corrigan, 2009; Corrigan & Bogner, 2007). The OSU TBI-ID is a standardized method designed to gather an individual's lifetime history of TBI through a 10-min semistructured interview. The interview does not serve as a clinical diagnosis but provides validated information.

Notably, it has been demonstrated that neuroimaging or neuropsychological assessment procedures are not always sensitive to lifetime exposure to TBI and can be time consuming (Hyzak et al., 2023). This semistructured interview based on the OSU TBI-ID ensures a thorough and precise data collection process. This is an ad hoc tool specifically designed for this purpose and similar interviews have been previously utilized (Vitoria-Estruch et al., 2018). The criteria used to determine potential TBI included: (a) a history of head trauma or injury, (b) loss of consciousness, (c) receipt of medical treatment, (d) cognitive difficulties postinjury, (e) participation in high-impact sports like boxing or martial arts, and (f) penetrating head injuries. These criteria have been shown to be crucial for assessing potential TBI (Blackwell, 2022; McCrory et al., 2017). Importantly, no single criterion is sufficient to confirm TBI; rather, multiple factors must converge. The interview includes

yes–no questions regarding the criteria specified earlier, making it straightforward for respondents. If responses are affirmative, further probing is done to understand details, such as how the injury occurred, the specific type of treatment received, how the individual felt at the time, and any specific alterations observed following the incident, among others. This approach ensures that all relevant aspects are comprehensively covered.

As a result, IPVAW perpetrators were categorized into two groups: those with TBI (TBI-IPVAW; $n = 26$) and those without (nontraumatic brain injury [nTBI]-IPVAW; $n = 37$). No participant from the nonoffender group exhibited any evidence of TBI.

Alcohol Consumption

The Spanish version of the Alcohol Use Disorders Identification Test (Guillamon et al., 1999) was used. This test includes questions about the quantity and frequency of alcohol use in adults. It was developed by the World Health Organization to identify individuals whose alcohol consumption has become hazardous or harmful to their health. The test consists of 10 self-report items, with responses ranging from 0 (*never*) to 4 (*daily or almost daily*). Cronbach's α was .64.

Neuropsychological Assessment

Impulsivity and Inattention. Impulsivity and inattention were assessed using the Conners' Continuous Performance Test-III (CPT-III; Conners, 2014), a 14-min computerized task requiring participants to press the space bar for all letters except "X." This test evaluates inattention, impulsivity, sustained attention, and vigilance, with high internal consistency (split-half reliability: .92 for normative and .94 for clinical samples). Our study specifically focused on impulsivity (commissions and perseveration) and inattention scores (omission errors, detectability, and hit reaction time).

Executive Functioning. Verbal fluency was assessed using the FAS phonemic fluency test, where participants generated as many words as possible starting with the letters F, A, and S within 60 s per letter. Semantic fluency was measured by asking participants to name as many animals as possible in 60 s. In both tests, higher scores indicated better verbal fluency (Del Ser Quijano et al., 2004).

Emotion Decoding. The Reading the Mind in the Eyes Test assesses facial emotion recognition by evaluating participants' ability to interpret emotions based on the eye region of 36 black-and-white photographs (Baron-Cohen et al., 2001). Participants select one of four words that best describes the depicted mental state. Scores reflect the total number of correct responses, with the test demonstrating a Cronbach's α of .4 for reliability.

Risk of Recidivism

We employed the Spanish version of the Spousal Assault Risk Assessment Guide (Kropp et al., 1995; Pueyo et al., 2008). This tool consists of 20 items rated on a scale from 0 (*absence of the risk factor*), 1 (*moderate presence of the risk factor*), to 2 (*high presence of the risk factor*). Trained program facilitators, specializing in this area administered the checklist to assess participants' risk of recidivism. Multiple studies have consistently demonstrated the predictive validity of the test across diverse data sources (Hilton et al., 2008; K. R. Williams & Houghton, 2004), with recent research further highlighting the superior predictive accuracy of its Summary Risk Ratings (Arbach & Folino, 2021). Risk assessment in this study followed a multimodal approach, incorporating information from judicial and probation records, interviews, observations, and questionnaires to categorize recidivism risk into distinct levels. This method adhered to forensic research conventions, focusing on identifying broader risk patterns rather than fine-grained variations in scale ratings. Cronbach's α for the Spousal Assault Risk Assessment in this study was .66.

Data Analysis

Data normality was assessed using the Shapiro–Wilk test ($p < .05$). Chi-squared tests were applied to sociodemographic variables (marital status, education level, income, employment, and nationality), while one-way analyses of variance were used to examine group differences in age, alcohol consumption, impulsivity, inattention, verbal fluency, and emotional decoding. Effect sizes were calculated using Cohen's d for analyses of variance and Cramer's V for chi-squared tests, with thresholds set at .20 (small), .50 (medium), and .80 (large; Cohen, 1988). An analysis of covariance was conducted to control sociodemographic factors, ensuring that key predictors could be isolated from potential confounding variables. In addition, pairwise comparisons were conducted using the Bonferroni correction.

For the second objective, correlations were analyzed to identify the strongest predictors of recidivism risk, providing a foundation for further investigation. A subsequent regression analysis was performed, with recidivism risk as the dependent variable, to assess the influence of TBI and neuropsychological measures. Univariate analysis explored interactions between TBI status and neuropsychological variables, leading to additional separate regression models for the TBI-IPVAW and nTBI-IPVAW groups, aimed at understanding how neuropsychological variables influenced recidivism risk within each group.

All analyses were performed using IBM SPSS Statistics (Version 28.0, Armonk, New York), with $p < .05$ set as the threshold for statistical significance. Results are reported as mean ± standard deviation (*SD*).

Results

Sociodemographic Characteristics of the Participants

There were no significant differences between groups in age, $F(101) = 1.881$, $p = .158$; alcohol use, $F(98) = 0.179$, $p = .836$; level of education, $\chi^2 = 5.470$, $p = .0242$; annual income, $\chi^2 = 7.904$, $p = .638$; nationality, $\chi^2 = 5.673$, $p = .059$; or employment, $\chi^2 = 1.705$, $p = .426$. However, significant differences were found in marital status, $\chi^2 = 16.246$, $p = .012$ (See Table 1).

Differences Between Groups for Neuropsychological Variables

Regarding impulsivity scores, significant differences between the groups were observed for the CPT-III commissions, $F(2, 102) = 7.654$, $p = .001$, $\eta^2 = .130$, and perseverations scores, $F(2, 102) = 4.730$, $p = .011$, $\eta^2 = .085$; see Table 2. Specifically, both the TBI-IPVAW and nTBI-IPVAW groups exhibited a greater number of

Table 1
Means, Standard Deviations, Percentages, and Means Comparisons for Sociodemographic Variables for All Groups

Variable	TBI-IPVAW (n = 26)	nTBI-IPVAW (n = 37)	Control (n = 42)	F/χ^2
Age (*M*, *SD*)	36.30 (11.57)	39.62 (11.28)	34.26 (13.38)	1.881
Alcohol consumption (*M*, *SD*)	4.79 (7.92)	5.67 (8.27)	4.82 (4.32)	0.179
Marital status (%)				16.246*
Married	34.6	21.6	51.2	
Single/divorced/widowed	65.4	78.4	48.8	
Level of education (%)				5.470
No studies	0	0	0	
Primary	34.6	27.0	14.6	
Upper secondary	57.7	51.4	63.4	
University	7.7	21.6	22.0	
Annual income (%)				7.904
<1,800	0	2.7	0	
1,800–3,600	25.0	8.1	17.1	
3,600–12,000	25.0	37.8	26.8	
12,000–36,000	33.3	45.9	46.3	
36,000–120,000	8.3	5.4	7.3	
>120,000	8.3	0	2.4	
Nationality				5.673
Spanish	88.5	78.4	63.4	
Other	11.5	21.6	36.6	
Employment				1.705
Employed	69.2	51.4	48.8	
Unemployed	30.8	48.6	51.2	

Note. TBI = traumatic brain injury; nTBI = nontraumatic brain injury; IPVAW = intimate partner violence.
* $p < .05$.

commission errors compared to the nonoffender group ($p = .002$, $d = 0.950$; $p = .007$, $d = 0.670$, respectively). In addition, both the TBI-IPVAW and nTBI-IPVAW groups demonstrated significantly higher perseveration scores compared to the nonoffender group ($p = .024$, $d = 0.870$; $p = .046$, $d = 0.530$, respectively). No significant differences were found between the TBI-IPVAW and nTBI-IPVAW groups in either the commissions or perseveration scores.

Regarding the CPT-III inattention scores, significant differences between the groups were also observed. Specifically, differences were found in the omissions scores, $F(2, 102) = 10.136$, $p < .001$, $\eta^2 = .165$; detectability, $F(2, 102) = 9.883$, $p < .001$, $\eta^2 = .162$; and hit reaction time, $F(2, 102) = 5.479$, $p = .005$, $\eta^2 = .097$; see Table 2. For omission scores, the TBI-IPVAW group exhibited significantly more omission errors than both the nTBI-IPVAW group ($p = .024$, $d = 0.540$) and the nonoffender group ($p < .001$, $d = 1.120$). In addition, the TBI-IPVAW group reported significantly higher detectability scores compared to the nonoffender group ($p < .001$, $d = 0.91$), as did the nTBI-IPVAW group compared to the nonoffender group

Table 2
Means, Standard Deviations, and Analysis of Variance Statistics for the Neuropsychological Variables for All Groups

	TBI-IPVAW (n = 26)	nTBI-IPVAW (n = 37)	Control (n = 42)			
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*F*	*p*	η^2
CPT-III (impulsivity)						
Perseveration	54.50_a (10.56)	53.21_a (14.80)	47.21_b (5.36)	4.730	.011	.085
Commission	54.84_a (8.85)	53.27_a (11.06)	46.52_b (8.65)	7.654	.001	.130
CPT-III (inattention)						
Omissions	56.38_a (11.69)	53.27_b (11.06)	46.52_b (8.65)	10.136	<.001	.165
Detectability	56.53_a (10.98)	53.43_a (11.23)	46.19_b (8.02)	9.883	<.001	.162
Hit reaction time	56.26_a (7.65)	49.97_b (9.88)	50.57_b (6.22)	5.479	.005	.097
FAS						
Phonetic	26.92_a (8.44)	33.00_b (12.75)	37.28_b (11.62)	6.504	.002	.114
Semantic	15.36_a (3.65)	18.64_b (4.65)	21.57_c (6.30)	11.353	<.001	.183
RMET						
Total score	17.15_a (2.49)	19.22_b (2.75)	22.33_c (3.94)	22.113	<.001	.302

Note. Values with different subscripts differ significantly from each other ($p < .05$) according to the Bonferroni post hoc test. TBI = traumatic brain injury; nTBI = nontraumatic brain injury; IPVAW = intimate partner violence against women; CPT-III = Continuous Performance Test-III; RMET = Reading the Mind in the Eyes Test.

($p = .005$, $d = 0.63$). Concerning Hit Reaction Time scores, the TBI-IPVAW group demonstrated significantly longer reaction times compared to the nTBI-IPVAW group ($p = .008$, $d = 0.71$) and the nonoffender group ($p = .016$, $d = 0.81$). No other differences were found between the groups.

With regard to verbal fluency, significant differences were found among the three groups in both phonetic FAS scores, $F(2, 101) = 6.504$, $p = .002$, $\eta^2 = .114$, and semantic FAS scores, $F(2, 101) = 11.353$, $p < .001$, $\eta^2 = .183$; see Table 2. The TBI-IPVAW group exhibited lower phonetic FAS scores compared to the nTBI-IPVAW ($p = .025$, $d = 2.780$) and the nonoffender group ($p = .001$, $d = 1.020$). In addition, both the TBI-IPVAW and nTBI-IPVAW groups demonstrated lower semantic FAS scores than the nonoffender group ($p < .001$, $d = 1.20$; $p = .043$, $d = 0.52$, respectively).

Las, regarding emotional decoding scores, significant differences were found among the three groups, $F(2, 102) = 22.113$, $p < .001$, $\eta^2 = .302$; see Table 2. Participants in the TBI-IPVAW group performed worse than those in the nTBI-IPVAW group ($p = .043$, $d = 0.78$) and both, TBI-IPVAW and nTBI-IPVAW groups, reported significantly lower Reading the Mind in the Eyes Test scores compared to the nonoffender group ($p < .001$, $d = 1.57$; $p < .001$, $d = 0.91$, respectively).

Predictive Capacity of TBI and Neuropsychological Functions on IPVAW Recidivism

The correlation analysis revealed that the risk of recidivism was positively associated with the presence of TBI ($r = .357$, $p = .004$) and the perseveration score ($r = .272$, $p = .031$). In addition, there were negative associations with phonetic ($r = -.319$, $p = .011$) and semantic ($r = -.370$, $p = .003$) FAS scores. The results show no significant relationship between emotional decoding and the risk of recidivism ($r = -.056$, $p = .661$).

The linear regression model with TBI as a predictor and risk of partner violence as the dependent variable was significant, adj $R^2 = .113$, $F(1, 62) = 8.909$, $p = .004$, $\eta^2 = .127$; see Table 3. The presence of TBI was positively associated with the risk of partner violence ($\beta = .357$, $p = .004$). Univariate analysis was conducted with the risk of imminent partner violence as the dependent variable. Neuropsychological variables were included as fixed factors, while TBI was used as a covariate. The interaction between the neuropsychological variable of perseveration and TBI was significant, $F(9, 53) = 2.197$, $p = .037$, $\eta^2 = .272$, as was the interaction between semantic FAS and TBI, $F(19, 42) = 2.360$, $p = .010$, $\eta^2 = .516$; see Table 3, indicating that the effect of performance in perseveration and semantic FAS on the risk of recidivism varies depending on the absence or presence of TBI. The interaction between phonetic FAS and TBI was not significant. Based on these results, additional regression models were performed for each group based on the presence or absence of TBI.

After conducting additional regression models, in the nTBI-IPVAW group, the model was significant only for semantic FAS, adj $R^2 = .147$, $F(1, 36) = 7.214$, $p = .011$, $\eta^2 = .171$, and this predictor explained 14.7% of the variance in the risk of partner violence. A higher performance in semantic FAS was associated with a lower risk of violence in men convicted of gender violence without a history of TBI ($\beta = -.413$, $p = .011$; see Table 3). On the other hand, in the TBI-IPVAW group, neither perseveration scores nor semantic FAS scores seemed to have a significant influence on the risk of violence. A summary of these regression results is illustrated in Figure 1, which provides a comprehensive visualization of the associations between TBI, neuropsychological variables, and recidivism risk.

Discussion

TBI has been identified as a significant risk factor for violent behavior due to its impact on neuropsychological functioning. However, these have not been thoroughly studied in IPVAW perpetrators. Our findings revealed that IPVAW perpetrators with TBI exhibited greater neuropsychological dysfunction, including inattention, lower verbal fluency, and poorer emotional decoding compared to those without TBI and nonoffenders. Remarkably, the combination of TBI and neuropsychological deficits increases the risk of IPVAW recidivism, with the effects varying depending on the presence of TBI. In our study, these neuropsychological deficits may reflect diminished inhibitory control. This weakened inhibition could fail to regulate aggressive impulses in the face of interpersonal conflict, thereby increasing the likelihood of violence. These observations align with the I-cubed theory's assertion that deficits in inhibition play a critical role in the emergence of violent behavior.

First, our results partially support our initial hypothesis, as both IPVAW perpetrator groups exhibited more commission and perseveration errors on the CPT-III than the nonoffender group. These errors may suggest a tendency toward impulsive responses, characterized by difficulties in distinguishing between target and

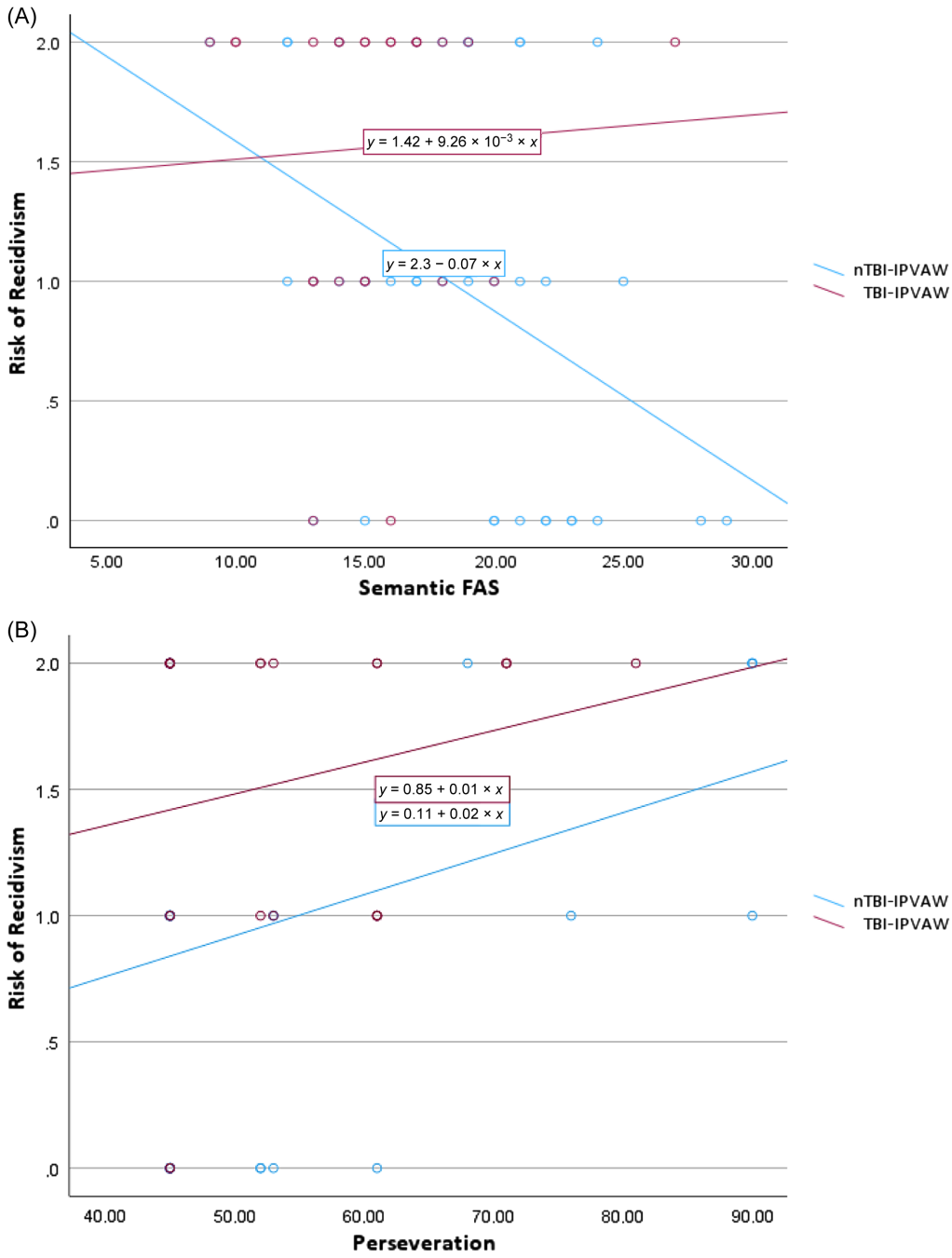
Table 3
Regression Models for Predicting IPVAW Risk and Neuropsychological Interactions

Dependent variable	Independent variable	Adj R^2	$F(df)$	β	p	η²
Risk of recidivism	TBI	.113	8.909(1, 62)	.357	.004	.127
Risk of recidivism	Perseveration × TBI	.148	2.197(9, 53)		.037	.272
	Phonetic FAS × TBI	.251	1.639(32, 29)		.091	.644
	Semantic FAS × TBI	.298	2.360(19, 42)		.010	.516
nTBI subgroup						
Risk of recidivism	Perseveration	.065	3.489(1, 36)	.301	.070	.091
	Semantic FAS	.147	7.214(1, 36)	−.413	.011	.171
TBI subgroup						
Risk of recidivism	Perseveration	.002	1.052(1, 25)	.205	.315	.042
	Semantic FAS	−.041	0.062(1, 24)	.062	.805	.002

Note. IPVAW = intimate partner violence against women; TBI = traumatic brain injury; nTBI = nontraumatic brain injury.

Figure 1

Interaction Effects Between Neuropsychological Variables and TBI in Predicting Recidivism Risk Among IPVAW Perpetrators



Note. (A) Interaction between semantic FAS and TBI in predicting recidivism risk. (B) Interaction between perseveration and TBI in predicting recidivism risk. TBI = traumatic brain injury; nTBI = nontraumatic brain injury; IPVAW = intimate partner violence against women. See the online article for the color version of this figure.

nontarget stimuli or in adapting behavior to changing circumstances. These findings are consistent with previous research, which indicates that IPVAW perpetrators—regardless of the presence of TBI—struggle with inhibition and behavior control (Humenik et al., 2020) and display greater impulsivity (Romero-Martínez et al., 2019). However, contrary to our hypothesis, TBI did not result in greater difficulties with impulsive behavior. This may suggest that persistent impulsive behavior patterns, resulting

from compromised perspective-shifting abilities (Romero-Martínez et al., 2016), can emerge even in the absence of TBI (Meijers et al., 2015). This underscores impulsivity as a characteristic feature of this population (Humbert et al., 2024). Yet, severe TBI is also associated with impulsivity and behavioral dysregulation in nonoffenders, suggesting that TBI may sustain rather than amplify existing impulsive tendencies (Azouvi et al., 2017).

Nonetheless, regarding inattention, the TBI-IPVAW group exhibited more omission errors and longer reaction times than the other groups, indicating difficulties in sustaining attention and processing information quickly. These findings align with research linking attention-deficit/hyperactivity disorder symptoms to a higher risk of IPVAW, regardless of the presence of TBI (Buitelaar, Posthumus, Bijlenga, et al., 2020; Wymbs et al., 2017). On the other hand, it is also well-documented that attentional impairments are frequently reported by TBI survivors without a history of violent behavior, often associated with slowed processing speed rather than purely attentional disorders (Azouvi et al., 2017). This suggests that TBI exacerbates the preexisting deficits. Such deficits may lead to ignoring potentially beneficial choices while failing to avoid unnecessary risks in decision-making situations (Verschure et al., 2014). This preference for disadvantageous decisions could be partially explained by reduced attention and processing speed (Romero-Martínez et al., 2021). In addition, slower processing speed necessitates more time for decision making, which, in conflict situations, could impair the ability to make appropriate and quick decisions under pressure. Both symptoms—impulsivity and inattention—clearly interfere with managing conflicts in intimate relationships (Buitelaar, Posthumus, & Buitelaar, 2020; Romero-Martínez et al., 2019). These cognitive processes directly impact self-regulation, goal-directed behavior, and affect social competence by inhibiting irrelevant information, constantly adapting to environmental demands, exerting top-down control of attention, suppressing rumination processes, and making future-oriented decisions (Goldstein & Naglieri, 2014; Hofmann et al., 2012).

In terms of verbal fluency, both IPVAW groups exhibited deficits in word search and retrieval, indicating problems with lexical access and phonological organization compared to the nonoffender group. A recent meta-analysis by Romero-Martínez et al. (2023b) confirmed significant fluency deficits in IPVAW perpetrators, regardless of TBI presence. Our study expands on these findings, indicating particular semantic fluency problems in TBI-IPVAW perpetrators compared to nTBI-IPVAW and nonoffender groups. Verbal fluency impairments are also commonly reported in individuals with TBI but have no history of violent behavior, where executive dysfunction may lead to conversational deficits, poor word retrieval, and impaired verbal fluency (Avramović et al., 2017; Marsh, 2018). Therefore, the presence of potential TBI seems to exacerbate difficulties in retrieving words based on meanings and conceptual associations, reflecting greater problems in semantic organization (Cermak et al., 2021). This suggests that the verbal fluency problems observed in the TBI-IPVAW group might be exacerbated by the combination of TBI- and IPVAW-related cognitive challenges, highlighting the complex interaction between brain injury and violent behavior. Research has shown that dysfunctions in these fundamental cognitive processes are crucial for problem solving, as they impact the expression of thoughts and the verbalization of intentions and motivations (Humenik et al., 2020; Romero-Martínez et al., 2019).

Last, TBI-IPVAW perpetrators reported lower scores on emotional recognition compared to both nonoffender and nTBI-IPVAW group. Poor emotional recognition is common among aggressors (Salas-Picón & Cáceres Durán, 2017), particularly those who perpetrate violence against women (Nyline et al., 2018), contributing to emotional, and behavioral dysregulation (Treeby et al., 2016). According to our results, the presence of TBI can exacerbate this diminished emotional sensitivity, potentially leading to increased interpersonal problems, such as behavioral disinhibition and violence (Babcock et al., 2008; Cruz et al., 2020). Interestingly, emotional decoding has been observed to be negatively impacted by inattentive symptoms (Romero-Martínez et al., 2016, 2019), another function previously shown to be affected by the presence of TBI. Together, these findings suggest that TBI in IPVAW perpetrators may act as a risk factor, increasing neuropsychological dysfunction and hindering social competence and adaptive behavior (D'Hondt et al., 2014). Moreover, the presence of these deficits in TBI populations without a history of violence (Wearne et al., 2020), who struggle to share and understand emotions, suggests that TBI itself may be a key factor driving these neuropsychological challenges.

In line with our second objective and hypothesis, regression analyses revealed that TBI, along with neuropsychological dysfunctions, robustly explained the risk of recidivism among IPVAW perpetrators. Previous studies on general offenders have linked TBI to a higher likelihood of recidivism (Ray & Richardson, 2017; W. H. Williams et al., 2010). Although the relationship between TBI and violence is complex (Ray & Richardson, 2017), it may potentially be explained by the impact of TBI on neuropsychological functioning (Meijers et al., 2015; Romero-Martínez et al., 2023b). Indeed, general offenders are 3.37 times more likely to have neurocognitive deficits as a result of TBI (Cebulla, 2016). However, IPVAW recidivism has not been widely studied in relation to TBI presence and neuropsychological functioning. Notably, our study reported that the effect of these variables on the risk of violence varies depending on the history of TBI. In individuals without TBI, semantic processing (measured by Semantic FAS) may be a key factor in reducing the risk of violence. In individuals with TBI, these same variables do not appear to be useful predictors of violence risk, possibly due to neuropsychological impairments resulting from TBI that affect broader cognitive abilities (Baxendale et al., 2019). For those without TBI, focusing on verbal and cognitive skills may be beneficial, while for individuals with TBI, other areas such as global neuropsychological rehabilitation or emotional management may be more effective in reducing the risk of recidivism (Cicerone et al., 2008).

Limitations

This study provides novel insights into how TBI affects neuropsychological functioning and emotional decoding abilities, highlighting the importance of these neuropsychological differences based on TBI history to predict the risk of recidivism among IPVAW perpetrators. However, there are several limitations. First, there was no clinical diagnosis of TBI, a semistructured interview similar to the OSU TBI-ID was employed instead. While this is a validated tool for registering a potential history of TBI (Bogner & Corrigan, 2009), it cannot replace a clinical diagnosis. This test was chosen due to the challenges in diagnosing TBI in this population, such as the lack of access to specialized services, variability in

symptoms, and difficulties in obtaining accurate medical information. In addition, although the emotional decoding task is widely validated for assessing social cognition, our study found a relatively low Cronbach's α. However, previous research indicates that such values are common due to its item structure and limited number of items, and they do not necessarily reflect poor reliability. Second, official recidivism data was not included due to the significant challenges in accessing official records. Although the Spousal Assault Risk Assessment is a validated and widely used tool for assessing the risk of recidivism, it does not provide a direct measure of actual recidivism rates. Third, regarding the sample, the absence of a nonoffender group consisting of individuals with TBI but no history of IPVAW, along with the disparity between the groups, may limit the generalizability of the results and should be considered. However, despite this limitation, the findings still offer valuable insights into the relationship between TBI and recidivism. In addition, exclusion criteria focusing on mental or neurological disorders were necessary for methodological rigor. While these criteria facilitated a clearer analysis of TBI's impact, they may have excluded certain offender populations where these conditions are more prevalent. Future research could explore these dynamics to better capture the heterogeneity of IPVAW perpetrators. Fourth, while CPT-III remains a valuable tool in this study, as it provides objective measures of response inhibition and attentional control, which are crucial components of impulsivity, it does not fully capture all dimensions of it, potentially leading to an incomplete understanding of impulsive behavior (Scimeca et al., 2021). Finally, despite the absence of prior criminal records, we cannot fully ensure that there is no history of violence in the nonoffender group. This limitation is inherent to the study of forensic psychology and criminology, where self-reported histories and the availability of comprehensive background information can vary.

Future Directions for Research

Future research should explore the impact of TBI on IPVAW and recidivism through complementary methods like neuroimaging and detailed neuropsychological evaluations to improve diagnostic precision. Longitudinal studies are needed to assess long-term effects and intervention opportunities. Including a TBI control group could isolate its specific effects on recidivism risk, while using official recidivism data would enhance validity. Diverse samples from various regions are also essential to improve the generalizability of findings. Furthermore, the biopsychosocial model highlights the need to consider community support, as social resources can play a key role in rehabilitation and reducing recidivism risk.

Preventive, Clinical, and Policy Implications

This study has important practical implications, highlighting the need for TBI screening in IPVAW perpetrators to enable targeted interventions that address neuropsychological deficits contributing to violent behavior. Effective intervention programs, aligned with the risk–need–responsivity (Bonta & Andrews, 2007) model, along with specialized rehabilitation focused on cognitive and emotional regulation skills, could reduce the risk of recidivism among IPVAW perpetrators with TBI (de Geus et al., 2021). This research underscores the importance of comprehensive TBI evaluations within criminal justice settings to inform policy and legal frameworks. Mandating TBI assessments and providing appropriate rehabilitation services for offenders can improve outcomes and reduce recidivism. Advanced risk and need assessment tools (Taxman & Smith, 2021) offer innovative approaches to identifying tailored treatment programs based on individualized profiles, incorporating actuarial assessments of reoffending risk and criminogenic needs.

In conclusion, IPVAW perpetrators with TBI exhibit more pronounced neuropsychological deficits and a higher risk of recidivism compared to those without TBI and nonoffenders. The presence of TBI, along with increased impulsivity and reduced semantic fluency, is significantly associated with a higher risk of recidivism. This study underscores the importance of screening for TBI in IPVAW perpetrators, enabling targeted interventions that address neuropsychological deficits. Hence, tailored intervention programs focusing on cognitive and emotional regulation skills could have the potential to reduce recidivism risk among IPVAW perpetrators with TBI.

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