Exploring the relationship between mental health and neuropsychological functioning in female survivors of IPV

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Abstract

Intimate Partner Violence (IPV) refers to a series of physical, psychological, and/or sexual abuses exercised over another individual during an intimate relationship. Several mental health difficulties have been reported related to IPV, and recently neuropsychological alterations have been also described in this population. This study has three aims: first, to explore the existence of mental health-based groups in women with and without a history of IPV; second, to establish whether belonging to the IPV group is related to having a poorer mental health and finally, to establish if women with mental health has a lower neuropsychological functioning. Fourteen female survivors of physical and psychological IPV, and 14 matched control women (CG) were assessed for their mental health and neuropsychological functions. A mental health protocol was used to evaluate the variables of anxiety, depression, and perception of stress. In addition, a protocol of neuropsychological tests evaluated alternating attention, long-term memory, abstract thinking, learning, and interference control. Results showed that (1) participants were grouped into two clusters: better mental health and poorer mental health. The main grouping variable was anxiety. (2) Women with a history of IPV had poorer mental health, and (3) women with poorer mental health had lower attentional ability, long-term memory, abstract thinking and working memory. These findings show the importance of assessing anxiety, which is one of the predictors of mental health problems in victims of IPV. Furthermore, it is important to protocolize a form of assessment including neuropsychological variables.

Key Words: Intimate Partner Violence; women’s mental health; women’s neuropsychological profile; Psychological Violence; Physical Violence.

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الصحة النفسية وعلاقتها بالأداء النيروسيكولوجي لدى الناجيات من عنف الشريك الحميم

الملخص

يشير مصطلح عنف الشريك الحميم إلى مجموعة من الانتهاكات الجسدية والنفسية أو الجنسية التي يمارسها أحد الشريكين على الآخر في ظل وجود علاقة حميمة بينهما. وقد أشارت العديد من الدراسات إلى ظهور مجموعة من المشاكل النفسية نتيجة للتعرض لعنف الشريك، إضافة إلى وصفها بعض العيوب النيروسيكولوجية لدى من تعرض لهذا النوع من العنف. تهدف الدراسة الحالية إلى أولًا، معرفة الفروق في الصحة النفسية بين النساء اللاتي لديهن تاريخ من العنف القائم على النوع الاجتماعي والنساء اللاتي ليس لديهن تاريخ من هذا النوع؛ ثانياً، تحديد ما إذا كان تعرض النساء لعنف الشريك مرتبطة بالحصول على درجة منخفضة في مقياس الصحة النفسية وأخيراً، دراسة ما إذا كان هناك علاقة بين الحصول على درجة منخفضة في مقياس الصحة النفسية وضعف الأداء النيروسيكولوجي.

تم تقييم الصحة النفسية والأداء النيروسيكولوجي لأربعة عشر امرأة ناجية من عنف الشريك الحميم (الجسدي والنفسي)، وكذلك تقييم 14 امرأة أخرى بعد ضبط المتغيرات الديموغرافية (مجموعة ضابطة). تم استخدام مجموعة من المقاييس النفسية لقياس متغيرات القلق والاكتئاب والتوتر. بالإضافة إلى ذلك، تم تطبيق مجموعة من الاختبارات النيروسيكولوجية (النفسي العصبي) لقياس تناوب الانتباه، والذاكرة طويلة المدى، والتفكير المجري، والتعلم، والقدرة على مقاومة التشتيت.

أظهرت النتائج (1) وجود مجموعتين: مجموعة ذات صحة نفسية عالية وأخرى ذات صحة نفسية منخفضة. وقد كان متغير القلق المثير الرئيسي في عملية التصنيف. (2) وحصلت النساء اللاتي لديهن تاريخ من عنف الشريك الحميم على درجة أقل في مقياس الصحة النفسية. (3) النساء الحاصلات على درجة منخفضة في مقياس الصحة النفسية كان لديهن قدرة أقل على الانتباه والذاكرة طويلة المدى والتفكير المجري والذاكرة العاملة. تظهر هذه النتائج أهمية تقييم القلق، وهو أحد مؤشرات مشاكل الصحة النفسية لدى ضحايا عنف الشريك الحميم. إضافة إلى ذلك، تؤكد هذه الدراسة أهمية العمل على تصميم بروتوكول خاص لتقديم ضحايا العنف لمشكلات الأداء النيروسيكولوجي.

الكلمات المفتاحية: عنف الشريك الحميم، الصحة النفسية للنساء، البروفايبل النيروسيكولوجي للنساء، العنف النفس، العنف الجسدي.

لا تعبير الافتراض الأولاد في المخطوطة عن أي افكار هيئة تحرير المجلة أو عمادة البحث العلمي في جامعة بيت لحم. يعتبر المؤلف المسؤول الوحيد عن مضمون المخطوطة أو أي أخطاء فيها.
Introduction

Intimate Partner Violence (IPV) refers to a series of physical, psychological, and/or sexual abuses exercised over another individual during an intimate relationship (Muñoz and Echeburúa, 2016). IPV is considered a public health problem as well as a violation of human rights. The World Health Organization (WHO) has established that this phenomenon constitutes great social and economic costs with important repercussions throughout society (WHO, 2014).

According to the UN Women Report (WHO, 2014), 30% of women who have maintained an intimate relationship have experienced physical and or sexual violence by their partner. In some countries, such as Afghanistan, this number can reach up to 38%. In Guatemala, 21.2% of all the women in the country have experienced IPV. The Report of the National Information System on Violence against Women in Guatemala shows that 39.2% of 12,570 women raped by men and who reported to the Office of Attention to the Victim (OAV) of the National Civil Police of Guatemala in 2016 were cases of psychological violence. On the other hand, 3.6% were cases of physical violence and 31.6% were cases of combined violence.

In recent years, this phenomenon has been investigated by experts from a variety of fields (IMES, 2012). Studies of the consequences of IPV on the survivors’ physical and mental health shown that IPV is commonly associated with several kinds of injuries such as fractures, burns, bruises, strangulations, and even traumatic brain injuries (Fernández, 2004; WHO, 2014). All of these physical assaults could have permanent consequences or death. Sexual assault can cause sexually transmitted diseases, urinary tract infections, pelvic pain, unwanted pregnancies, spontaneous abortions, and perinatal mortality. Long-conserved stress by the violent environment can also generate physical illnesses such as digestive disorders, cardiac affectations, among others (Fernández, 2004).

Regarding mental health consequences, it is known that IPV can generate high levels of stress, anxiety (Pico-Alfonso, et al., 2006), alcohol or drug consumption (la Flair, et al., 2012) and psychiatric disorders, such as post-traumatic stress disorder (PTSD), depressive disorders, and may even lead to suicide.

Research has also shown that human beings have different ways of dealing with the traumatic events that occur in their lives as the impact of a certain traumatic experience may vary from one individual to another. Factors such as the context in which a person operates, support networks, individual characteristics, can influence the way a victim endures a traumatic event (Billoux et al., 2016).

In addition, recent studies have begun to investigate the neuropsychological consequences of IPV in women survivors, and whether these consequences are related to mental health or not (Chung et al., 2014; Stein et al., 2002). Research results show that more severe PTSD and depression are related to lower neuropsychological functioning (Zapata, De la Rosa, Barrios & Rojas, 2016; Kwako et al., 2011; Seedat et al., 2005; Twamley et al.,
2009). However, this link cannot be fully addressed as most of the literature has focused on men with war trauma (Vasterling et al., 2006), or sports-related injuries (Manley et al., 2017). Finally, most of the research has focused on the United States and Spain, and less is known about the consequences of IPV in other parts of the world such as Latin American contexts (Daugherty et al., 2019; Ruiz, 2015; Stein et al., 2002; Torices et al., 2016; Valera & Berenbaum, 2003).

Therefore, this study aimed (1) to explore the existence of groups of Guatemalan women in the sample, based on mental health, (2) to establish whether the IPV group have poorer mental health than the control group and (3) to establish whether the group with better mental health have better neuropsychological functioning.

**Materials and Participants**

The sample included 28 women divided into two equal groups: 14 female survivors of physical and psychological IPV, and 14 matched control women (CG) with no history of IPV. Considering the population characteristics we did not perform the sample size calculation; we simply used convenient sampling. Women who had neurological or psychiatric difficulties before the experience of abuse were excluded. All groups were similar in age and marital status, but there were differences in the educational level (See Table 1).

**Table 1**

*Sociodemographic characteristics of the sample*

|                        | IPV Group | Control Group | Contrast |
|------------------------|-----------|---------------|----------|
| Age                    | (n=14)    | (n=14)        | p        |
| (SD)                   | 30.52 (10.26) | 28.11 (12.96) | 0.919    |
| Educational level      | (%)       | (%)           | 0.024    |
| Primary school         | 28.5      | 14.28         |          |
| Middle school          | 21.42     | 21.42         |          |
| High school            | 35.71     | 42.85         |          |
| College                | 14.28     | 21.42         |          |
| Marital Status   | (%) | (%) | .072 |
|------------------|-----|-----|------|
| Single           | 21.42 | 42.85 |      |
| Married          | 50   | 14.28 |      |
| With Partner     | 28.57 | 35.71 |      |

*Note.* IPV: Intimate partner violence.

**Instruments**

1. **Semi-structured interviews for victims of domestic abuse** (Echeburúa, Corral, Sarasua, Zubizarreta, & Sauca, 1999). This interview assesses the sociodemographic characteristics of the victims, their history of victimization and psychopathological disorders, as well as the circumstances and types of domestic abuse. It also provides a classification for the type of abuse suffered and the characteristics of the violence experienced.

2. **Non-Verbal Intelligence Test (TONI-2)** (Brown, Sherbenou, & Johnsen, 1990). This test measures intelligence free from the influence of language, motor ability, and education level (Brown et al., 1990). It can be administrated to people from 5 to 85 years old and takes between 15 to 20 minutes to complete. It comprises two parts and each part consists of 55 items sorted according to the level of difficulty. The subject is presented with drawings with an incomplete part and a series of response alternatives and is asked to select the alternative that completes each drawing.

3. **BELIEVE Battery (Daugherty et al., 2022)**. This is a free computerized battery specifically created for IPV victims to assess their cognitive functioning and mental health ([www.projectbelieve.info](http://www.projectbelieve.info)). The BELIEVE battery uses neuropsychological tests which are based on those developed in the EMBRACED Project (Ibáñez et al., 2017) to assess different cognitive domains (such as memory, attention, executive functions, language, and orientation). The battery also includes measures for psychopathology and mental health (i.e. PTSD, depression, perceived stress). For the purpose of this study, we used the following cognitive tests:

**Digits Forward and Backward Subtests:** This test measures working memory by assessing the ability to follow a series of numbers. It is divided into two tasks: in the first part, called forward digits, participants listen to a series of digits in one-second intervals and then they must repeat the series in the same order. The second part, called backward digits, works the same way, but instead of repeating the series in order, participants must say them from back to front. In this study, only the backward digit task was used. The total score for the working memory index was obtained (Heinly, Greve, Bianchini, Love, & Brennan, 2005).
**Victoria Stroop Test:** This test assesses interference control and is divided into four sections. In the first section, participants are asked to read the words that are presented to them on the screen, as quickly as possible. In the second task, participants must read the words that are presented, regardless of the color in which they are written. In the third task, participants are presented with circles of different colors and are asked to name the color of the circles as fast as they can. In the final task, participants are required to name the color in which the word is written, instead of reading it. The original version of this test has normative data for Guatemala (Rivera et al., 2015). The time spent on the last task was used as an interference control index.

**Trail Making Test B:** This test is used to assess attention, processing speed, and cognitive flexibility. It is divided into two parts, both consisting of 25 circles presented on a white surface. In part B, the circles include both numbers and letters, and participants must draw lines connecting the circles but must alternate between letters and numbers this time, for example (1-A-2-B), until completing the task with the letter L. This test has normative data for Guatemala (Arango et al., 2015). In this study, only part B was used and the time spent was used as an index of attentional alternation (Sánchez-Cubillo et al., 2009).

**Wordlist:** This test is used to assess long-term memory and learning ability. In this test, participants are asked to remember as many words as possible from a list presented to them. The participants listen to the word list five times, and after each trial, they are asked to repeat as many words as they can remember. After listening to the list five times, an interference list is presented, in which all the words have been modified. Finally, after a 20-minute pause; and, without looking at the first-word list, the subject is asked to repeat all the words they can remember. The score is obtained by the sum of the first five trials. This score was used as a learning index, and the score of the last word list after the 20-minute break was used as a long-term memory index.

**Matrix test:** This task was used to assess abstract thinking. It consists of 60 incomplete and abstract figures that are gradually shown to participants, with increasing difficulty. The participant’s task is to select from a group of six options the figure that best completes the pattern presented. Total hits was used as the final score, and this score was used as an abstract thinking index.

Regarding questionnaires and assessments for mental health and psychopathology, we selected the following scales from the BELIEVE Battery:

**Perceived Stress Scale-10** (PSS-10; Cohen, Kamarck, & Mermelstein, 1983). For this study, we used the Spanish version of the PSS-10. This scale assesses the perception of stress during the past month. Each statement is scored on a scale of 0 to 4, with 0 being never and 4 very often. Scores range from 0 to 40. Higher scores indicate higher levels of stress. This scale has been used in numerous clinical and epidemiological investigations (Campo-Arias, Oviedo, & Herazo, 2015; Mira et al., 2012), and has several translated versions. The internal consistency of the PSS-10 has been estimated to range from $\alpha = 0.74$ to $\alpha = 0.91$. 
PTSD Checklist from DSM-V (Weathers, Litz, Keane, Palmieri, Marx & Schnurr 2013). This scale assesses the frequency and intensity of PTSD symptoms, based on the DSM-V diagnostic criteria. This scale uses a Likert-type format ranging from 0 to 3, depending on the frequency and intensity of the symptoms. It includes 17 items, which assess symptoms of re-experimentation (5), avoidance (7), and hyperactivation (5). Higher scores indicate a higher frequency and intensity of symptoms. The diagnostic efficacy of the scale is 95.45%, with an overall cut-off point of 15 and partial cut-off points of 5, 6, and 4 on the re-experimentation, avoidance, and hyperactivation subscales, respectively. Likewise, the scale has a Cronbach’s alpha level of 0.70 (Sveen, Bondjers, & Willebrand, 2016).

Generalized Anxiety Disorder (GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006). This self-administered questionnaire assesses the presence of generalized anxiety disorder symptoms based on the DSM-5 criteria. It consists of seven items that evaluate the frequency of anxiety symptoms, using a Likert-type scale that goes from never (0) to almost every day (3), for a total range from 0 to 21. The total score classifies the evaluated items into four levels: Minimum (0–4), Mild (5–9), Moderate (10–14) and Severe (14–21) (Kroenke, Spitzer, Williams, Monahan, & Lowe, 2009).

Patient Health Questionnaire (PHQ-9; Kroenke & Spitzer, 2002). The PHQ-9 assesses depression symptoms based on the DSM-V criteria (Maroufizadeh, Omani-Samani, Almasi-Hashiani, Amini, & Sepidarkish, 2019). The PHQ-9 has demonstrated a sensitivity of 92% and a specificity of 89% in the detection of depressive patients, which is higher than the Hamilton-D scale. It also has construct validity and concurrent predictive validity with the ICD-10 criteria for depression and a consistency level of α = 0.80 (Kroenke et al., 2009).

Procedure

Participants were recruited through the Center of Victim Services at the National Hospital of Coatepeque in Guatemala. The control group was intentionally selected from the community of Coatepeque in order to achieve a sociodemographic equivalence with the IPV group in terms of age, socioeconomic status and educational level. Participants who were interested and who met the eligibility criteria read and signed the informed consent form. Subsequently, we administered the EMBRACED computerized test using an iPad Pro device in the presence of a trained research assistant. All participants also took part in the semi-structured interview on domestic abuse (Echeburúa et al., 1999). The project was approved by the Universidad del Valle de Guatemala Ethics Committee under act number 39. All data were codified, to protect personal details and guarantee confidentiality.

Statistical Analyses

To explore the existence of two groups based on mental health (better or lower mental health), cluster analyses were carried out using the following grouping variables: anxiety, depression, post-traumatic stress, and perceived stress. For the cluster analysis, the Log-likelihood criterion of Bayesian Schwartz clustering and distance measure was
applied. To establish if the IPV group had poorer mental health than control group, a Chi-square analysis was performed.

Finally, considering the influence of educational level on cognitive performance (Ostrosky-Solís, Ardila, & Rosselli, 1999), and given the differences within this variable across the mental health-based groups, we conducted a U Mann Whitney test between groups to see the differences in IQ. No differences were found ($U = 150, p = .015$). Due to the small sample size, we performed a U-Mann Whitney test to compare neuropsychological functioning between poorer and better mental health groups.

**Results**

**Clusters Size and Clusters distribution**

A cluster analysis was carried out to find groups according to the assessed mental health variables: anxiety, depression, post-traumatic stress, and perceived stress. The participants were grouped into two clusters: better mental health ($n = 15$) and poorer mental health ($n = 13$).

Most of the women in the CG were classified as having better mental health. On the other hand, most women in the IPV group were classified as having poorer mental health. Nevertheless, as can be seen in Figure 1, two women in the CG were more similar in their mental health to the IPV group; and one woman in the IPV group was more similar in her mental health to the CG group as well. Finally, belonging to the IPV group was related to having a poorer mental health ($X^2 = 17.374 \text{ df}=1, p < .001$).

Figure 1. *Clusters distribution*

*Note. MH: Mental Health. IPV: Intimate partner violence*
**Relationship between mental health and neuropsychological functioning**

Finally, we compared neuropsychological functioning between the poorer and better mental health groups. Results showed that people in the poorer mental health group had a lower performance in attentional alternation, long-term memory, abstract thinking, and working memory (Table 2).

### Table 2. Relationship between mental health and neuropsychological functioning.

| Neuropsychological functions | n  | \(\bar{x}\) | SD  | U   | \(\eta^2\) | p   |
|------------------------------|----|-------------|-----|-----|------------|-----|
| Attentional Alternation      |    |             |     |     |            |     |
| WMH                          | 13 | 95.24       | 35.11 | 40  | 11.54      | .007|
| BMH                          | 15 | 65.12       | 34.01 |   |            |     |
| Long Term Memory             |    |             |     |     |            |     |
| WMH                          | 13 | 6.62        | 2.2  | 1.66| 0.696      | .001|
| BMH                          | 15 | 8.47        | 2.2  |   |            |     |
| Abstract Thinking            |    |             |     |     |            |     |
| WMH                          | 13 | 30.85       | 9.5  | 166 | 20.85      | .001|
| BMH                          | 15 | 42.67       | 5.3  |   |            |     |
| Learning                     |    |             |     |     |            |     |
| WMH                          | 13 | 8.77        | 3.2  | 150 | 17.02      | .015|
| BMH                          | 15 | 10.93       | 2.3  |   |            |     |
| Working Memory               |    |             |     |     |            |     |
| WMH                          | 13 | 1.77        | 1.09 | 147 | 16.35      | .022|
| BMH                          | 15 | 3.07        | 1.5  |   |            |     |
| Interference Control         |    |             |     |     |            |     |
| WMH                          | 13 | 31.89       | 9.43 | 89  | 59.89      | .717|
| BMH                          | 15 | 31.96       | 12.45|   |            |     |

*Note. Effect sizes: Small <.039; Medium <.110; Large >.140 (Lenhard & Lenhard, 2016)*
This study aimed (1) to explore the existence of groups of Guatemalan women in the sample, based on mental health, (2) to establish whether the IPV group demonstrated poorer mental health than control group, and (3) to establish whether the group with better mental health performed with better neuropsychological functioning. Results suggest that there are two groups of women: poorer and better mental health, with anxiety being the main grouping variable. Women who had a history of IPV had poorer mental health. Furthermore, having poorer mental health was related to having poorer attentional alternation, long-term memory, abstract thinking, and working memory.

These results are similar to different previous studies which have evaluated the relationship between IPV and mental health. For example, various studies conclude that IPV leads not only to physical problems but also to psychological ones (Pico-Alfonso et al., 2006; Godoy-Ruiz et al., 2015; Rincón, Labrador, Arinero & Crespo, 2004).

We also found anxiety to be the main grouping variable. These results confirm the importance of including this variable as a predictor of IPV when victims are being assessed. Traditionally, studies have generally focused on Post Traumatic Stress Disorder (PTSD) as the only predictor of other types of violence similar to IPV such as sexual violence (Martinez & Quiroz Molinares, 2020).

Several studies relate these difficulties to different causes. First, some suggest that these impairments may be related to PTSD and anxiety presented by women who have been victims of IPV (Hidalgo-Ruzzante et al., 2012; Stein et al., 2002). Second, other studies suggest that the decline in cognitive performance and mental health may be related to injuries to the head (traumatic brain injury, TBI) presented in most of the women who suffer from physical IPV (Quiroz Molinares et al., 2019; Valera & Berenbaum, 2003).

Finally, some studies have linked high levels of cortisol to impaired neuropsychological functioning, especially memory and attention (Hidalgo et al., 2012b). High levels of cortisol have been linked to women who are victims of IPV due to their history of intimate partner violence (Zapata et al., 2016). However, it is still not clear which of the three mechanisms (PTSD and anxiety, TBI, or cortisol level) is a better predictor of neuropsychological dysfunction or if is the interrelation of all three at the same time.

Despite the important results that the present study has found, the most important limitations should be addressed. Due to the small sample size and sampling biases, the results may not be generalizable to all female IPV survivors. We recommend that future studies should include a larger sample using better sampling methods. Furthermore, although the Believe battery has been specifically designed to assess neuropsychological and mental health outcomes among female victims and survivors, this instrument does not have normative data for the Guatemalan population. Future research should use tests with normative data from this population. Finally, mental health and neuropsychological functioning can be assessed more clearly on a continuum, as there are no clean and concrete “profiles” of female victims of IPV.

In addition, because a long-term follow-up of mental health and neuropsychological
performance was not carried out. It was not possible to determine if these outcomes remained stable or evolved over time. It is suggested that future studies should evaluate the long term effects of IPV on mental health and neuropsychological functions.

Despite these limitations, our results have important theoretical, clinical, and social implications. From a theoretical point of view, the present study constitutes one of the few investigations that highlight the importance of conducting cluster analysis to reflect the fact that not all IPV survivors have the same needs and to contribute to the growing body of literature, related to alterations.

In clinical contexts, our results point to the need for identifying mental health concerns and neuropsychological alterations, to design better assessment and intervention protocols for this population. Finally, from a social point of view, this is one of the first studies on the Guatemalan population, and the results could help raise awareness among this population and even governments to develop better protection and intervention programs for women victims of IPV.
Conclusions

Participants were grouped into two clusters: better and poorer mental health, with anxiety being the main grouping variable. Belonging to the IPV group was related to having poorer mental health. Finally, having poorer mental health was related to having poorer attentional alternation, long-term memory, abstract thinking, and working memory.
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